

# HF PWG Weekly Meeting

High Pt NPE analysis on P+P Run2012  
@200Gev

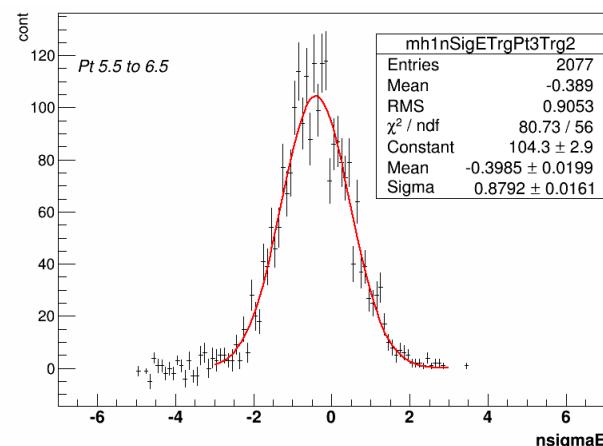
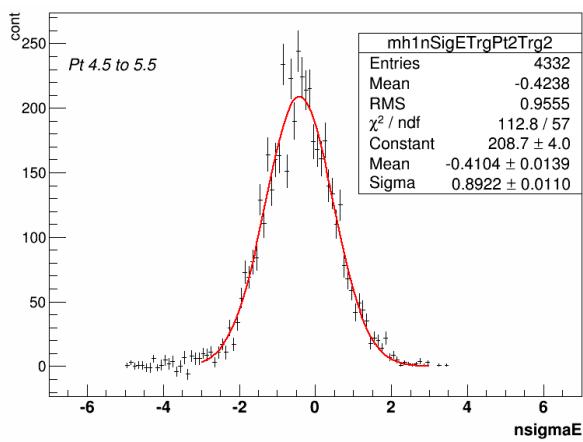
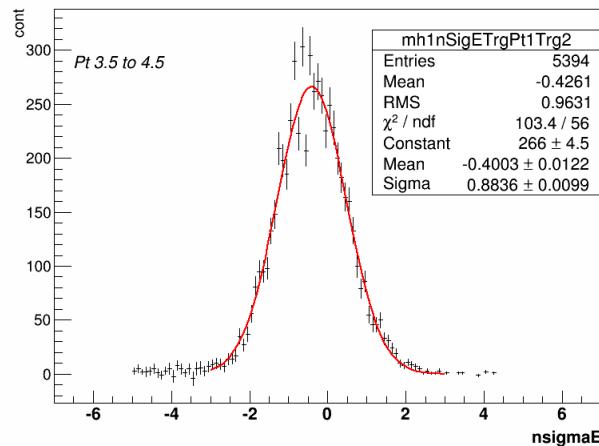
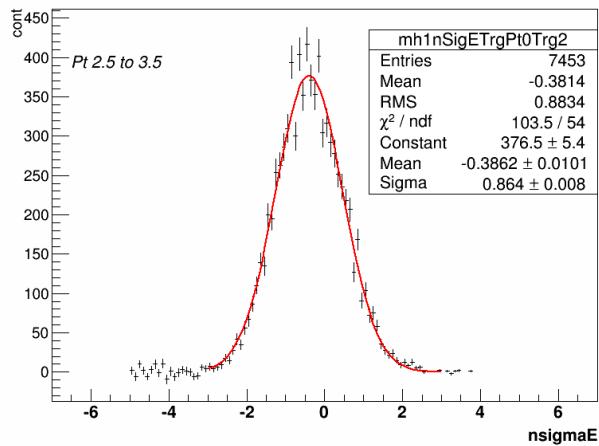
*Xiaozhi Bai Mustafa Zhenyu Ye*

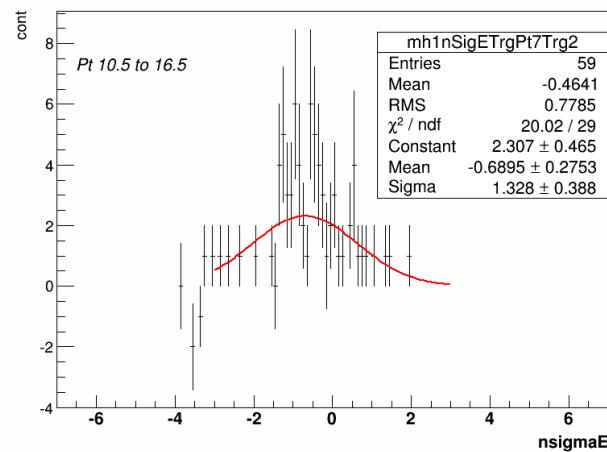
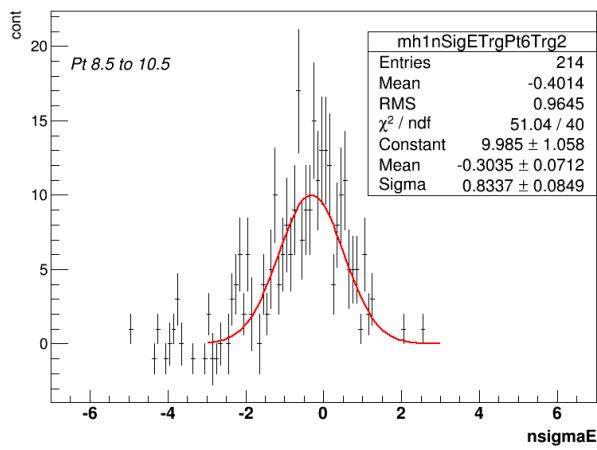
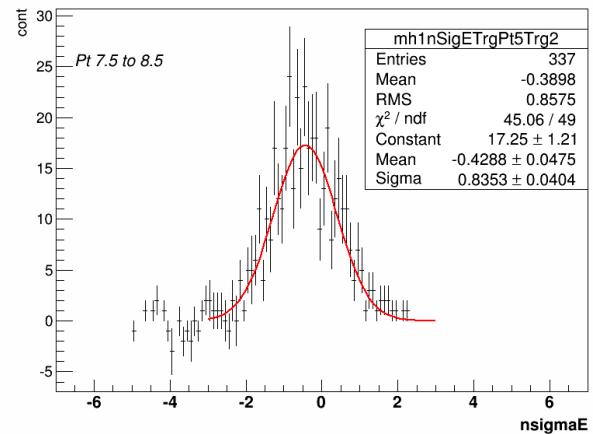
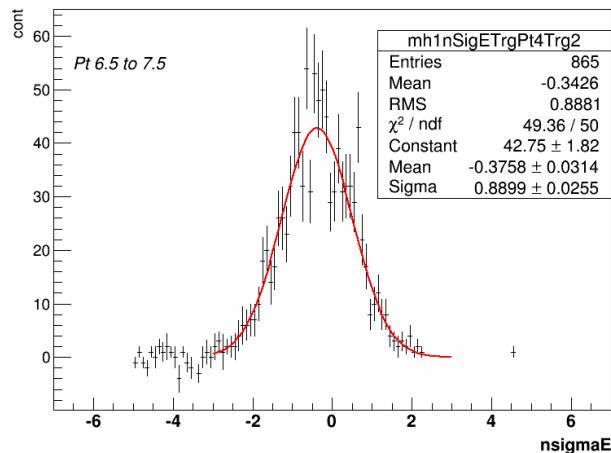
2/27/2014

# Outline

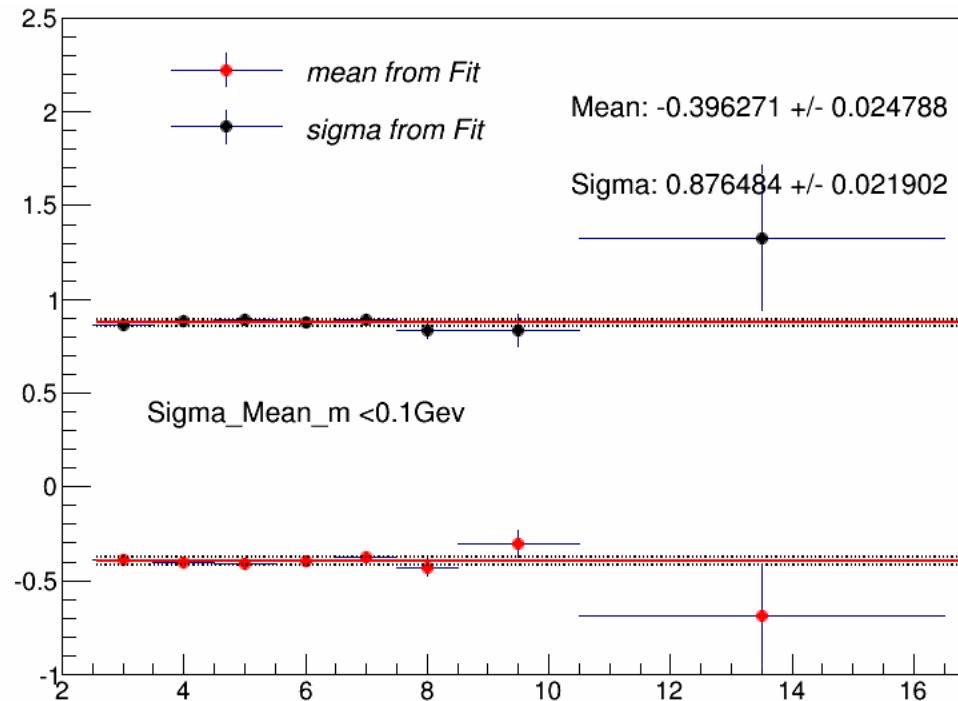
- Extrapolation the high pt mean and sigma use pol0 Fit
- Why the purity Run12 higher than Run08?

# Gauss Fit nsigmaE in global Pt Bin by Bin (InvMass cut m<0.1Gev)





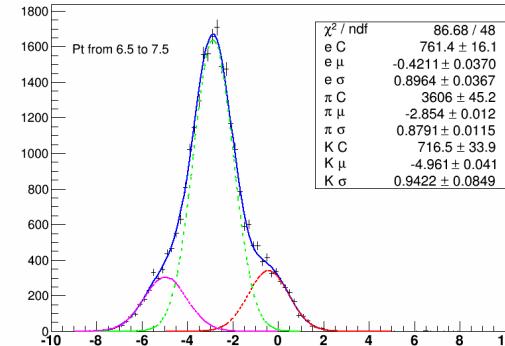
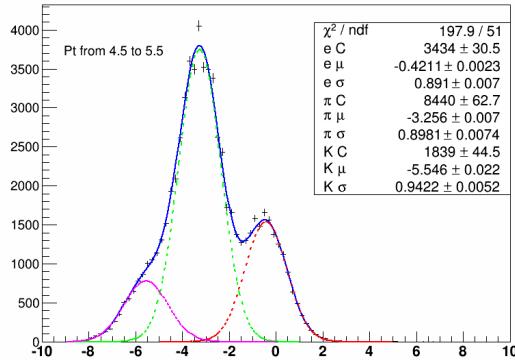
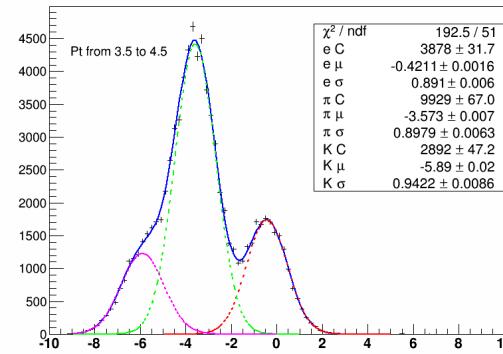
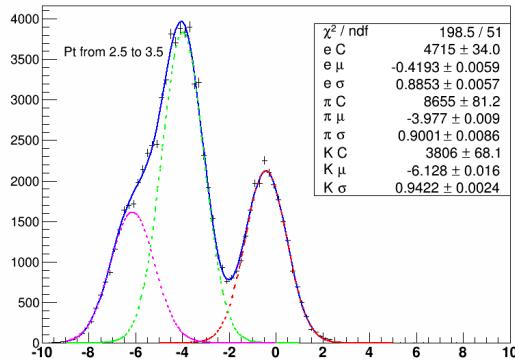
# nsigmaE mean and sigma Pol0 Fit (Fit range 2.5-8.5)



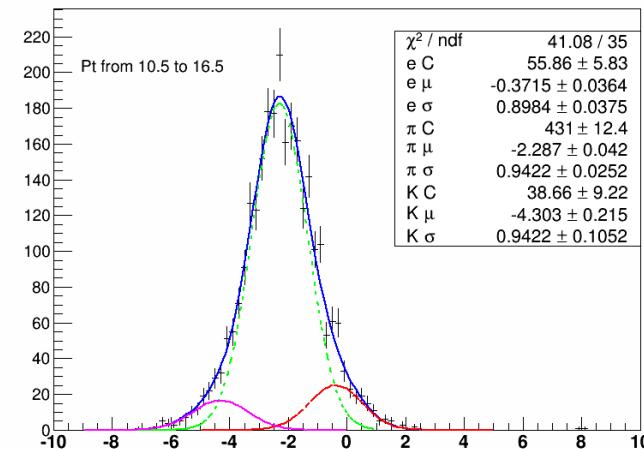
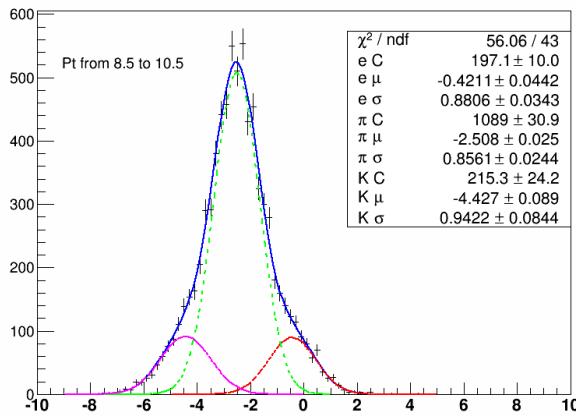
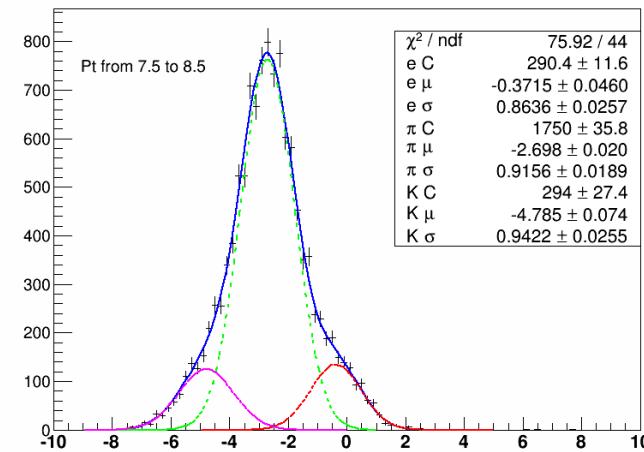
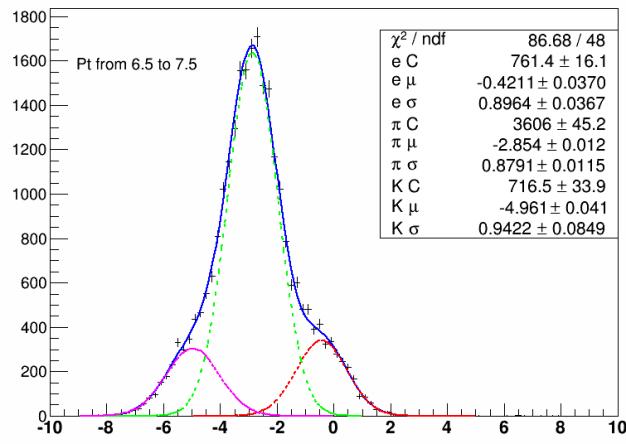
# Three Gauss Fit Inclusive electron purity

## nsigmaE mean and sigma with pol0 Fit

Constrain the electron with one sigma standard deviation  
Three sigma standard deviation for Pion and Kaon+proton

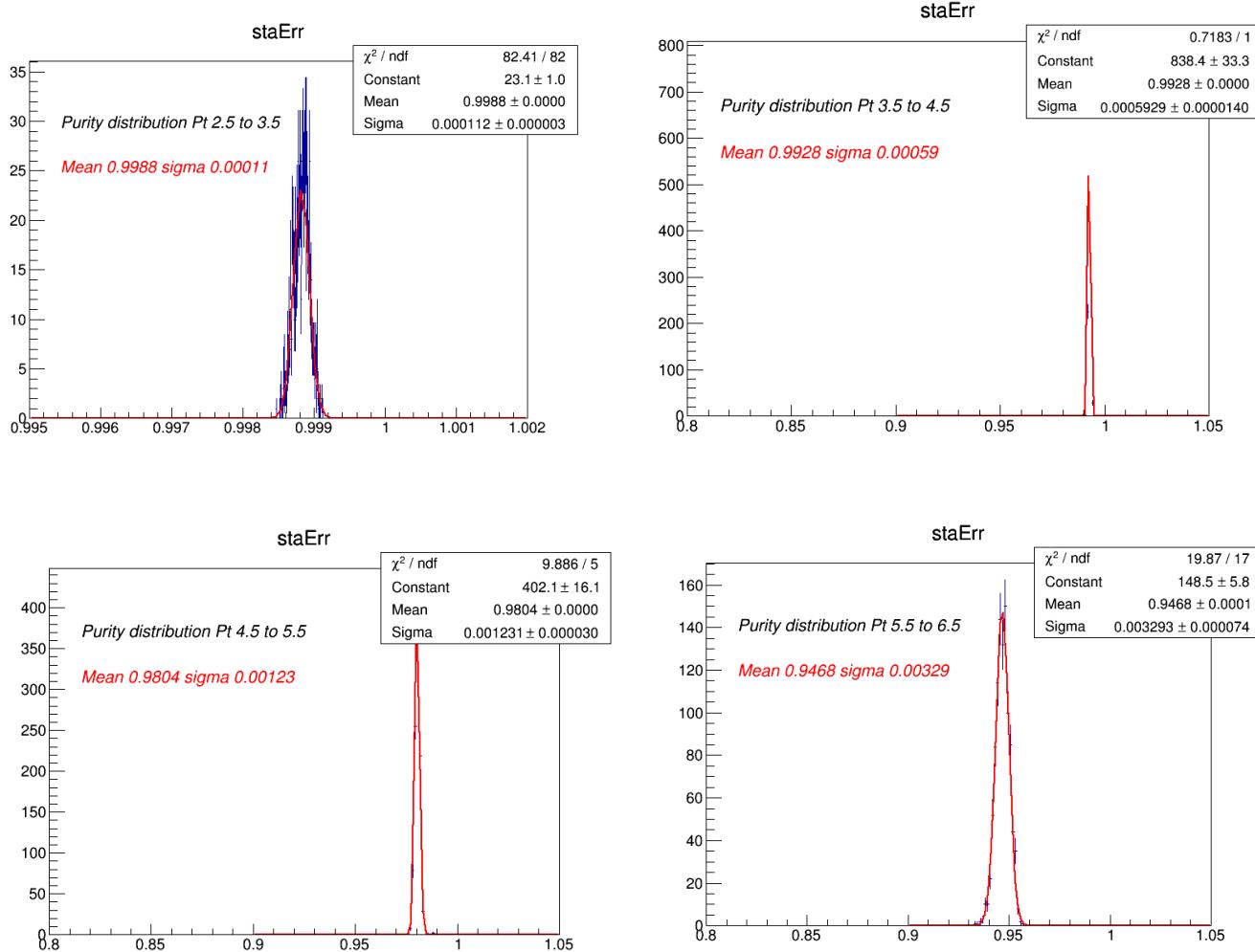


# Constrain the electron with one standard deviation Three standard deviation for Pion and Kaon+proton



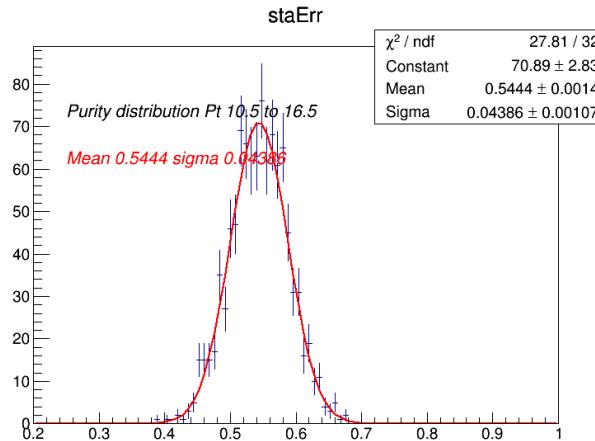
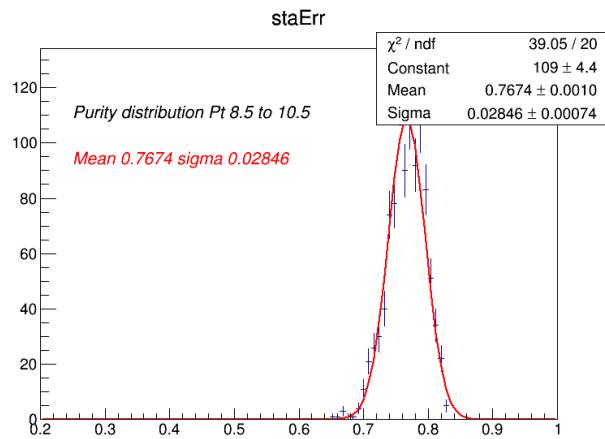
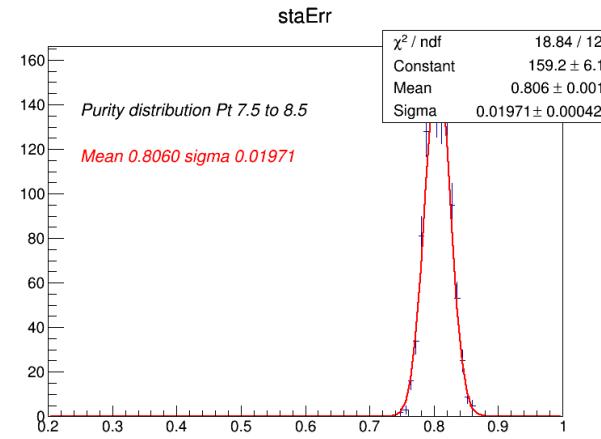
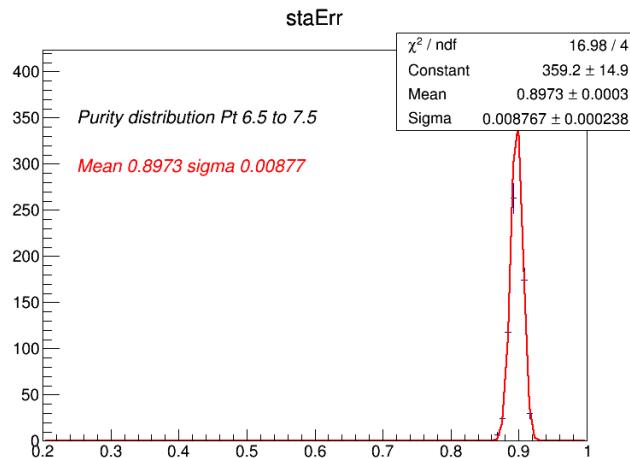
# Purity statistic uncertainty

## Pt(2.5-6.5)

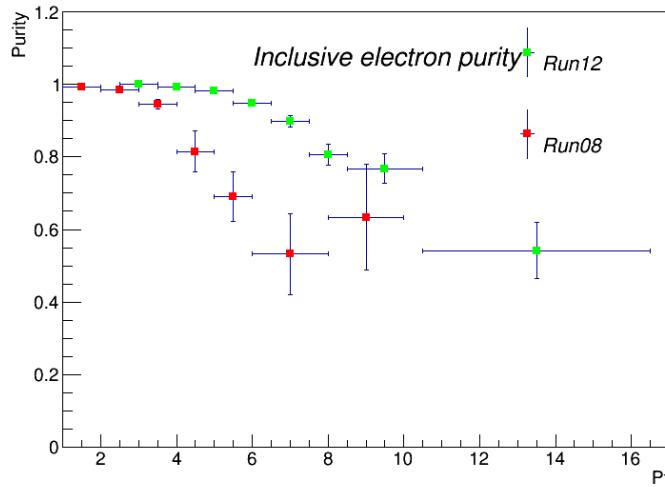


# Purity statistic uncertainty

## Pt(6.5-16.5)



# Purity of inclusive electron (electron mean and sigma from pol0 Fit )

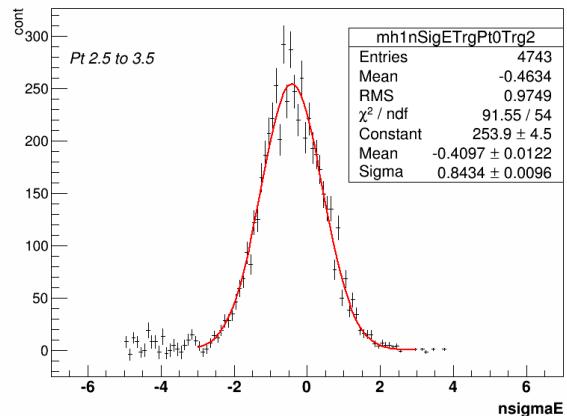


- Systematic uncertainty: Fit the purity with 1/2/3 standard deviation, then get the maximum deviation from these three constrain Fit
- Statistics uncertainty : Randomly shift the data point up and down 1000 times follow the Gauss function, then make the Gauss Fit . Get the mean as the purity central value, the sigma as the statistics uncertainty.

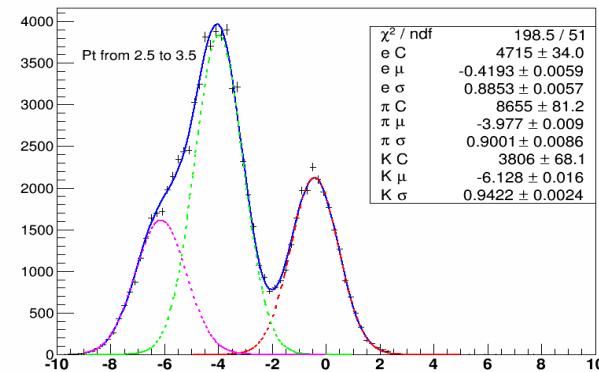
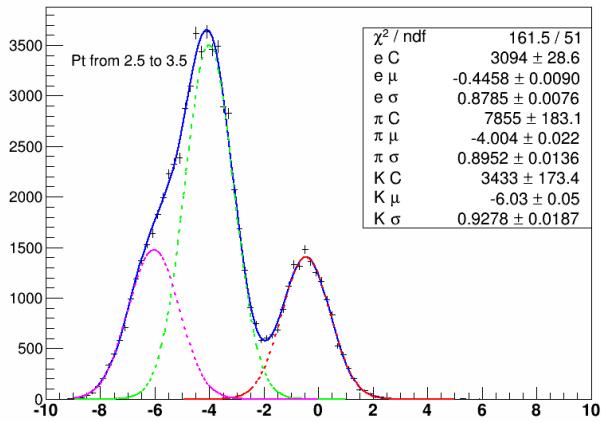
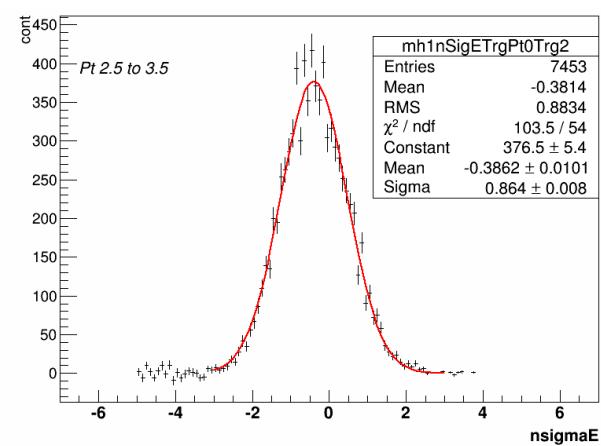
# Compare the Run12 ePID Cuts and Run08

	Run08	Run12	Run12->Run08
triggerDSM ADC	HT0 && DSMadc<16 HT1 && DSMadc>=16 && DSMadc<19 TH2&&19<=DSMadc	TH0 && DSMadc<=15&& DSMadc>11 TH2 &&18<DSMadc	TH0 && DSMadc<16 HT2 &&DSMadc>=19
Track quality cut	nFit>20 nFit/nMax >0.52 gDCA<1.5	nFit>20 nFit/nMax >0.52 nHitsDedx >15 gDCA<1.5	<b>nFit&gt;20</b> <b>nFit/nMax &gt;0.52</b> <b>gDCA&lt;1.5</b>
first TPC point	<70	<73	<b>&lt;70</b>
zVtx cut	Vz <30	Vz <35	<b>&lt;30</b>
eta cut	eta <0.5	eta <0.7	<b> eta &lt;0.5</b>
pt primary electron	>1.5Gev	No	No cut
pair DCA	pairDCA<1.0	pairDCA<1.0	<b>pair DCA&lt;1.0</b>
p/E	0<p/e <2	0.3<poe<1.5	<b>0&lt;p/E&lt;2</b>
btower	dphi<0.1 Dz<20	No	No cuts
bSMDEta	dphi<0.15 Dz<15	Dz<3	<b>Dz&lt;15</b>
bSMDphi	dphi<0.15 Dz<35	dphi<0.015	<b>dphi&lt;0.15</b>
nsmd_eta nsmd_phi	nsmd_eta>1 nsmd_phi>1	nsmd_eta>1 nsmd_phi>1	<b>nsmd_eta&gt;1</b> <b>nsmd_phi&gt;1</b>
nsigma_E	-1<nsigma_e	nsigma_e>-1 && nsigma_e<3	<b>remove nsigma_e&lt;3</b>

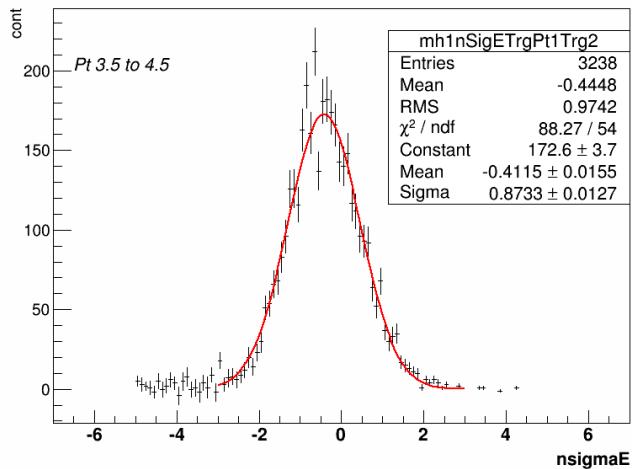
## Run08 Cuts Applied(Left)



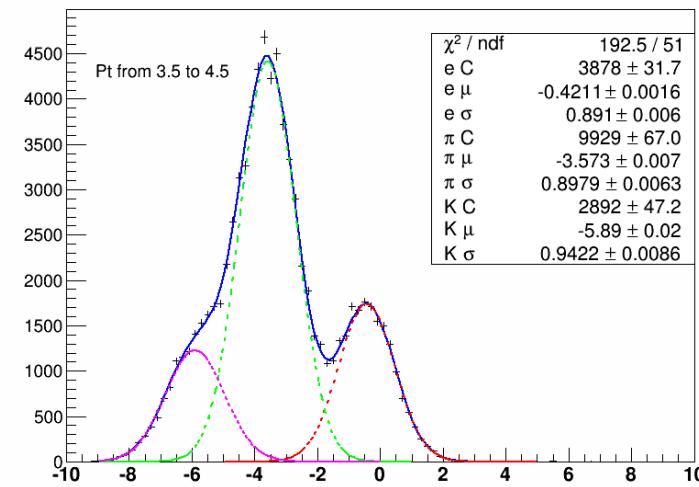
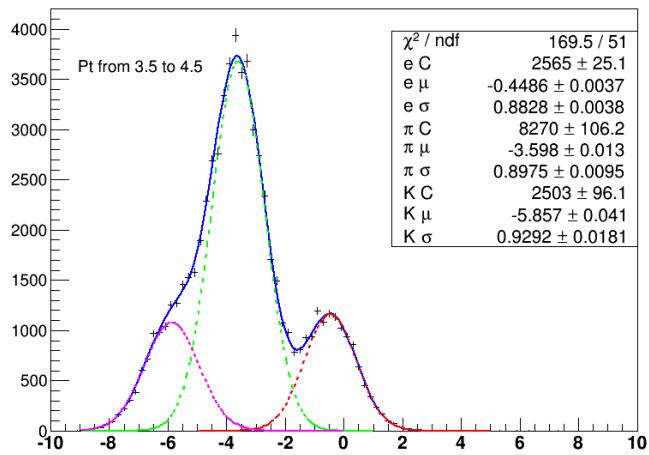
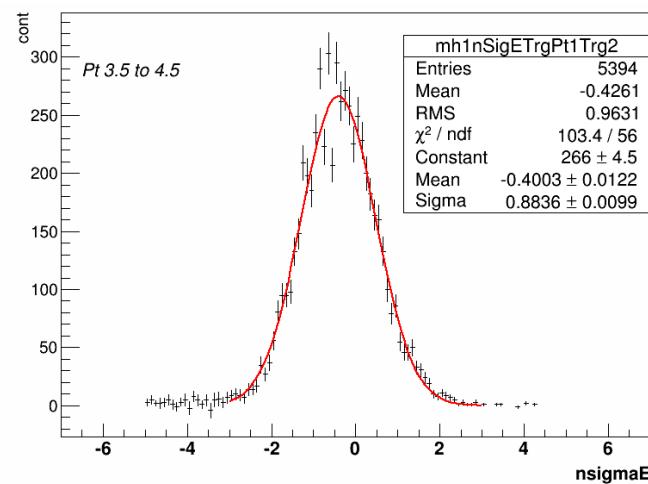
## Run12Cuts(Right)



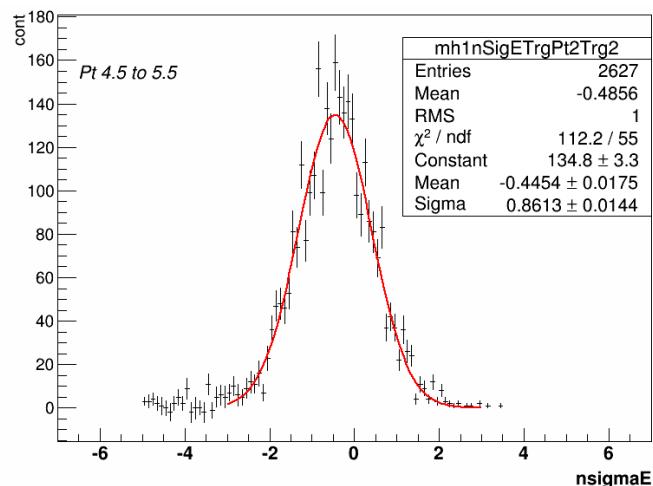
## Run08 Cuts Applied(Left)



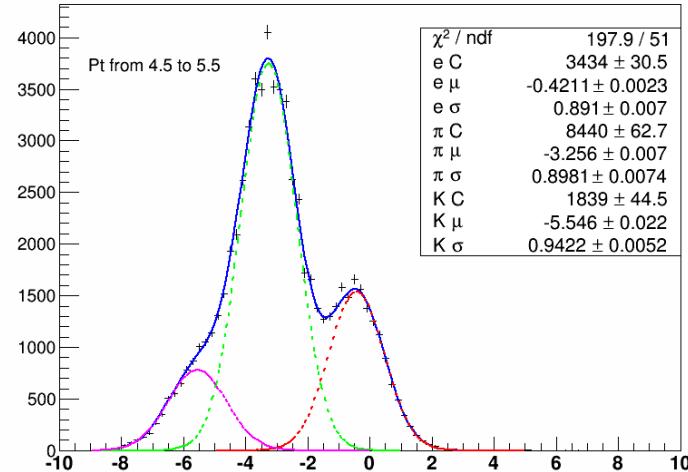
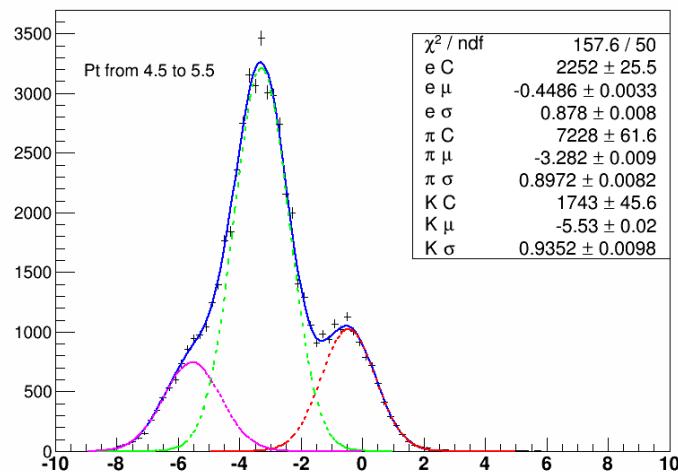
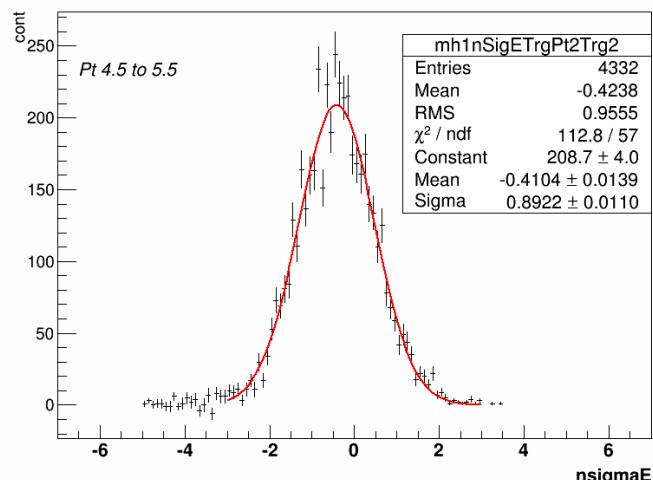
## Run12Cuts(Right)



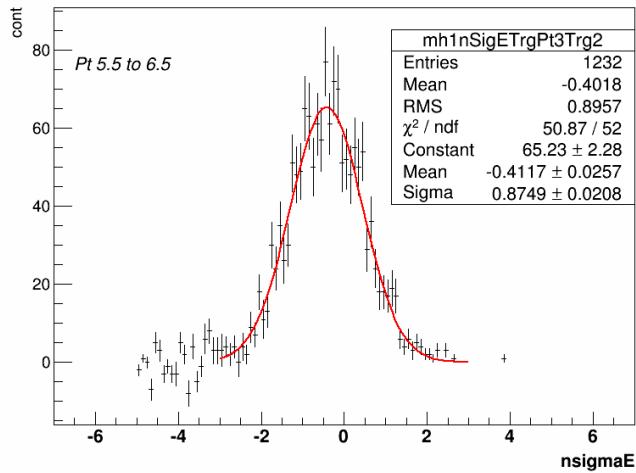
## Run08 Cuts Applied(Left)



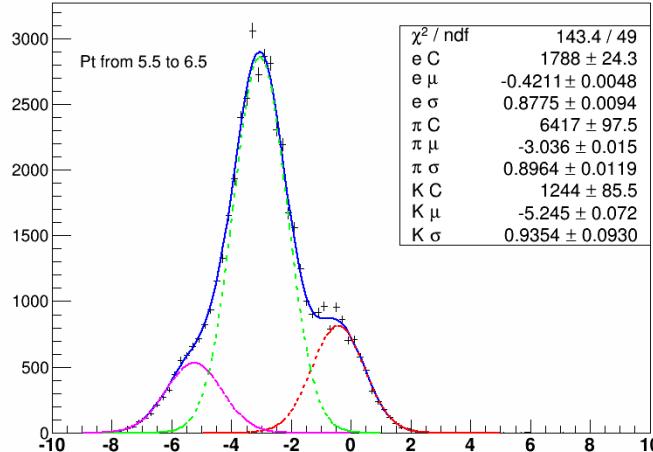
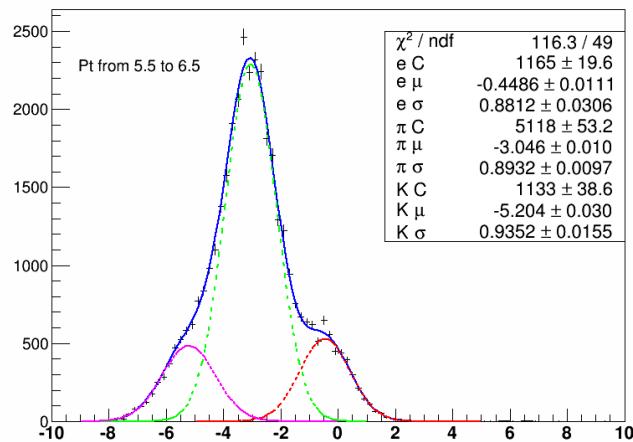
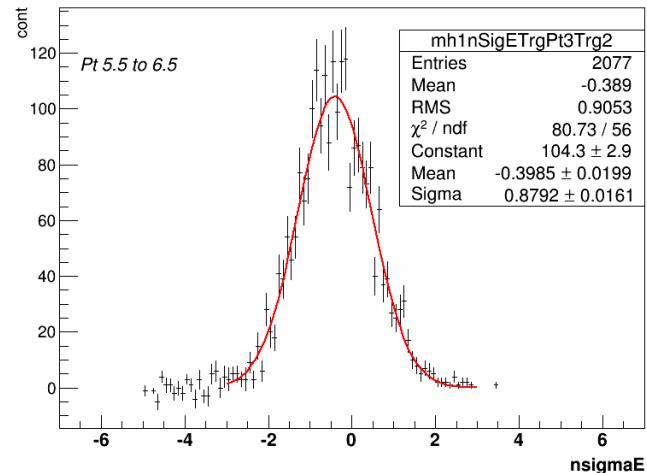
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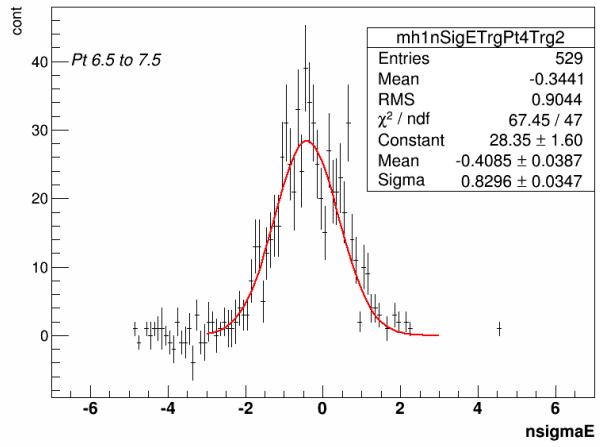
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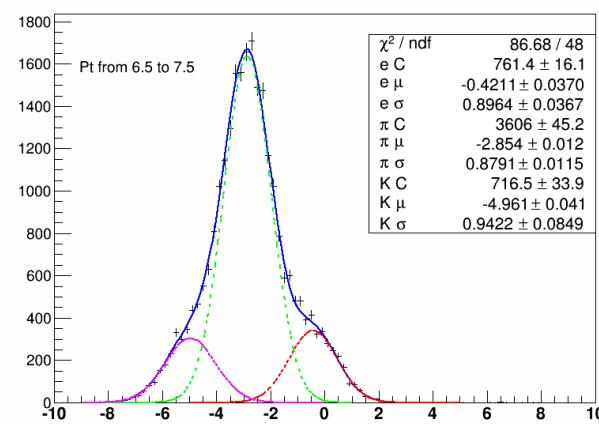
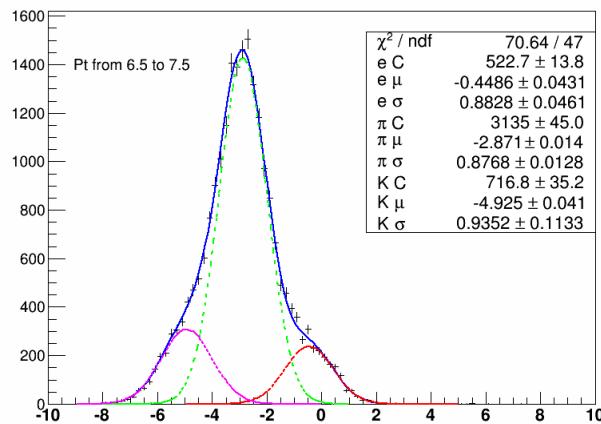
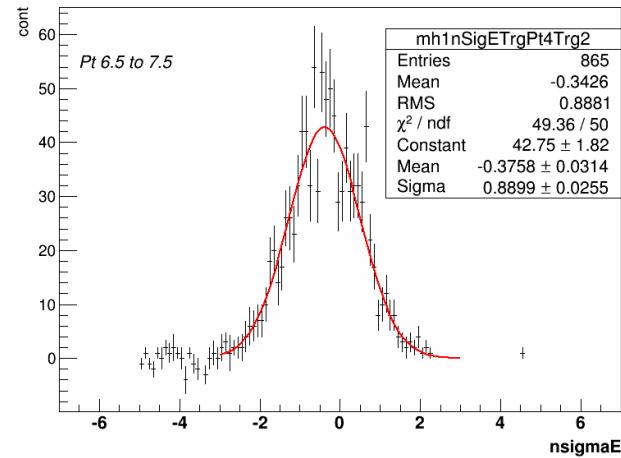
## Run12Cuts(Right)



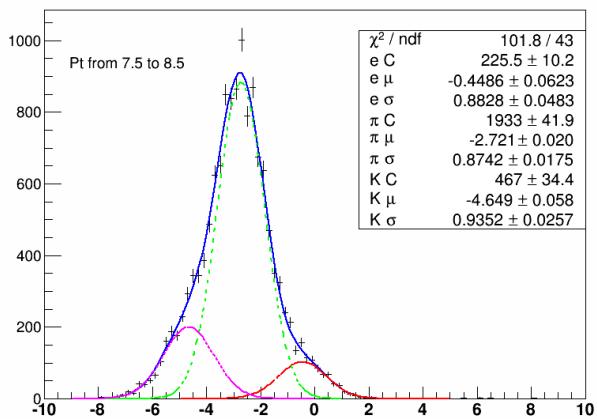
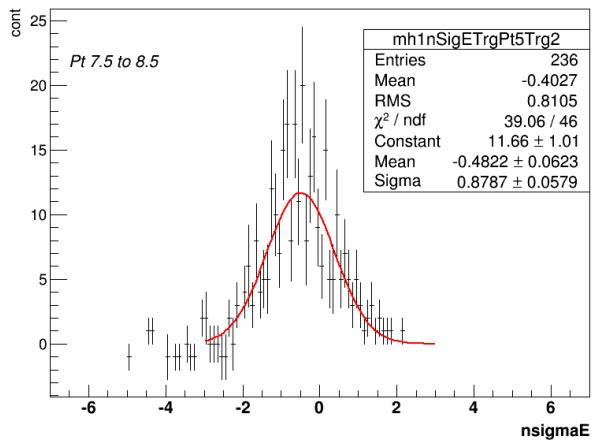
# Run08 Cuts Applied(Left)



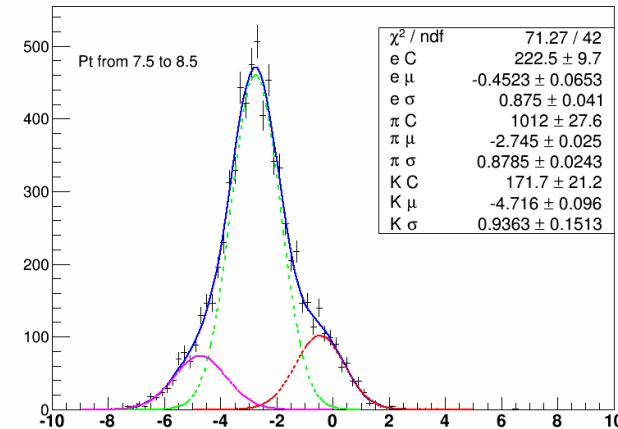
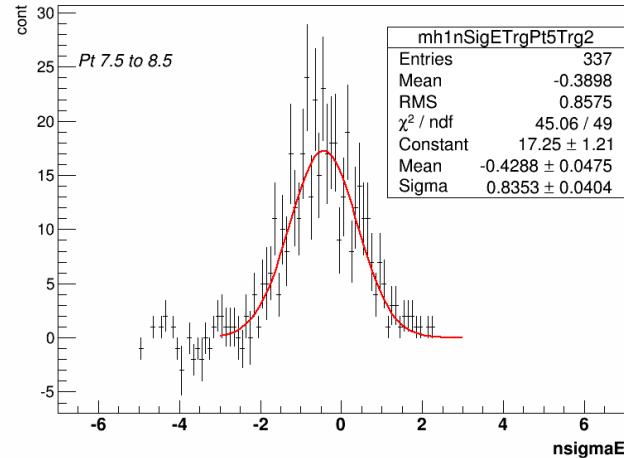
# Run12Cuts(Right)



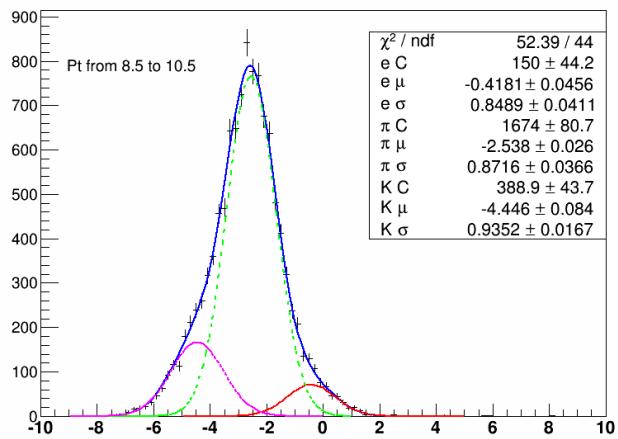
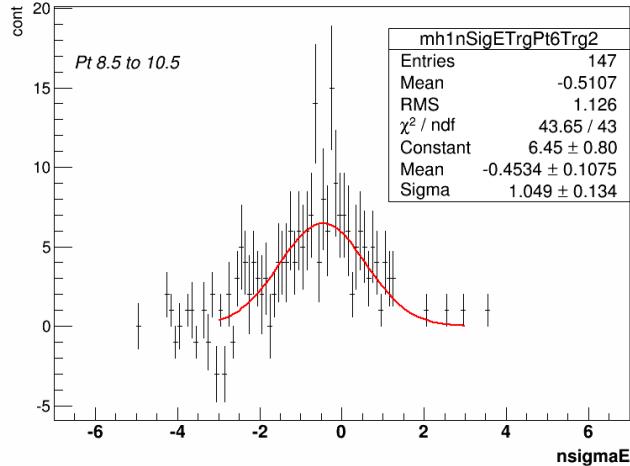
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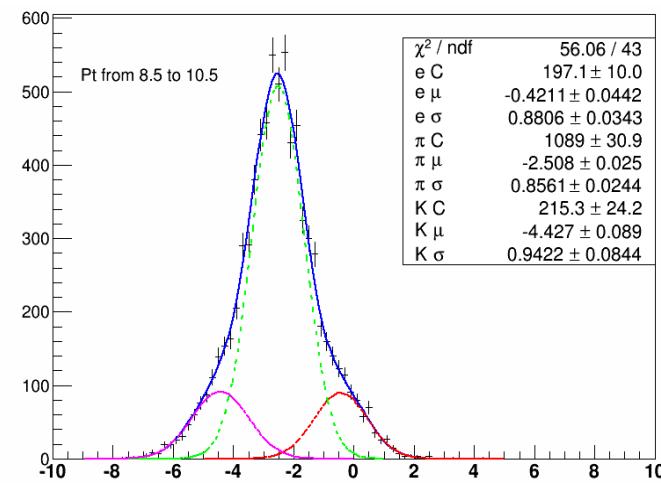
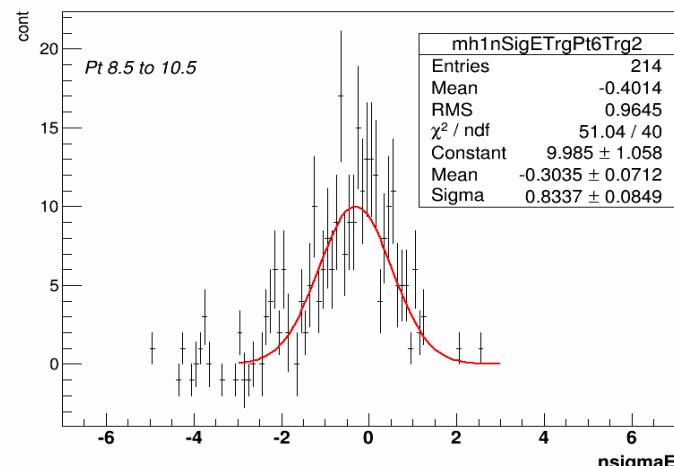
## Run12Cuts(Right)



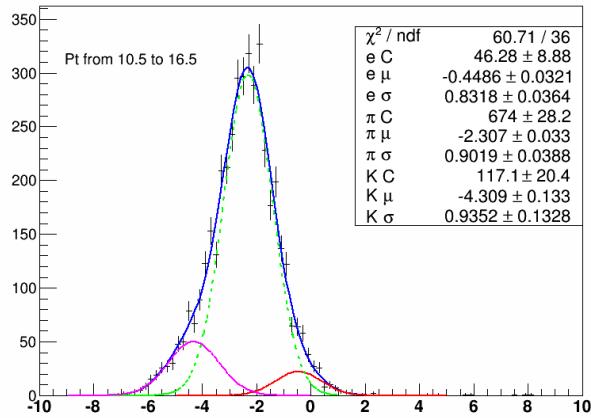
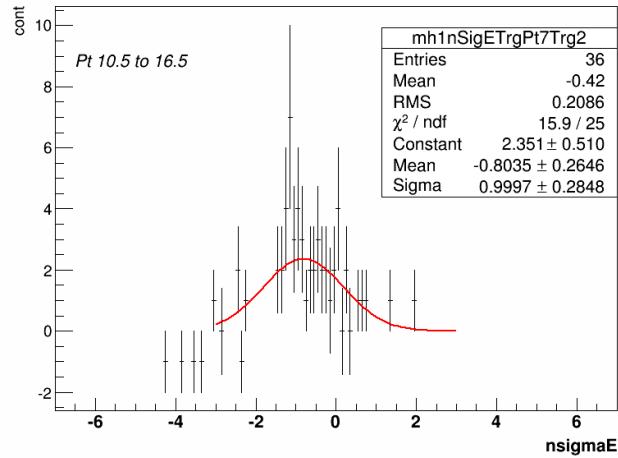
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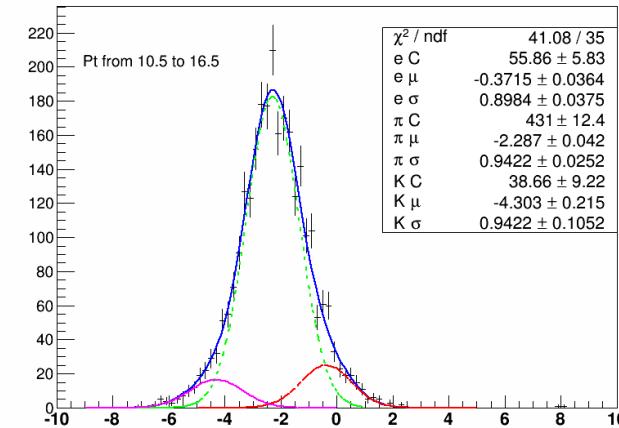
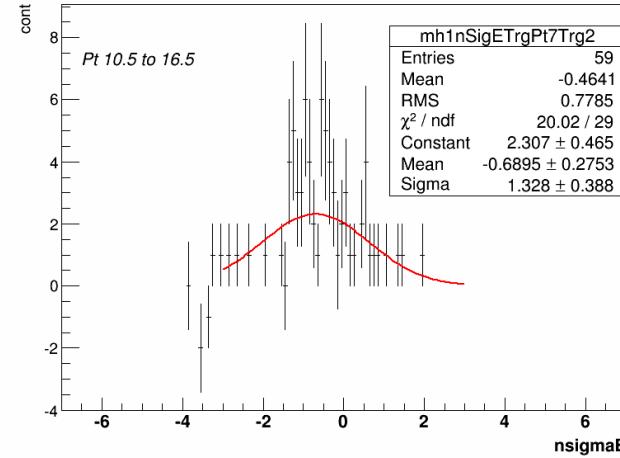
## Run12Cuts(Right)



## Run08 Cuts Applied(Left)

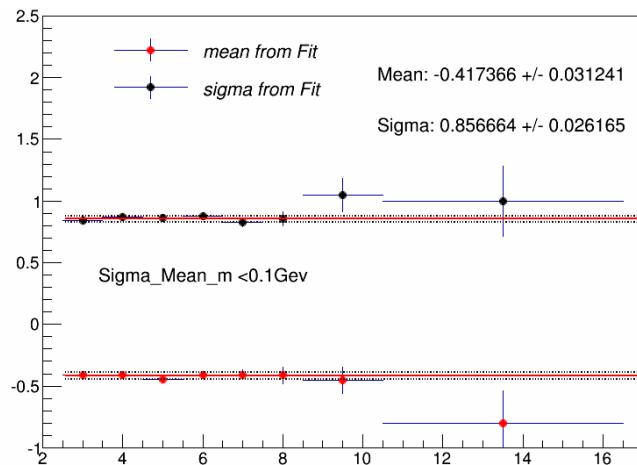


## Run12Cuts(Right)

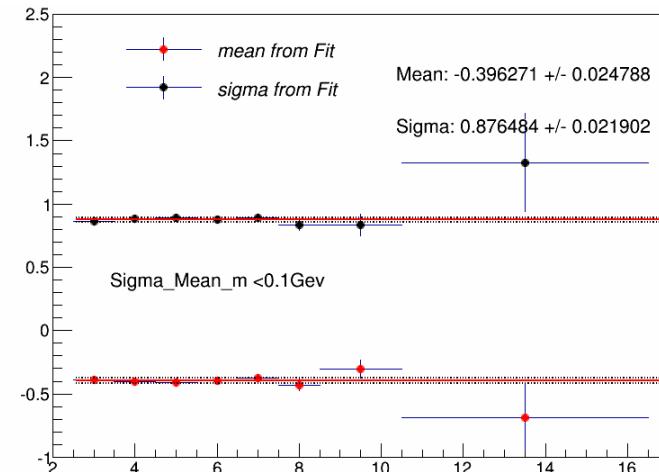


# Electron Mean and sigma(poI0 Fit) Fit Range(2.5-8.5)

Run08 Cuts Applied(Left)

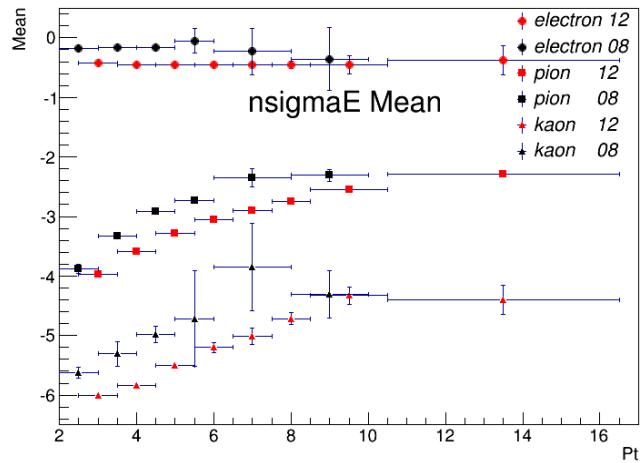


Run12Cuts(Right)

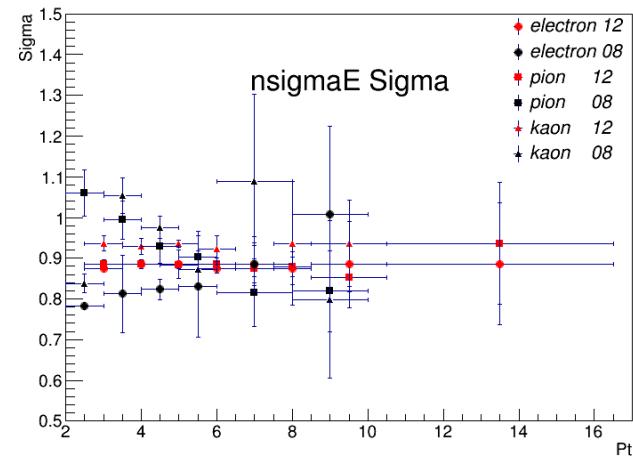


# Compare the Mean ,sigma, constant ratio

Red: Run12 Default cut Black: Run08



nsigmaE Mean

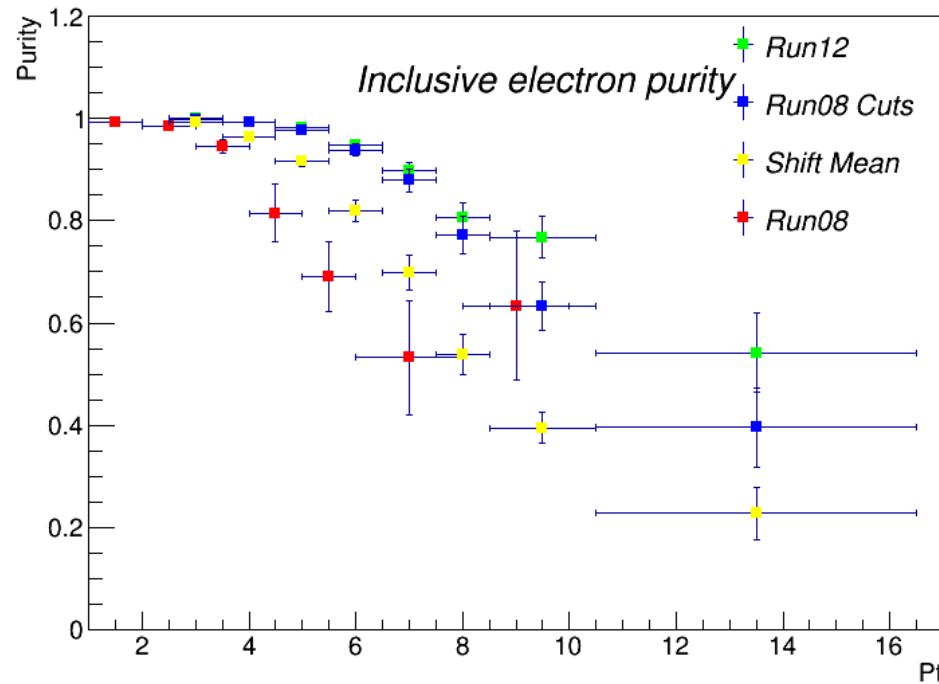


nsigmaE Sigma

nsigmaE Mean of E, P and K+P

Sigma of E,P,K+P

## Compare the purity of Run12 and Run08



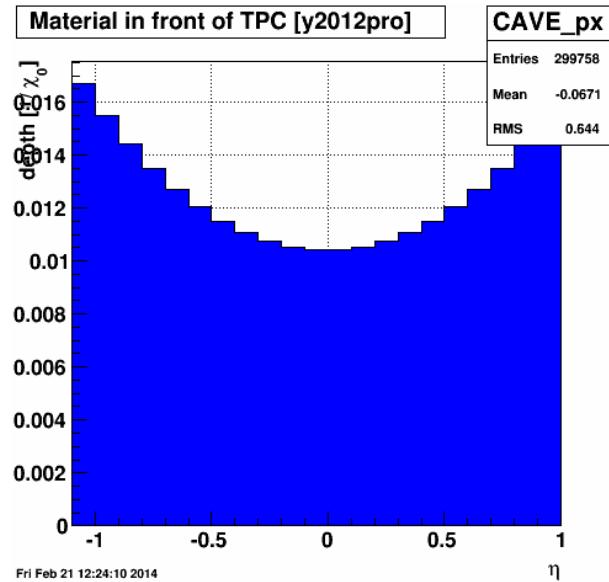
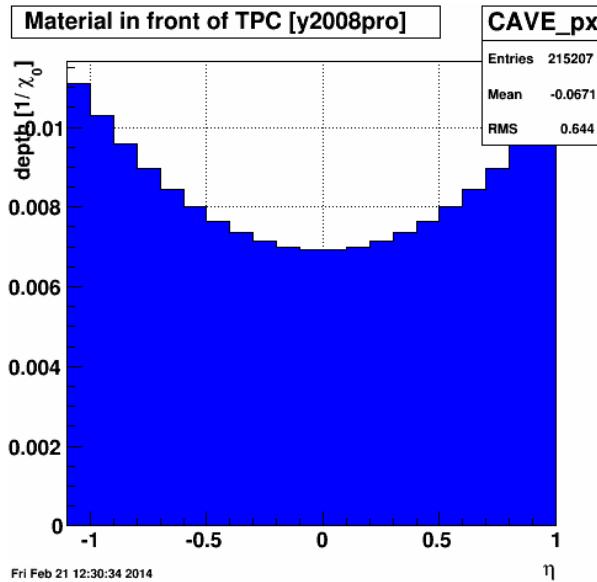
Green: Run12, Default cut

Blue : Run12, with Run08 cuts applied

Yellow:Run12, with Run08 cuts and with electron/pion/kaon  
mean shifted up by 0.3/0.5/0.8"

Red: Run08 purity

# Geometry tags for years 2008 and 2012



Run12 photo conversion from the materiel higher,(material budget) purity will be increase about 0.05

## Material Budgets

(Number of Radiation Lengths in front of TPC Inner Field Cage)

Jason Webb  
2/21/2014

## Conclusion:

Why the purity of Run12 higher than Run08?

1. Run12 ePID cuts is tighter than Run08
2. TPC calibration is different ( Electron Mean position )
3. Run12 sigma of Pion,Kaon Proton is narrow(hadron contamination)
4. Run12 photo conversion from the materiel higher,(material budget) purity will be increase about 0.05

## To do list

1. Calculate trigger efficiency
2. Calculate photonic reconstruction efficiency from embedding sample
- 3 .Refit the purity with pion and kaon constraints from Hao's study
- 4.calculate single electron reconstruction efficiency from embedding sample

# Thanks