

HF PWG Weekly Meeting

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

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4/15/2014

Data Set and ePID cuts

Trigger selection

TH0BBCMBTof0 && DSMadc>11 && DSMadc<=18

TH2BBCMB DSMadc>18

Event cuts

|Vz|<35 && Ranking>0

Track quality cut:

Nhit>20 && nhit/nhit_poss>0.52&& nhitDedx>15 && gDca<1.5
&& first_TPC pointR<73

ePID cuts:

|Eta|<0.7 && nSMDeta>1 && nSMDPhi>1

0.3<poe0<1.5 && SMDeta_z|<3 && SMDphi_phi|<0.015 && -1<nøe<3

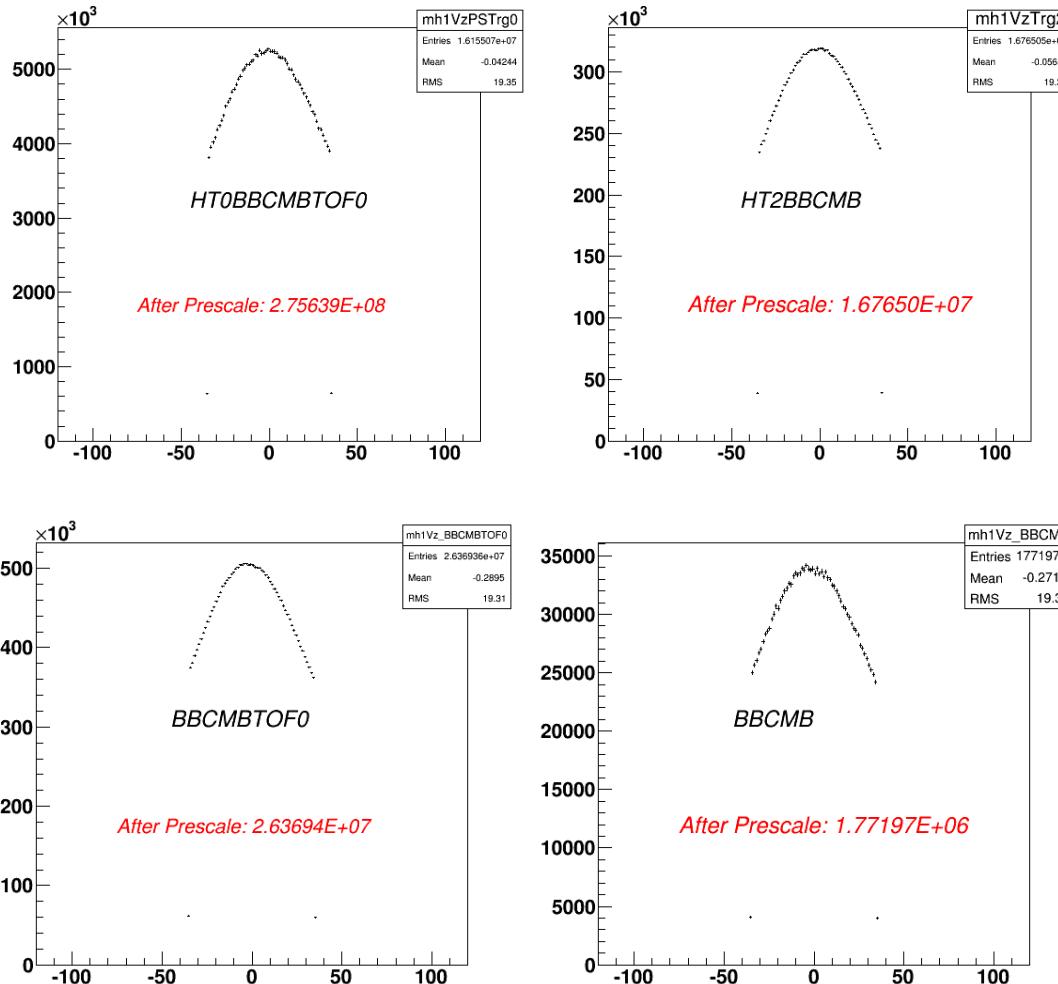
Electron partner cut:

0.2<Pt

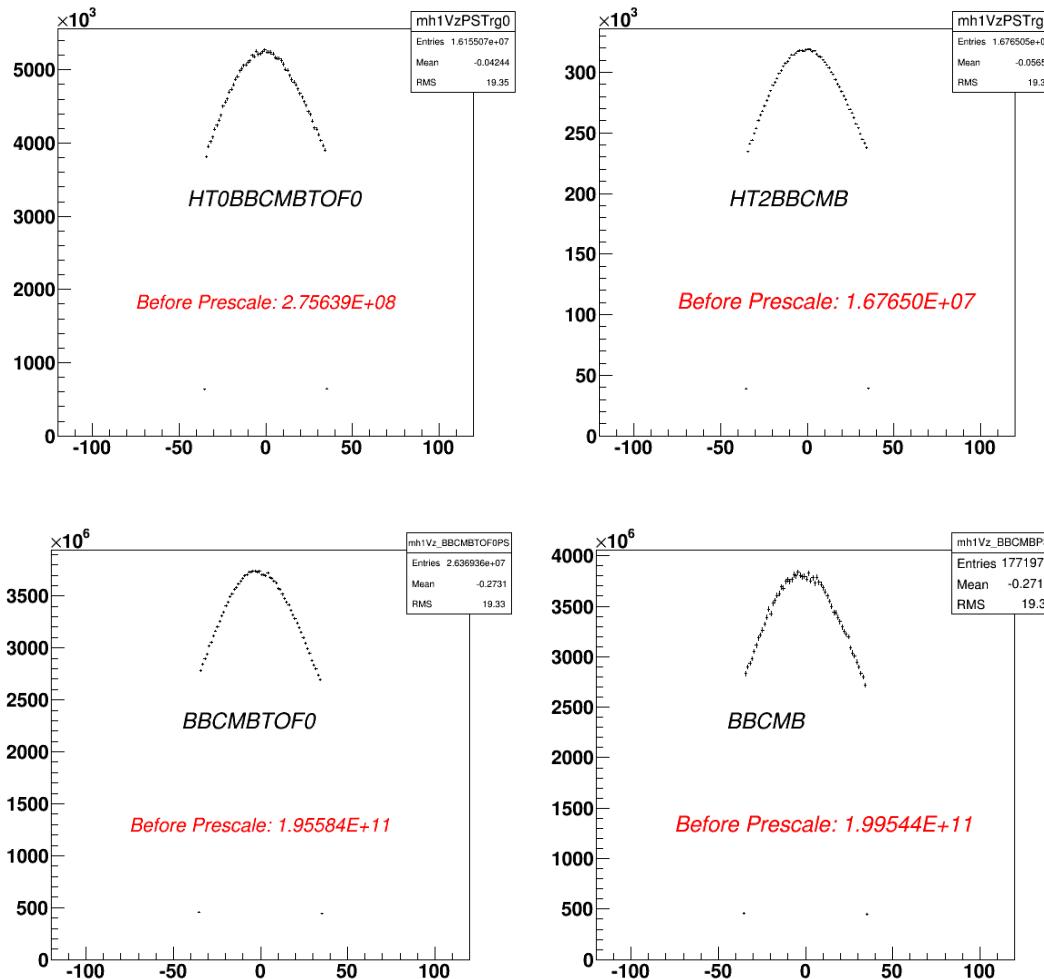
Photonic electron pair cut:

Pair Dca<1 && InvMass<0.24Gev(Spectra) InvMass<0.1Gev(purity study)

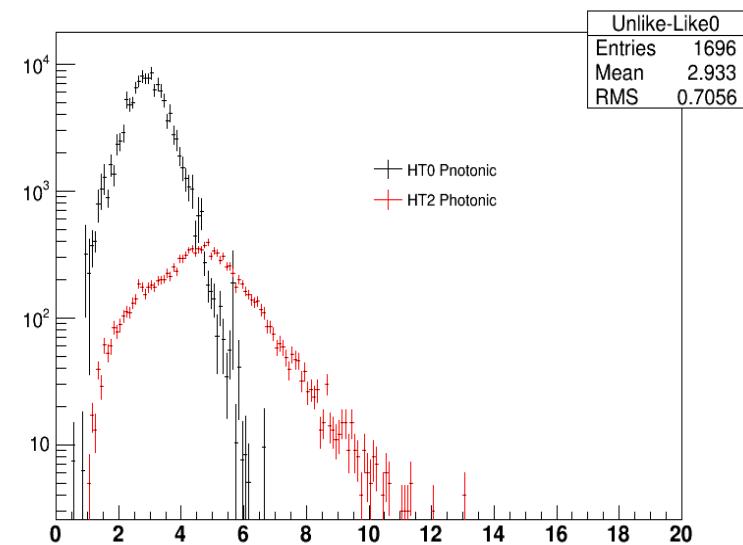
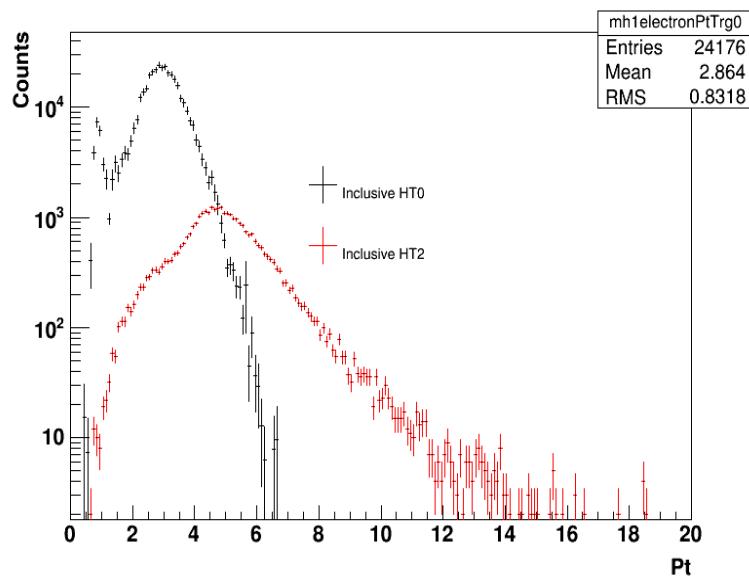
Number of events in different trigger after prescale $|Vz| < 35$ cut applied



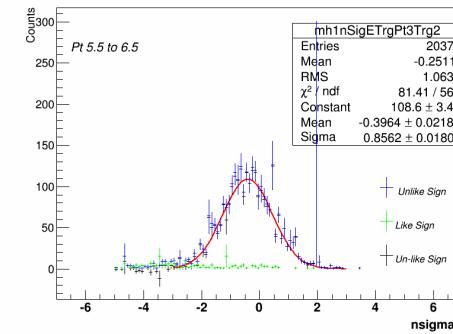
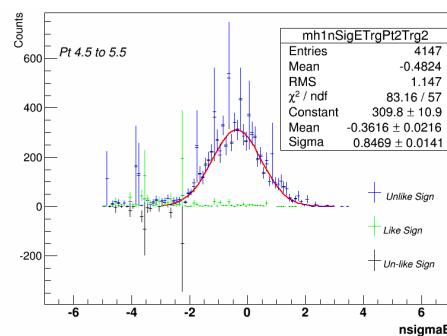
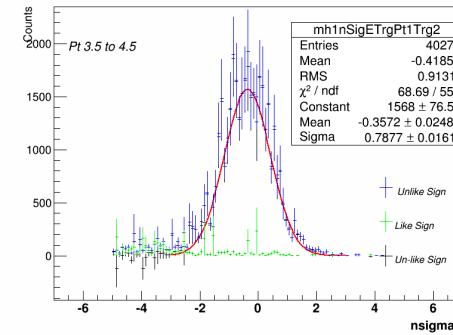
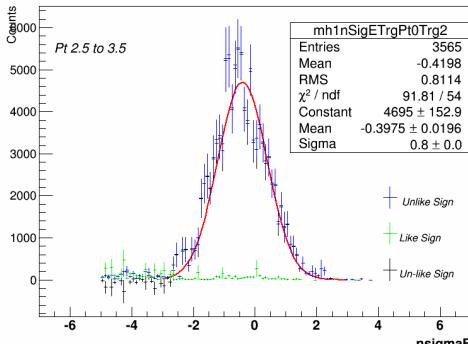
Number of events in different trigger before prescale $|Vz| < 35$ cut applied



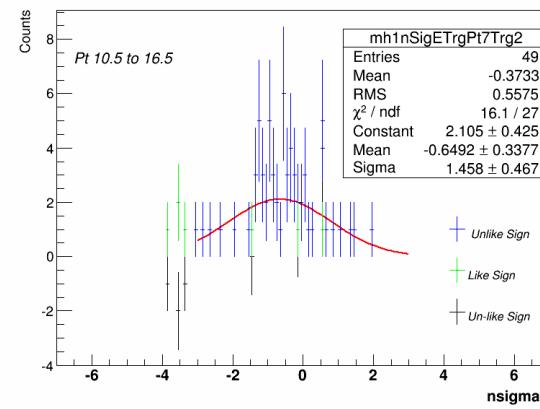
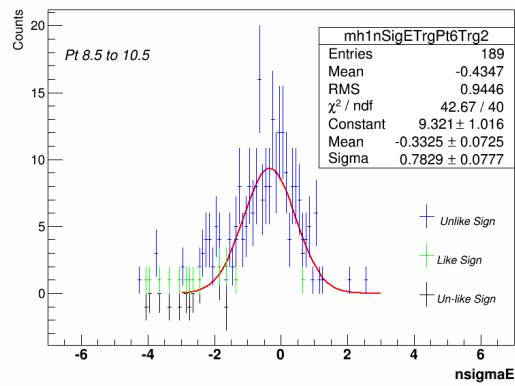
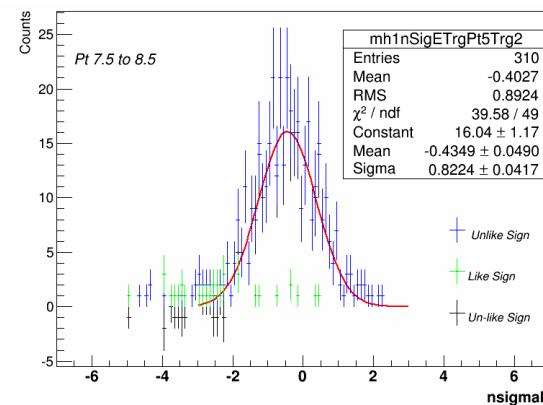
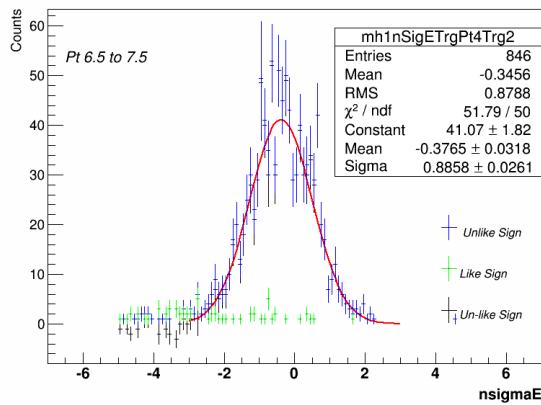
Inclusive electron and photonic electron Pt spectra in different trigger



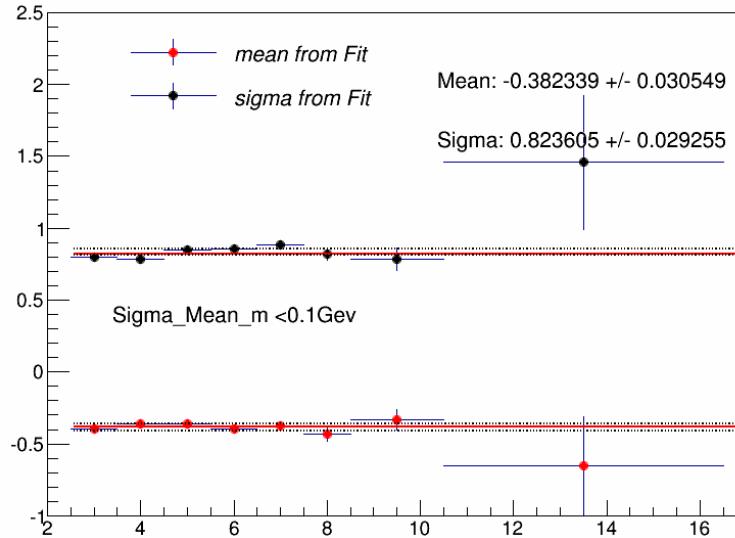
Nsigma Electron calibration in different global Pt bin ($2.5 < \text{pt} < 6.5$)



Nsigma Electron calibration in different global Pt bin ($6.5 < pt < 16.5$)



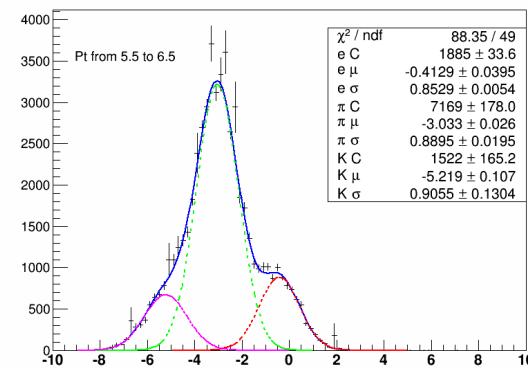
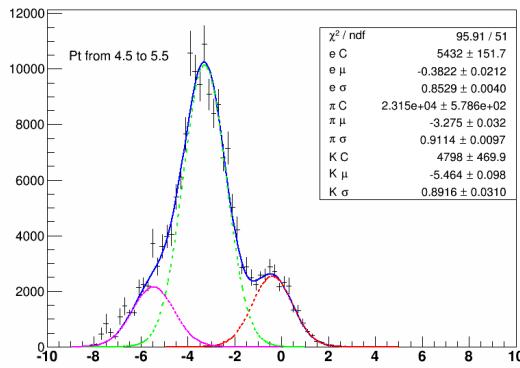
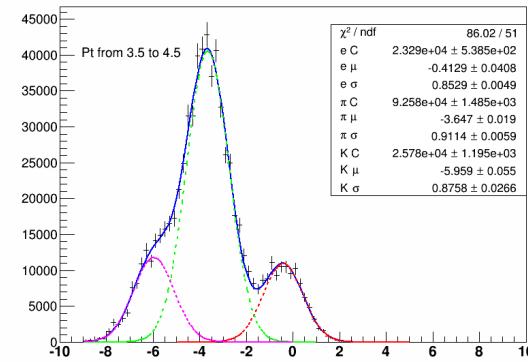
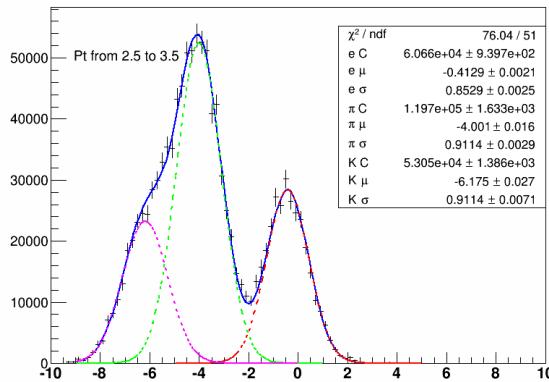
Nsigma electron mean and sigma



- Both the mean and sigma are the pol0 Fit Fit range (2.5,8.5) ,then extrapolate the last two Pt bin
- Get the one standard deviation of the calibration Fit as the the mean and sigma uncertainty

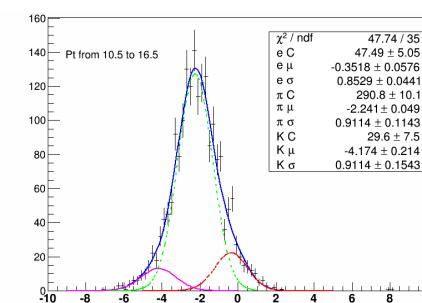
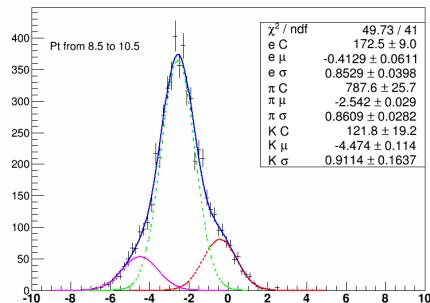
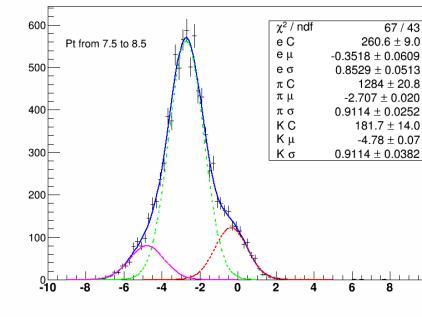
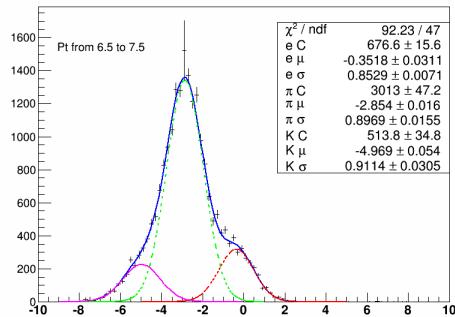
Purity of inclusive electron

Constrain the electron mean and sigma with one standard deviation π
and p+k with three standard deviation

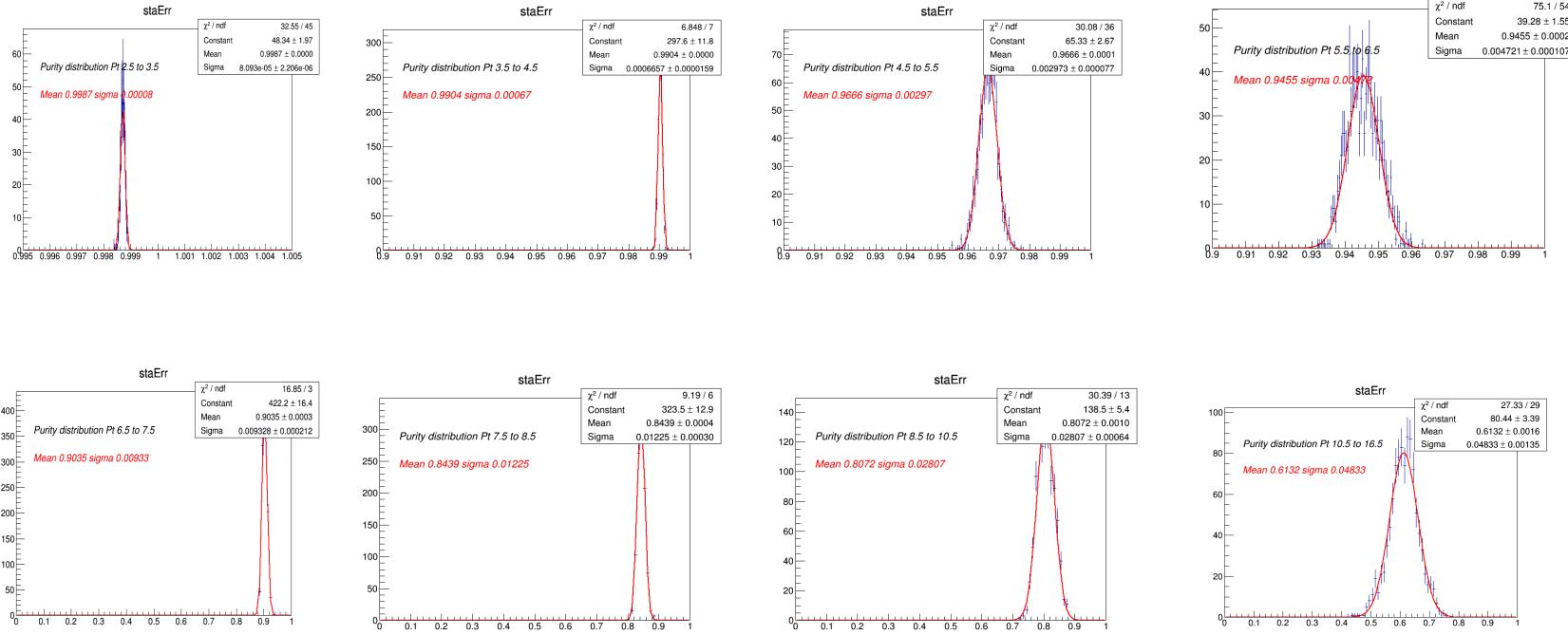


Purity of inclusive electron

Constrain the electron mean and sigma with one standard deviation π
and p+k with three standard deviation

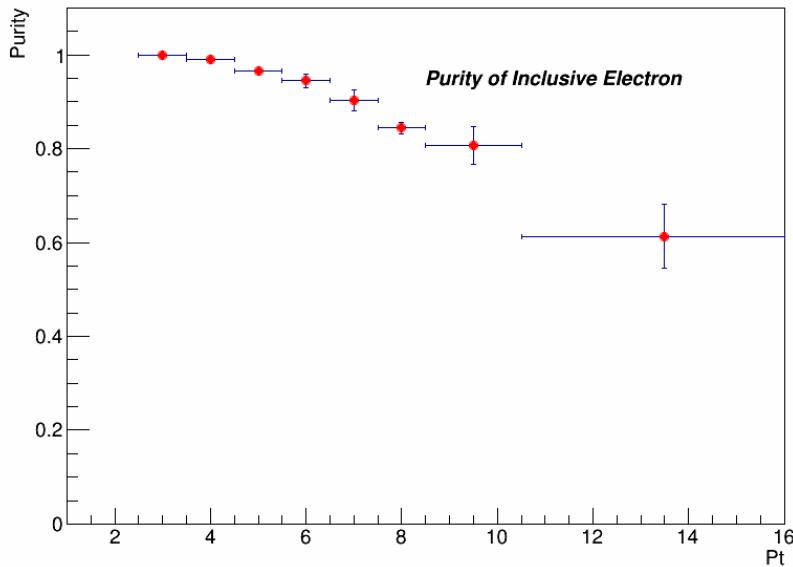


Statistics uncertainty Fit of the purity



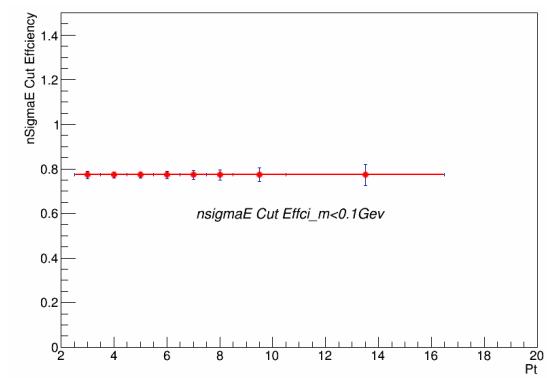
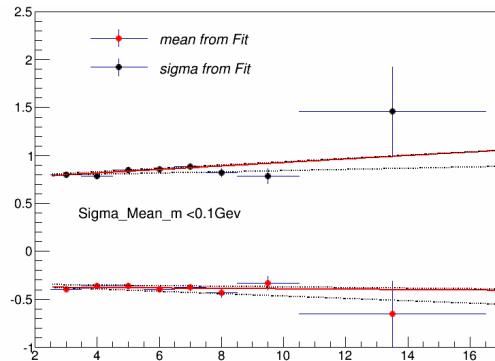
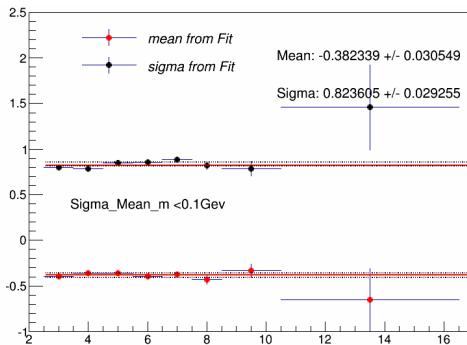
Shift the data point of the inclusive electron esigmaE up and down with one sigma Bin Error 1000 times, the make a Gauss Fit, Get the mean as the purity and sigma as the statistics uncertainty

Purity of inclusive electron



- Purity statistics uncertainty: shift the data one sigma bin Error point up and down 1000 times and make the Gauss Fit (slide 11)
- Purity systematics uncertainty: constrain the electron mean and sigma with one,two and three standard deviation, and calculate the maximum deviation from the mean value

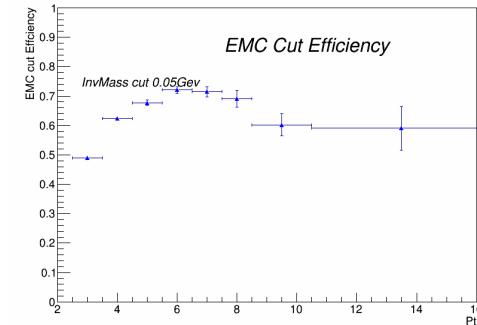
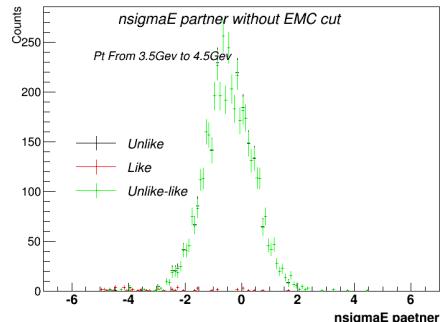
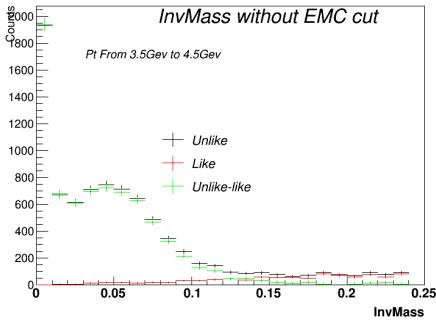
Nsigma_Electron cut efficiency (-1<nsigmaE<3)



- nsigma_E mean and sigma come from the pol0 fit of calibration
- nsigma_E cut efficiency sts. uncertainty by one standard deviation of mean and sigma respectively, then get the maximum deviation from the central value as the uncertainty
- Sys. uncertainty : Difference between pol0 and pol1 Fit

EMC cut efficiency (InvMass<0.05Gev)

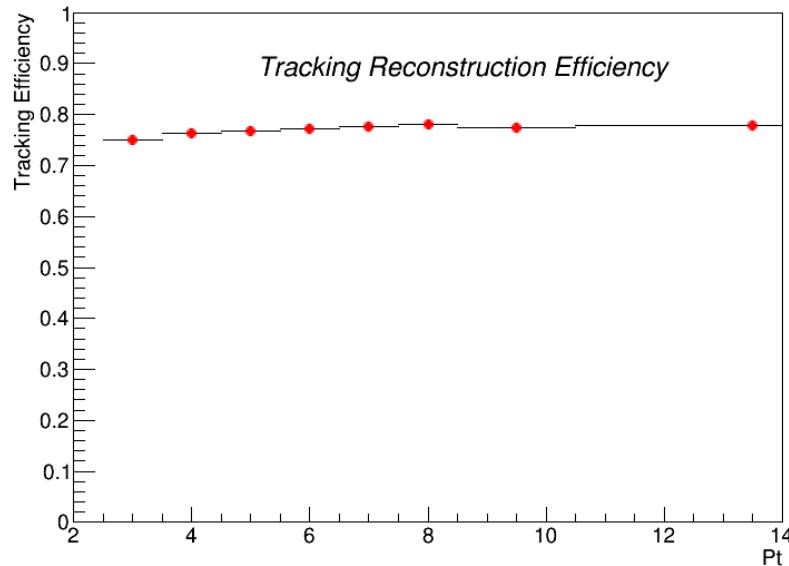
0.3<Poe<1.5 && nSMDEta>1 && NSMDPhi>1 && SMDEta_||z||<3
&& SMDphi_||phi||<0.015



Calculate EMC cut efficiency by
TGraphAsymmErrors(pass_cut,total)

TPC Tracking efficiency

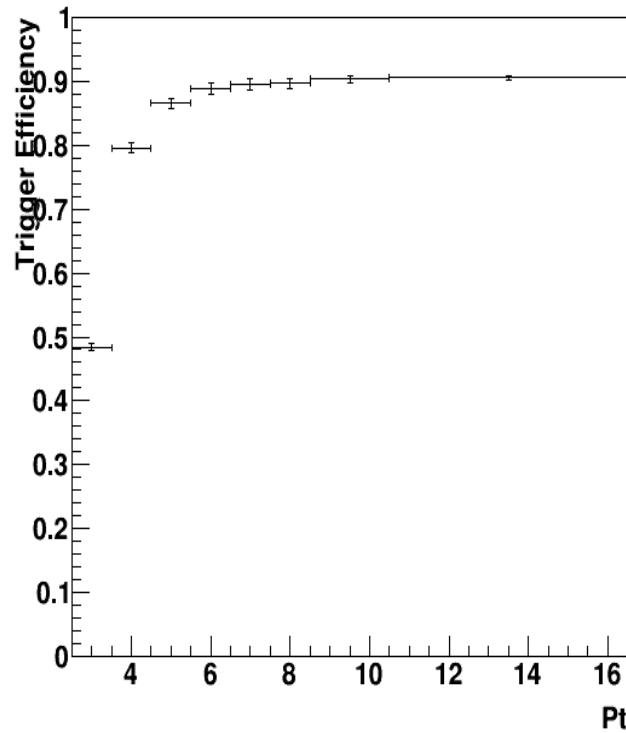
`nhit>20 && nhit/nhit_poss>0.52 && 15<nhitDedx
&&First TPC_pointR<73 && gDca<1.5`



- Calculate the tracking efficiency by embedding
- Calculate the tracking Efficiency and sts. err by `TGraphAsymmErrors(pass_cut,total)`
- Sys. Err `abs((nhit_25/nhit_20)_Data- (nhit_25/nhit_20)_Embedding)`

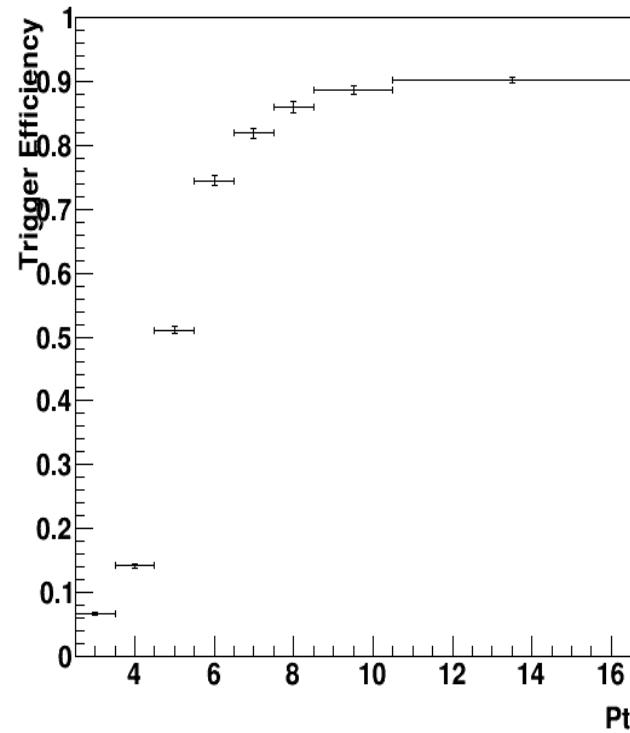
Trigger efficiency (embedding)

HT0 Trigger Efficiency



11<DSMADC

HT2 Trigger Efficiency

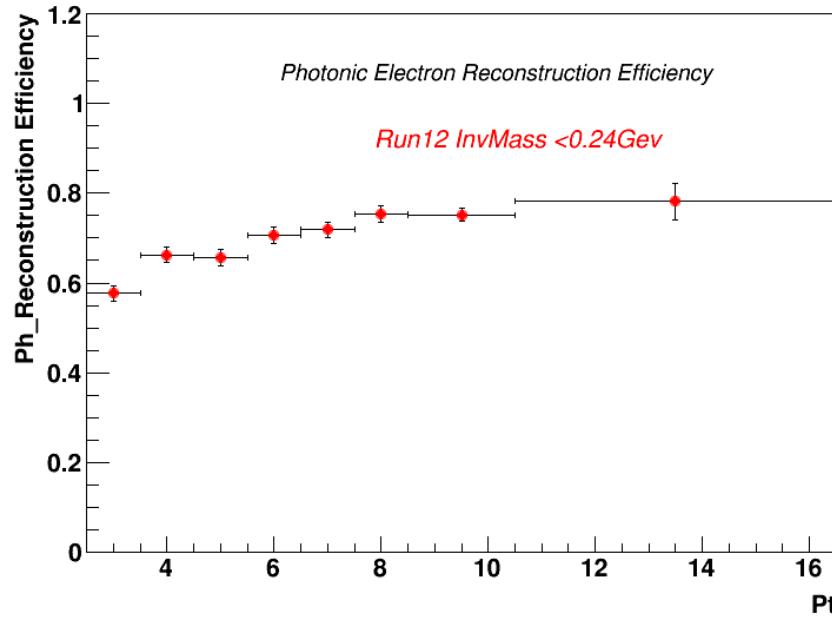


18<DSMADC

Calculate the Trigger efficiency by TGraphAsymmErrors (pass_cut, total)

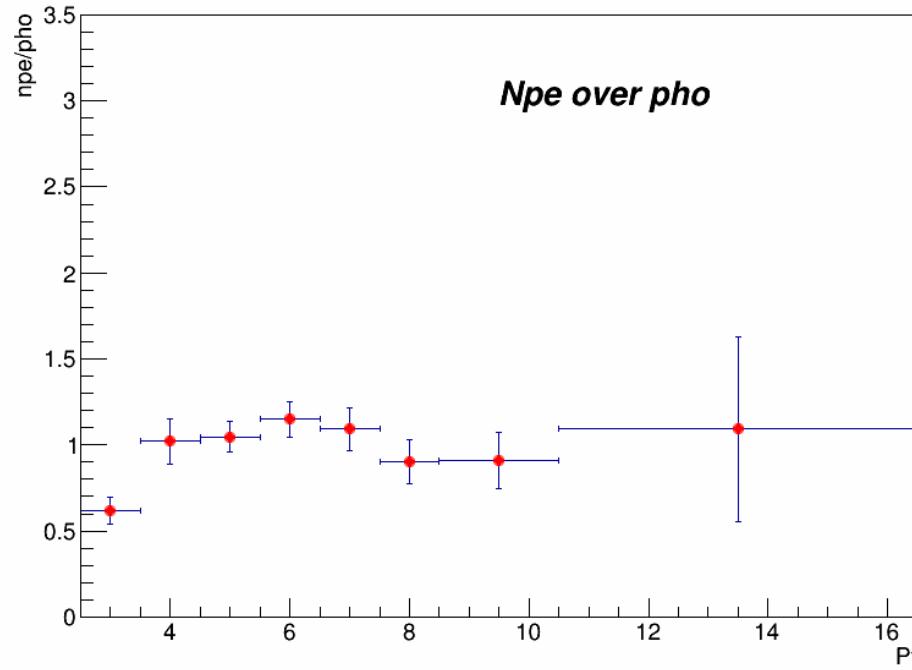
Photonic Electron reconstruction efficiency (Embedding)

mPir



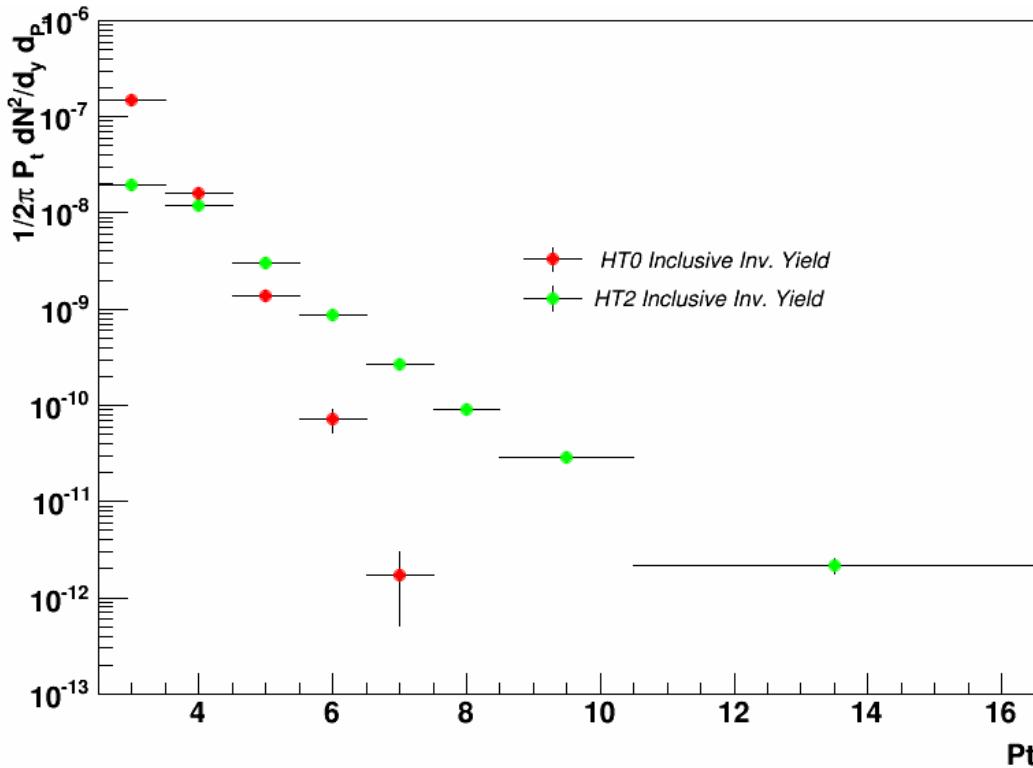
- Photonic electron pair has been weight by the gamma spectra
- InvMass cut<0.24Gev && pairDCA<1
- Calculate the Photonic Electron reconstruction efficiency
- By TGraphAsymmErrors(pair,single)

Ration of Nonphotonic electron and and photonic electron



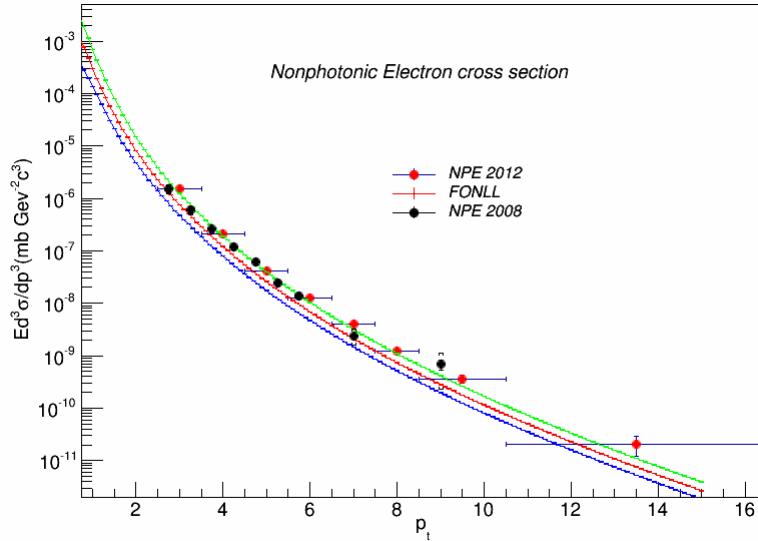
- Photonic Electron = photonic_electron_cut/photonic reconstruction Efficiency
- NPE=inclusive * purity-Photonic Electron

Inclusive electron Inv. Yield in different trigger



- $BdN/dptdy = 1/(2*2* 3.14159* 1.4* dPt)1/nsigma_cut_eff *1/EMC_cut_eff * 1/Tracking_eff* 1/Trigger_eff *1/N_MB*(HT*)$
- Inclusive electron= Inclusive_electron_pass_cut* purity

Nonphotonic electron cross section



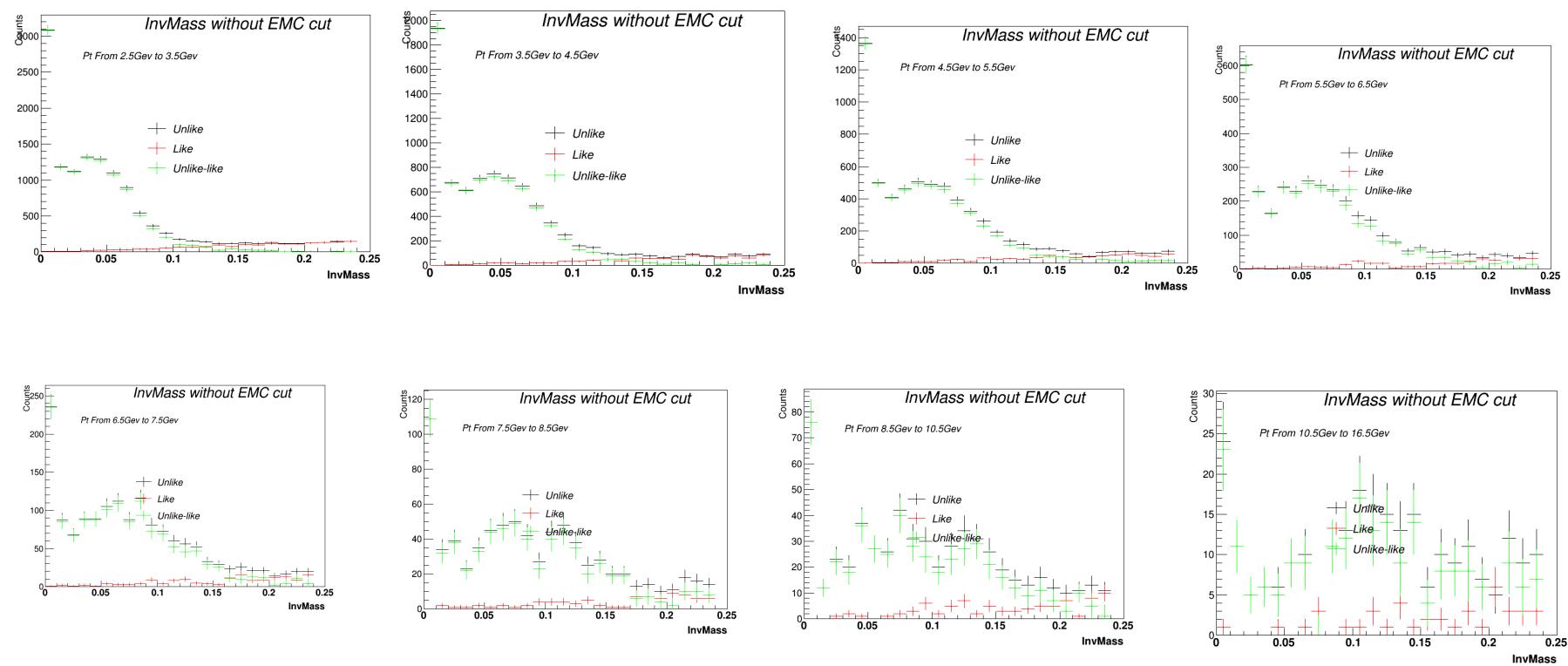
- $BdN/dptdy = 1/(2*2* 3.14159* 1.4* dPt)1/nsigma_cut_eff *1/EMC_cut_eff * 1/ Tracking_eff* 1/Trigger_eff *1/N_MB*(NPE) *30mb+-2.4$
- Combine HT0 and HT2, HT0($11 < \text{DSMAdc} \leq 18$) HT2($\text{DSMAdc} > 18$)
- background from vector meson, J/psi is not corrected.
- Both statistics and systematics uncertainty are included.

Plan for This analysis:

- 1) Use the full embedding sample to calculate the tracking efficiency , Trigger efficiency, photonic Electron efficiency
- 2) derive trigger efficiency from data
- 3) estimate background contribution from vector meson, J/psi decay
- 4) prepare poster for QM2014
- 5) finalize the analysis for publication (combined with Run09 results)

Backup

InvMass without EMC Cut



nsgamaE of partner without EMC cut (InvMass <0.05Gev cut applied)

