R_{pA} and R_{AA}

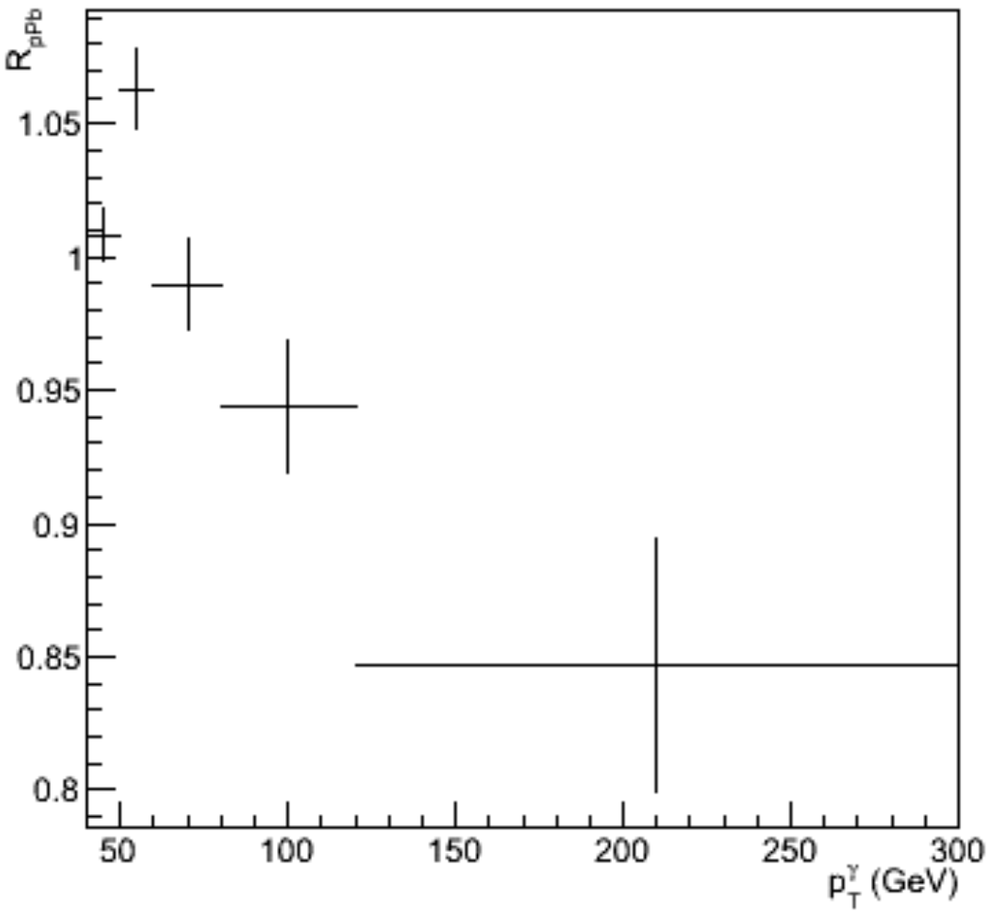
after Centrality & Vertex Re-weighting

Yeonju Go

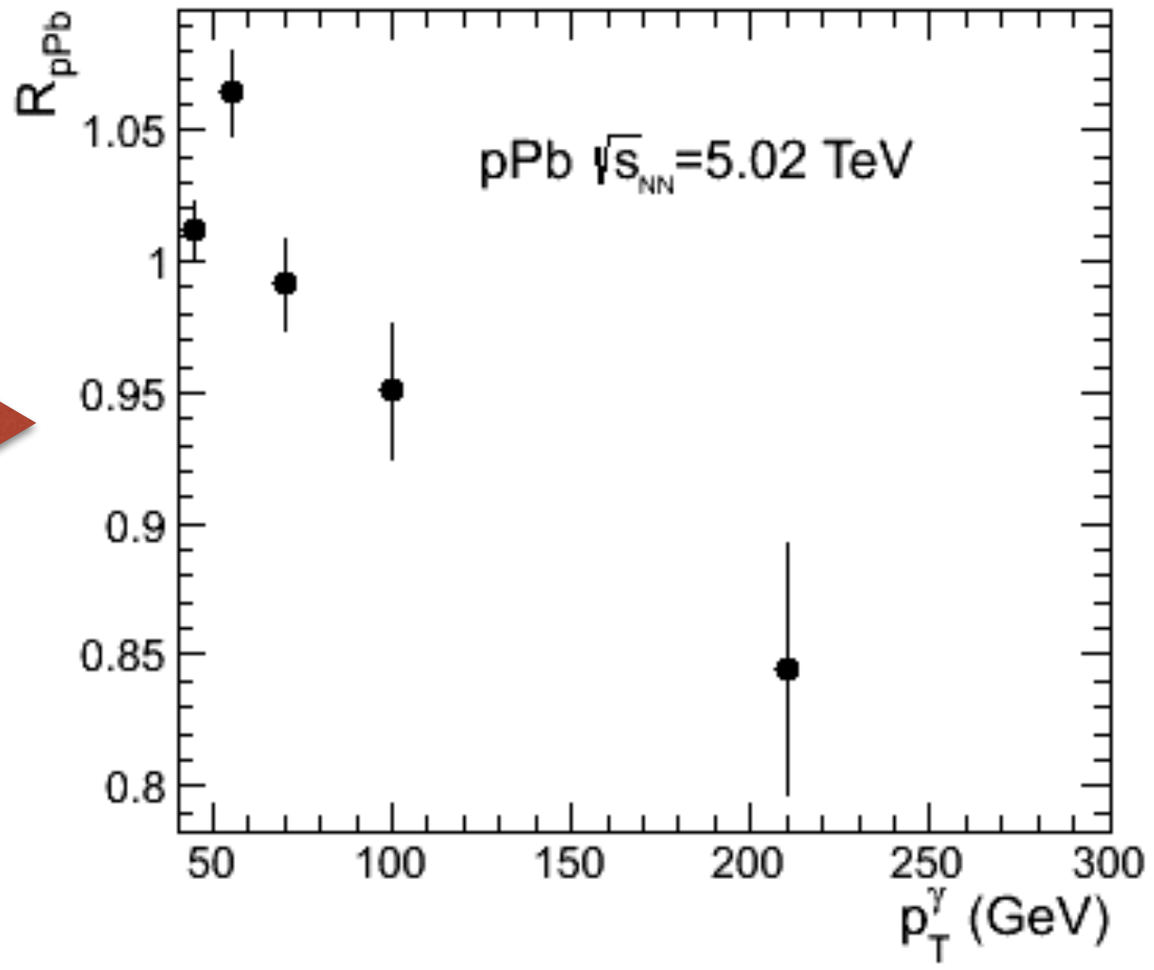
28 Feb. 2014

R_pA

before



after

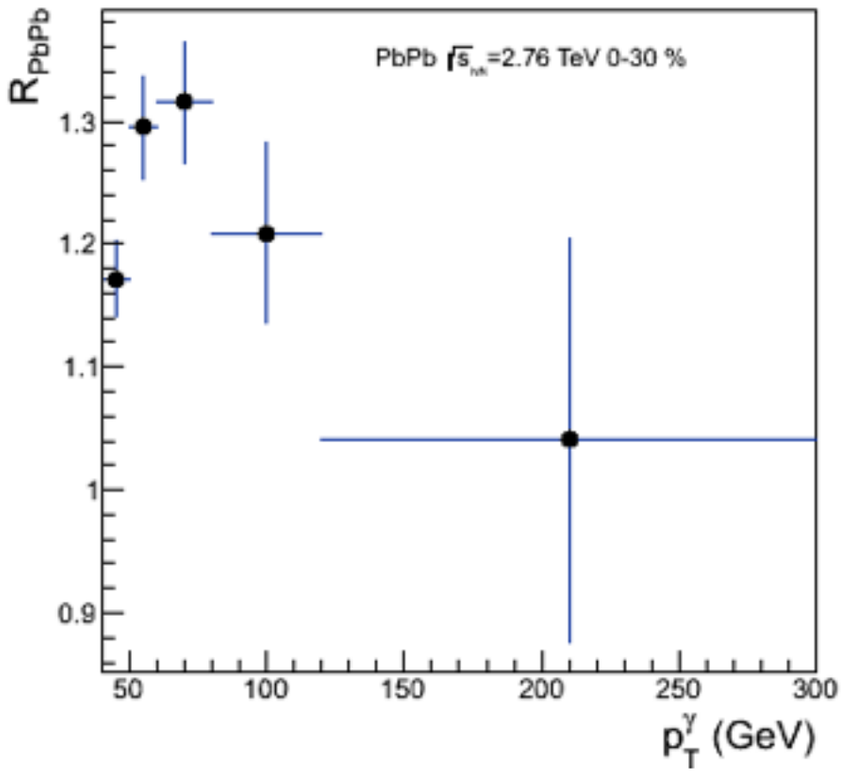


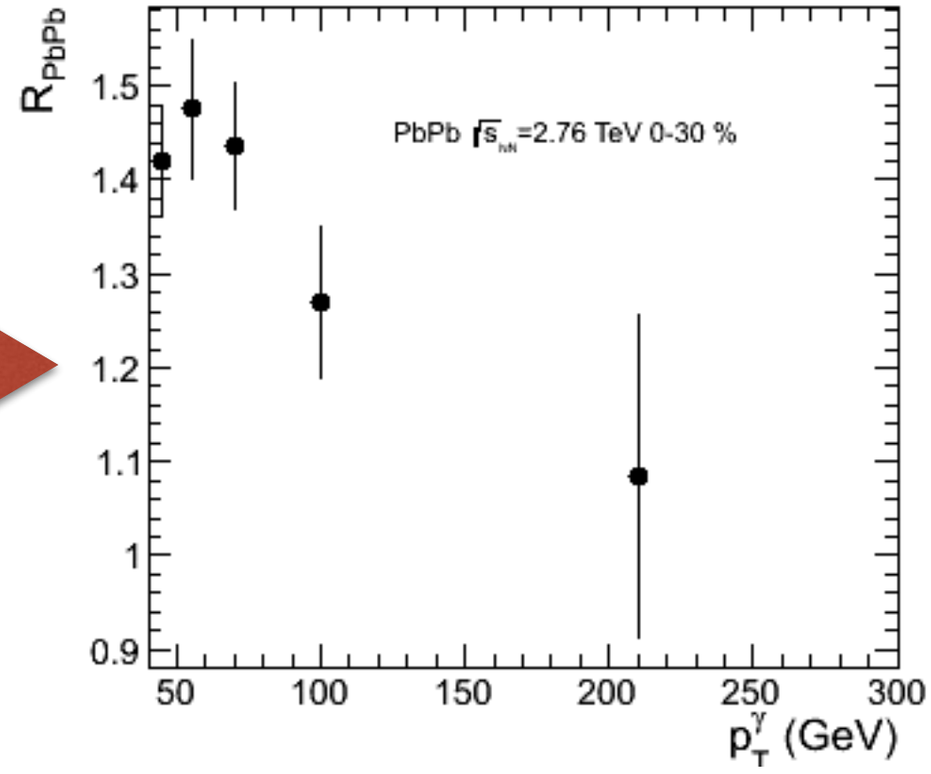
R_AA

before

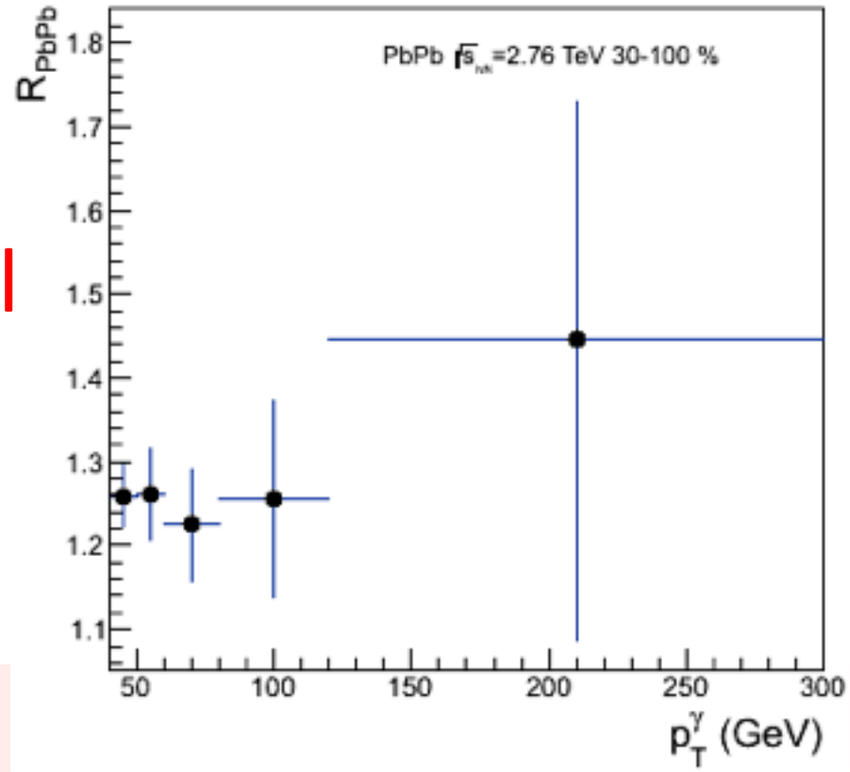
after

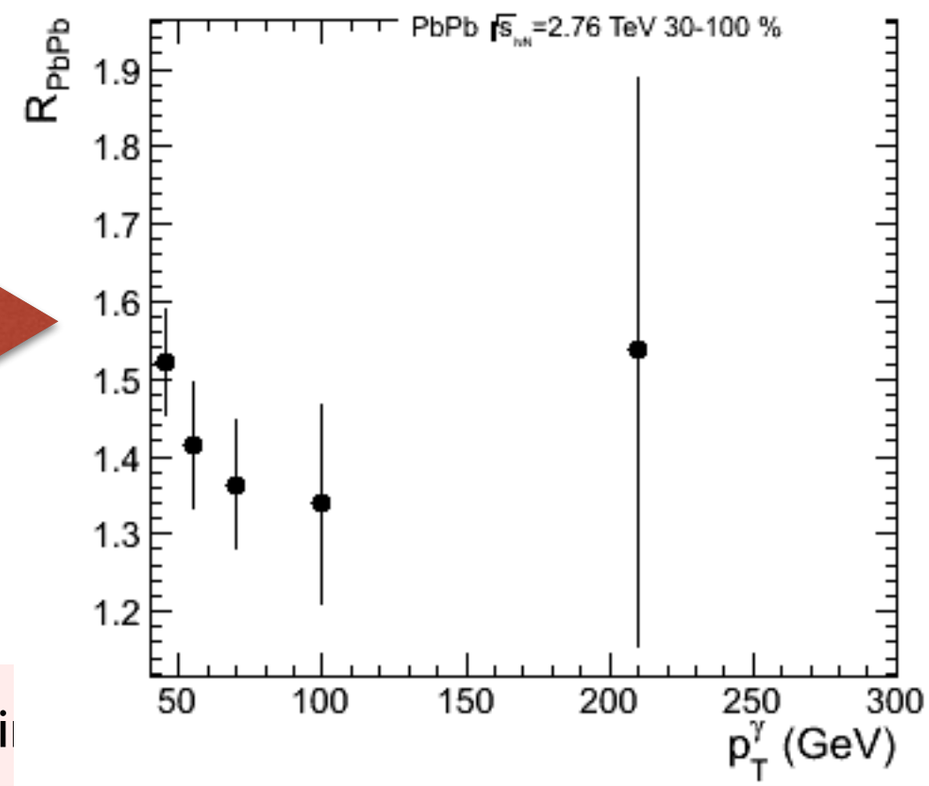
central





peripheral



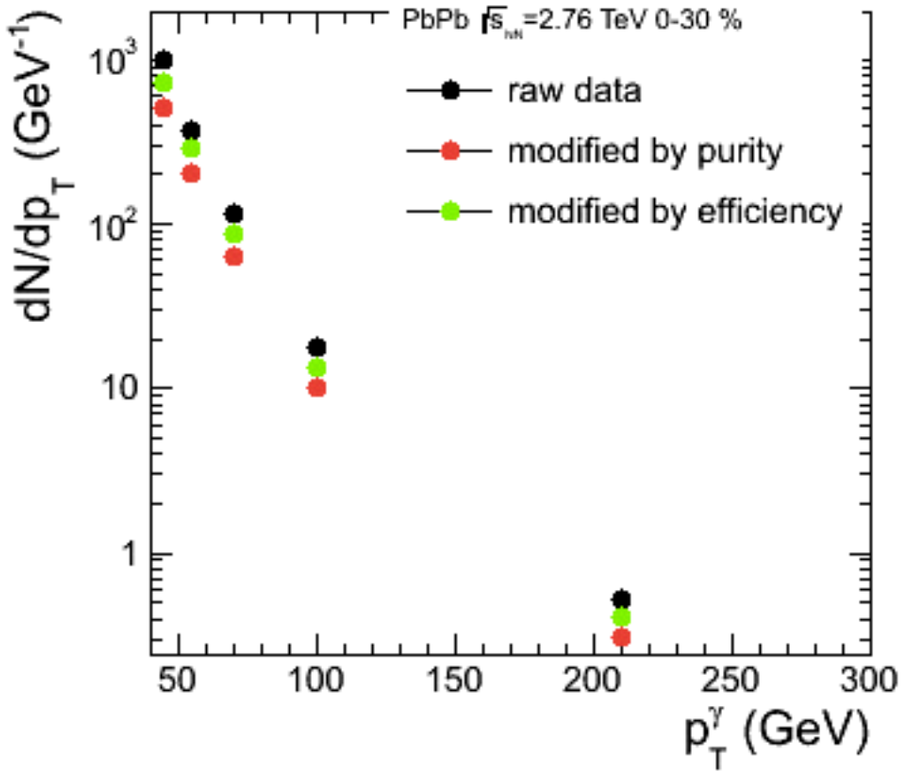


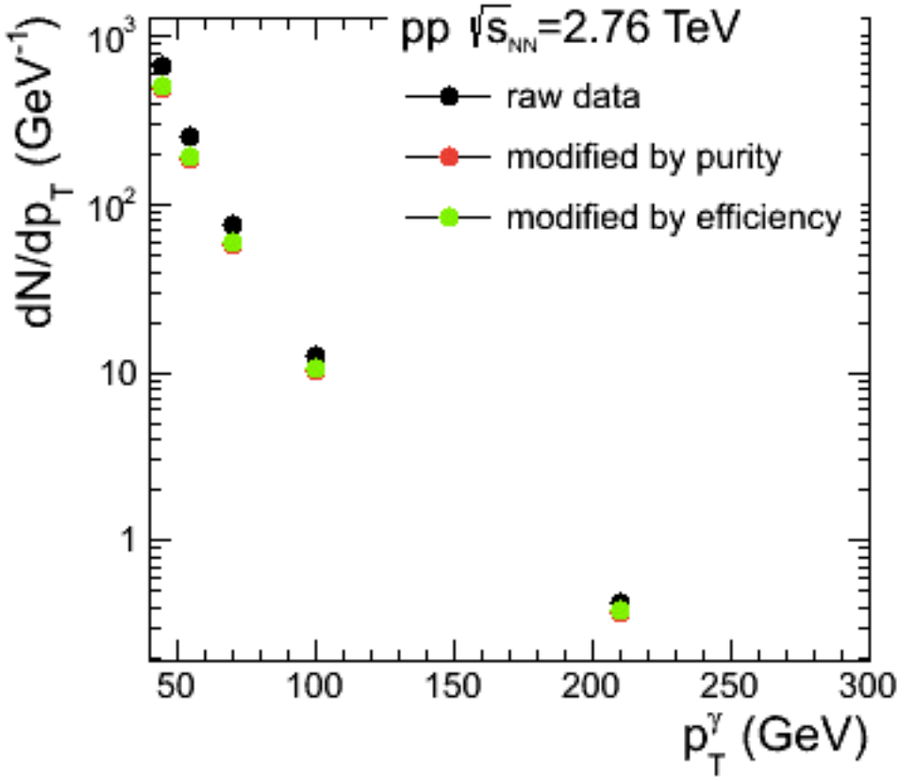
Plan

- validation work for re-reco.
- improve R_pA and R_AA.

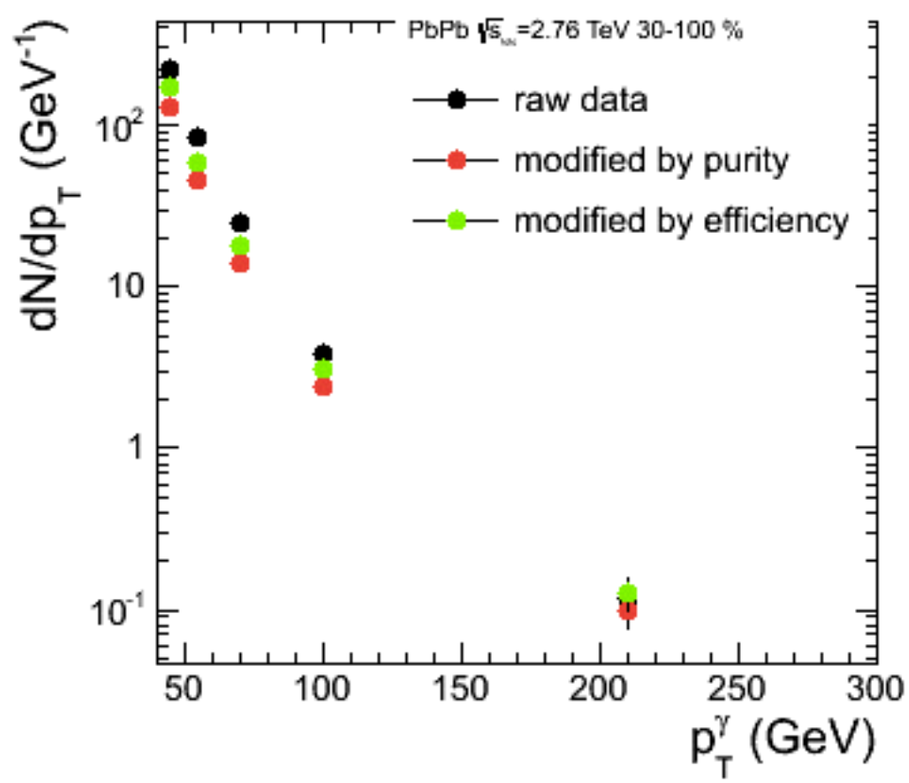
Back up

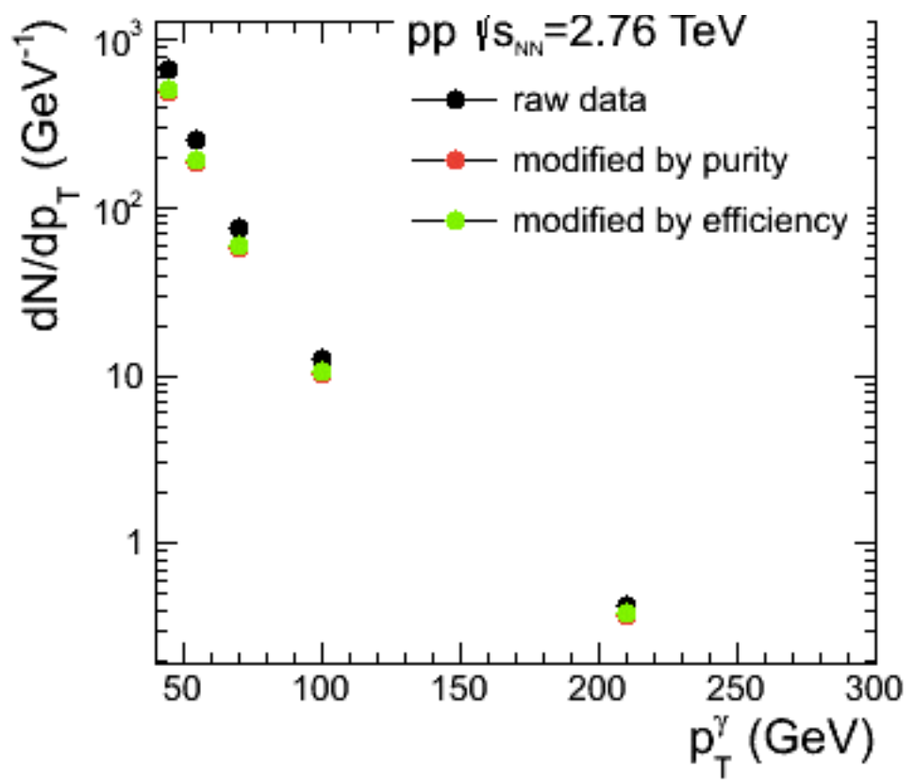
central





peripheral





- The process of measuring ‘nuclear modification factor’ of ‘inclusive isolated photon’.

$$R_{AA}(p_T) = \frac{d^2N_{ch}^{AA}/dp_T}{< T_{AA} > d^2\sigma_{ch}^{NN}/dp_T}$$

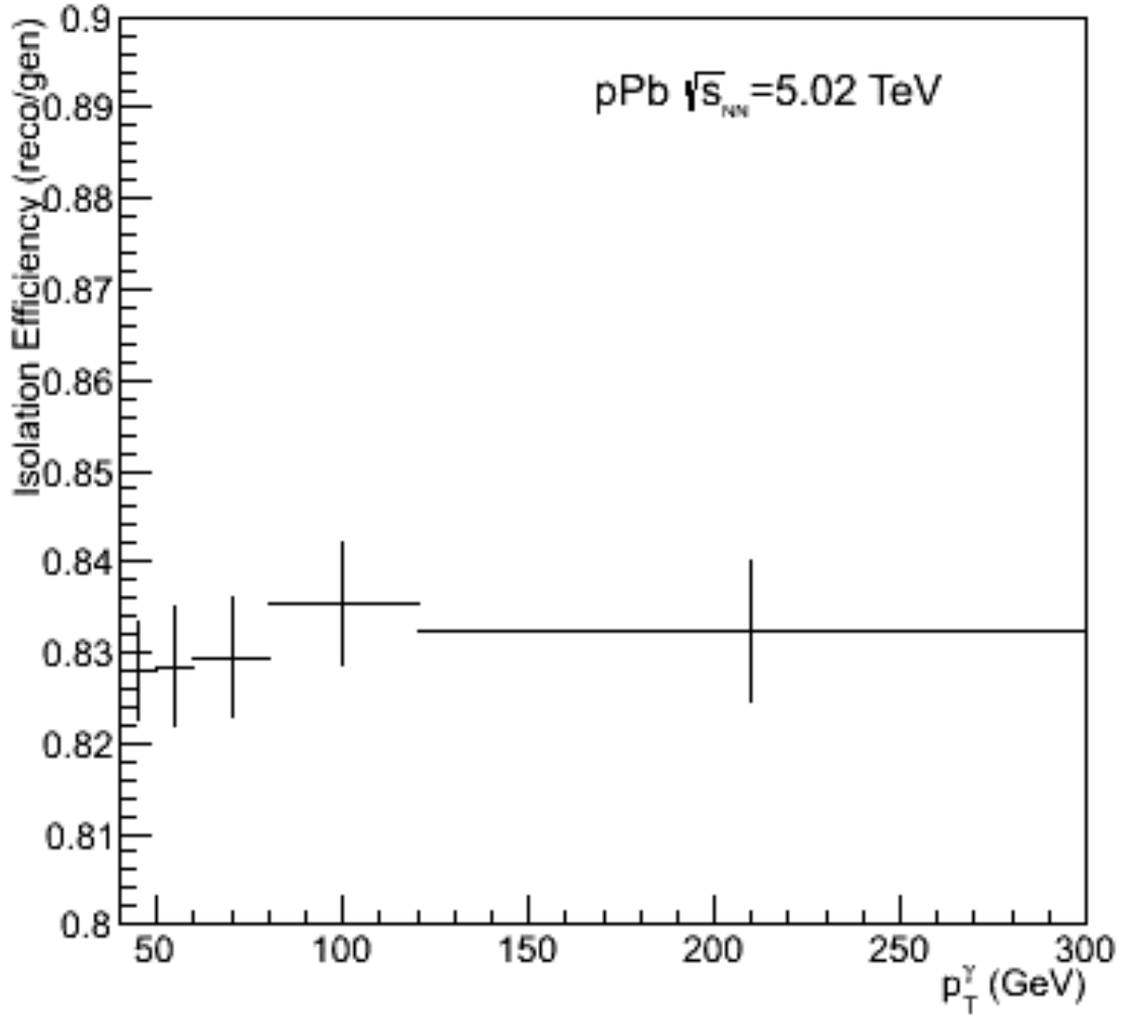
$$< T_{AA} >=< N_{coll} > /\sigma_{inelastic}$$

- It needs efficiency and purity correction

Isolation Efficiency

Isolation efficiency = $\frac{reco}{gen}$, 5 p_T bin (GeV) : 40-50, 50-60, 60-80, 80-120, 120-300

pA



<Efficiency cut>

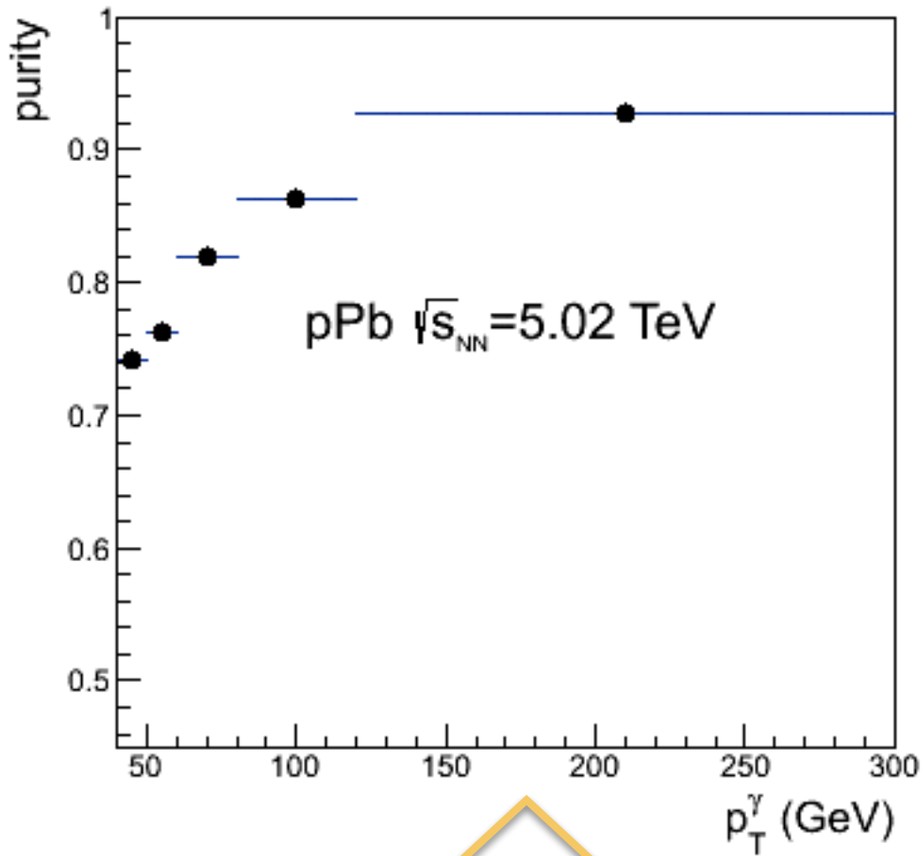
Gen condition : abs(momId) <=22 && abs(eta) < 1.44 && H/E ratio < 0.1 && genIso < 5

Reco condition : Gen condition + (Ecal Iso < 4.2 && Hcal Iso < 2.2 && Track Iso < 2)

reco isolation

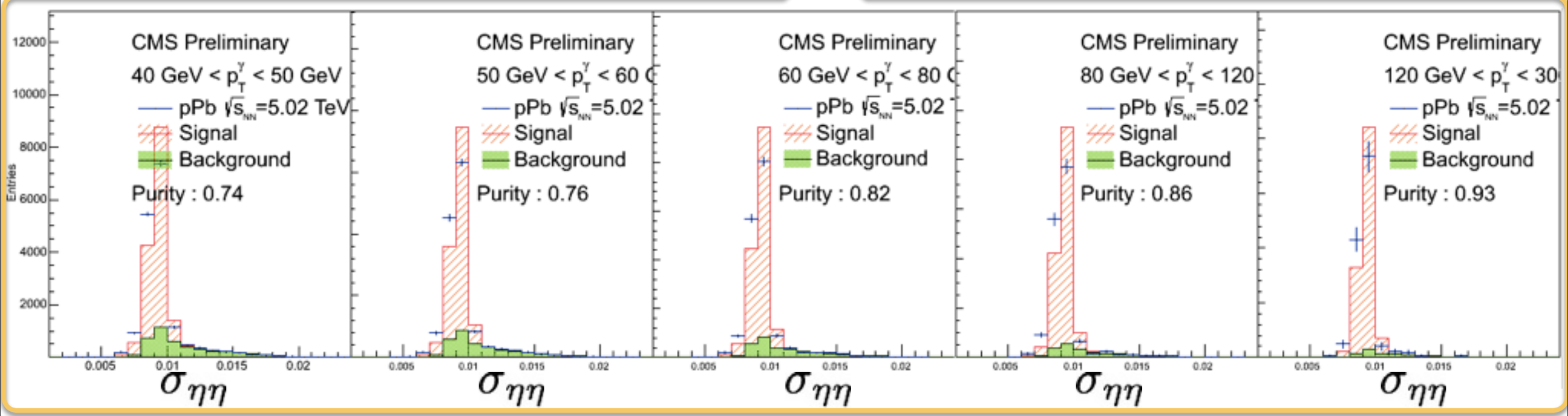
Purity

pA



Purity is measured
by using 'Shower Shape'

Purity = signal/(bkg+signal)



R_pA

of isolated photon = # of photon from data * purity / isolation efficiency

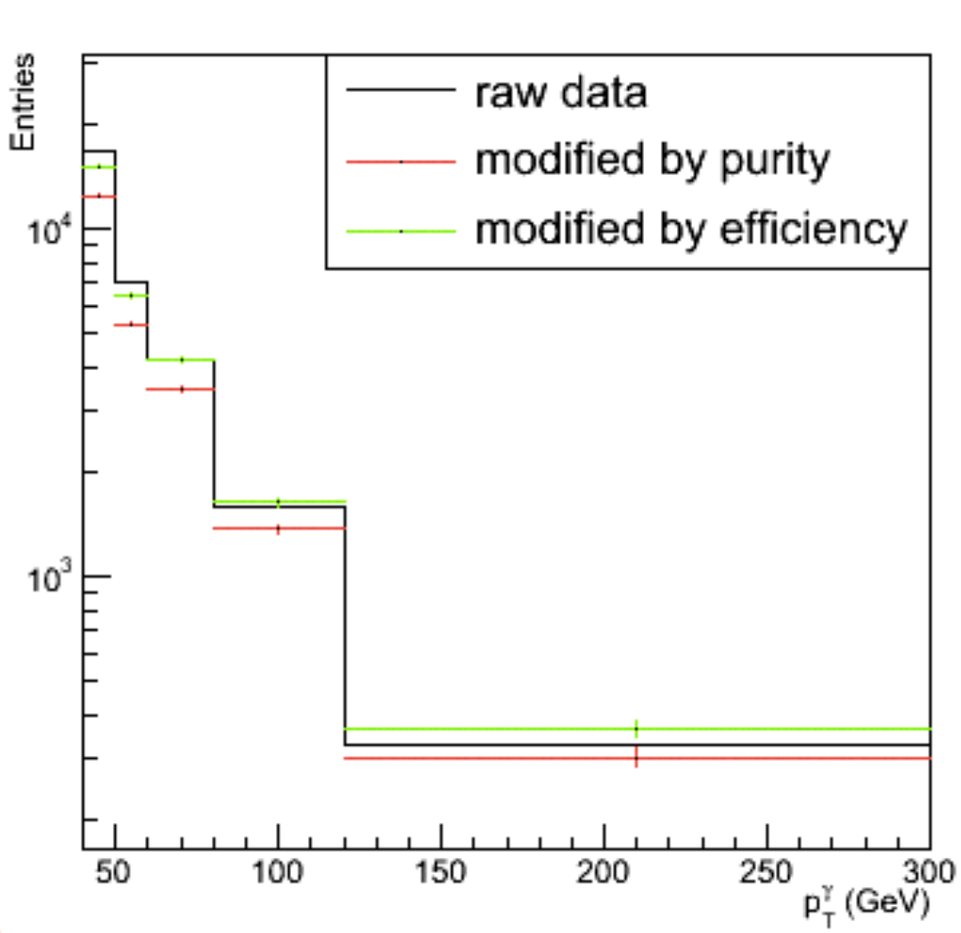
pA

$$R_{pA} = \frac{N_{pA} \cdot \frac{1}{N_{inelastic}} \cdot \frac{1}{dp_T}}{\sigma_{pp} \cdot \frac{N_{coll}}{\sigma_{inelastic,pp}} \cdot \frac{1}{dp_T}}$$

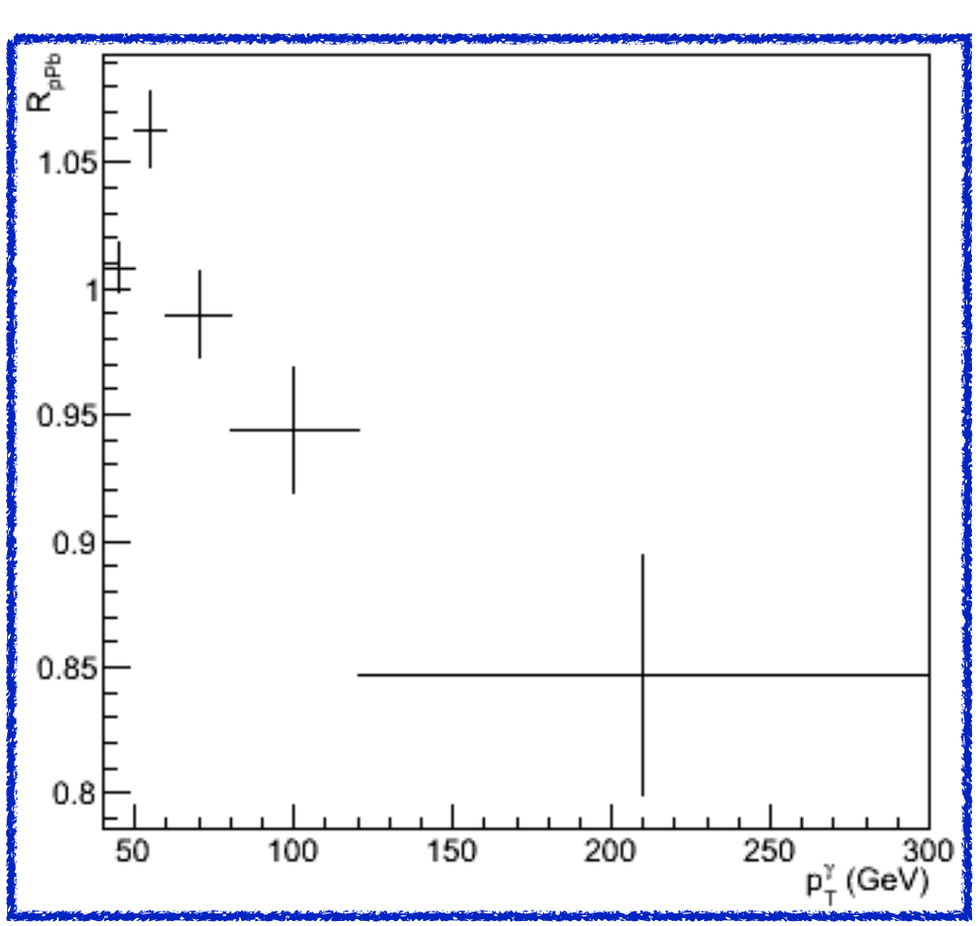
For 5.02 TeV pp reference, I used the JETPHOX values $d^2\sigma/dE_T/d\eta$ in nb/GeV

40-50 : 0.0715079
50-60 : 0.0289211
60-80 : 0.0100936
80-120 : 0.00207405
120-300 : 0.000113533

- $N_{inelastic}$ =2.11 * 35 * 1e9
- N_{coll} =6.9
- $\sigma_{inelastic,pp}$ = 7e7



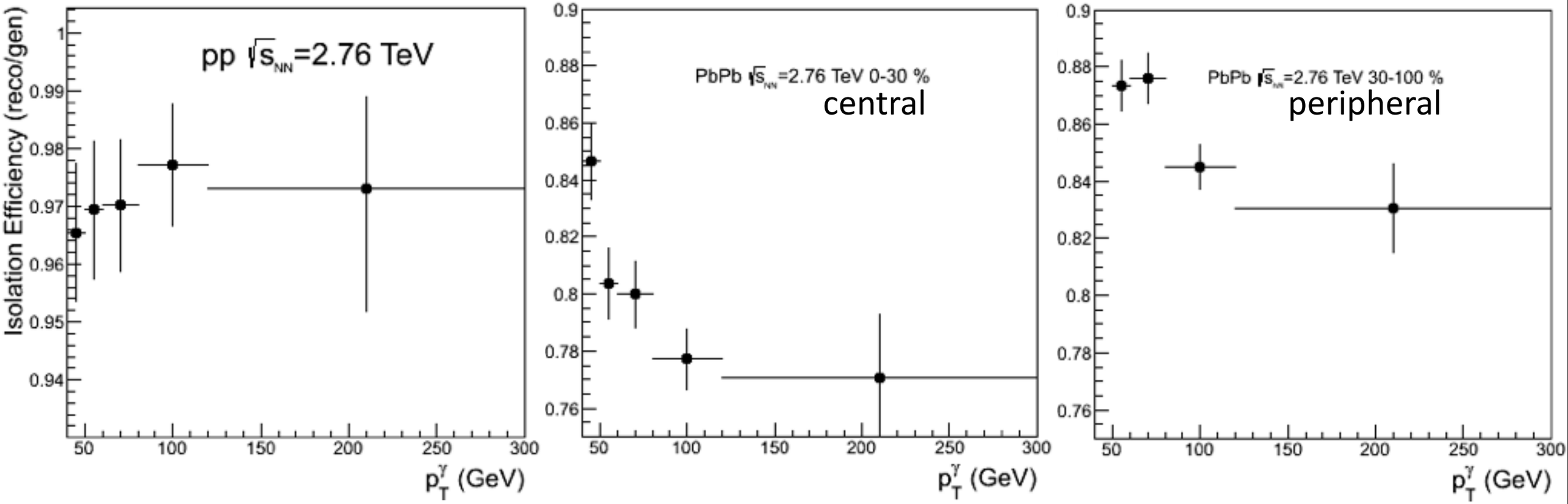
after correction



Isolation Efficiency

5 p_T bin (GeV) : 40-50, 50-60, 60-80, 80-120, 120-300

PbPb



<Efficiency cut>

Gen condition : abs(momId) <=22 && abs(eta) < 1.44 && H/E ratio < 0.1 && genIso < 5

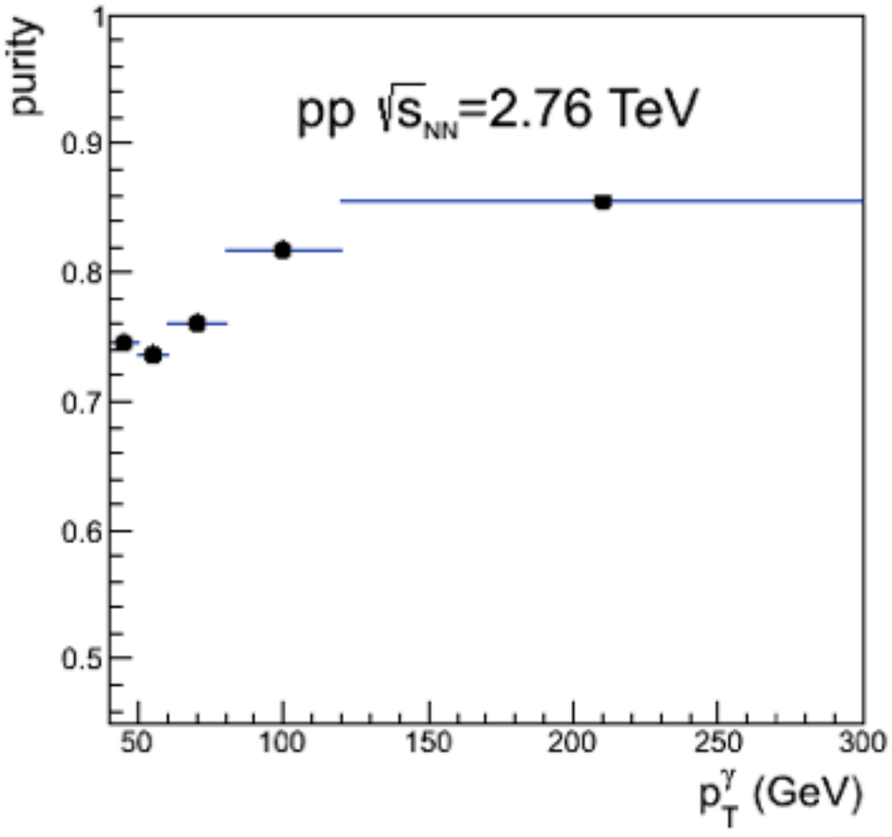
Reco condition(**pp**) : Gen condition + (Ecal Iso < 4.2 && Hcal Iso < 2.2 && Track Iso < 2)

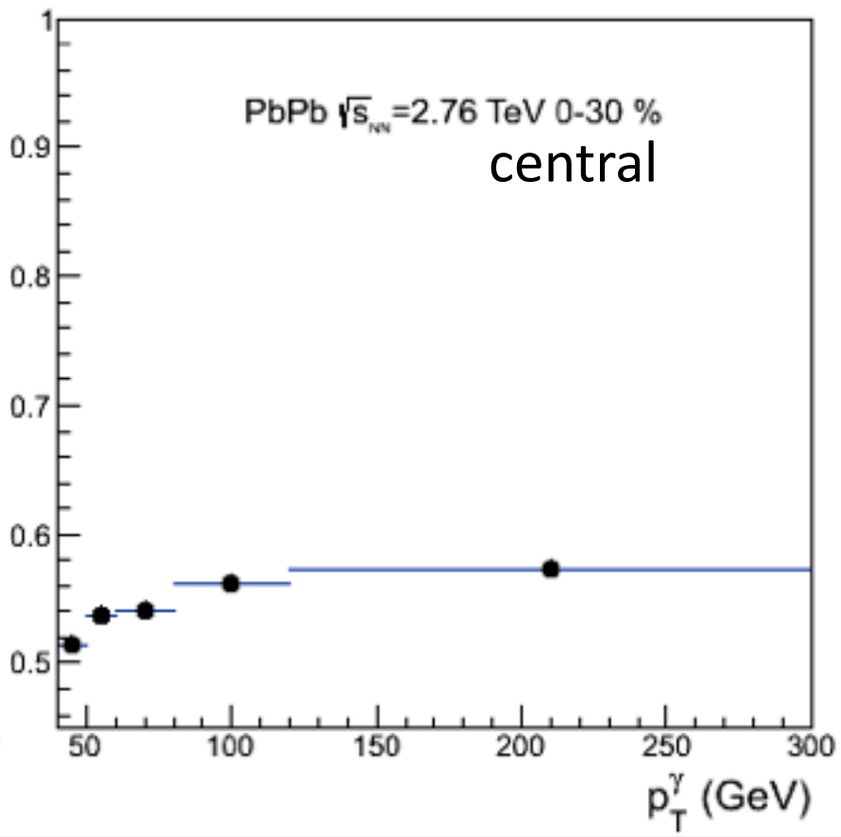
Reco condition(**PbPb**) : Gen condition + (Sum Iso < 1) reco isolation

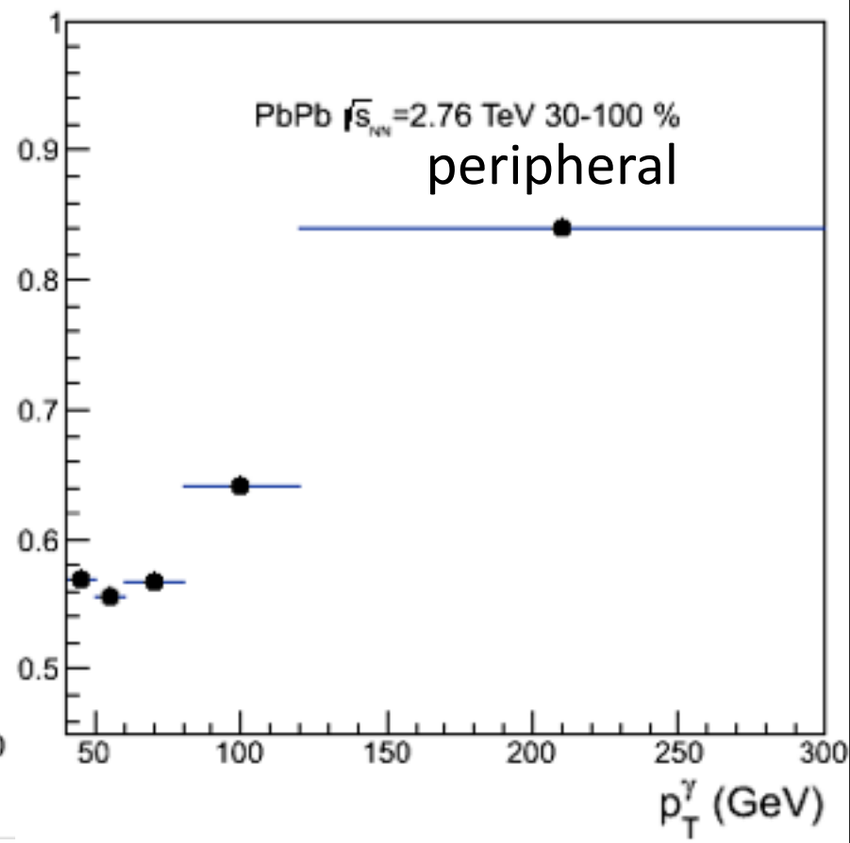
Purity

5 p_T bin (GeV) : 40-50, 50-60, 60-80, 80-120, 120-300

PbPb



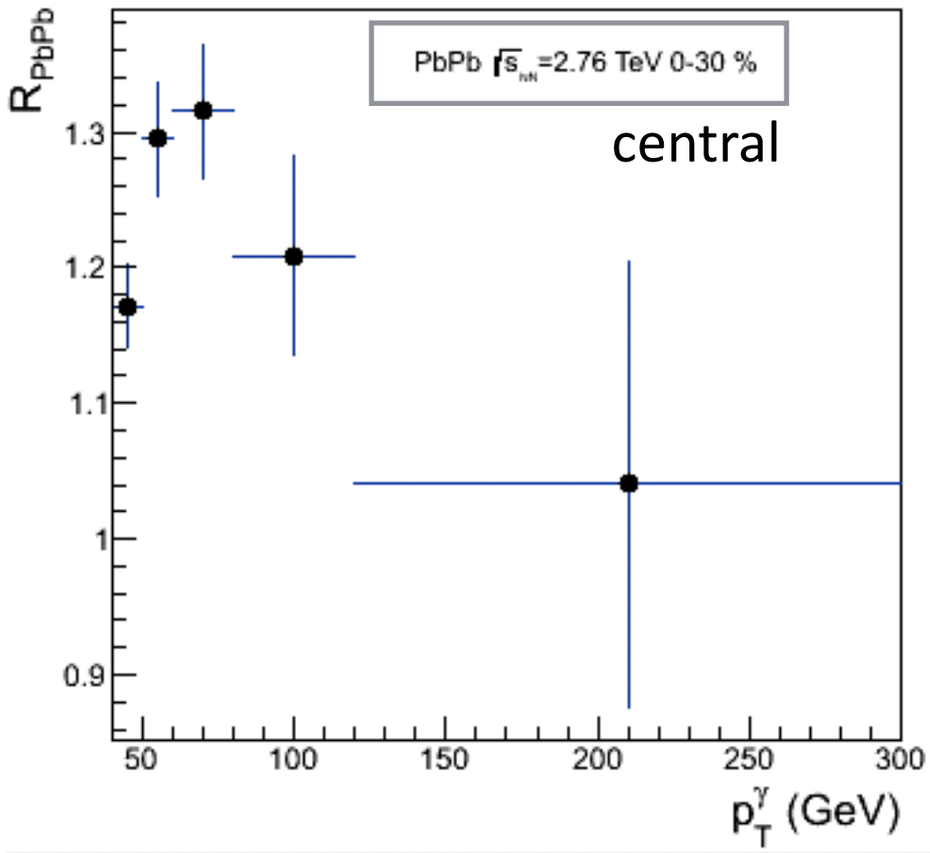


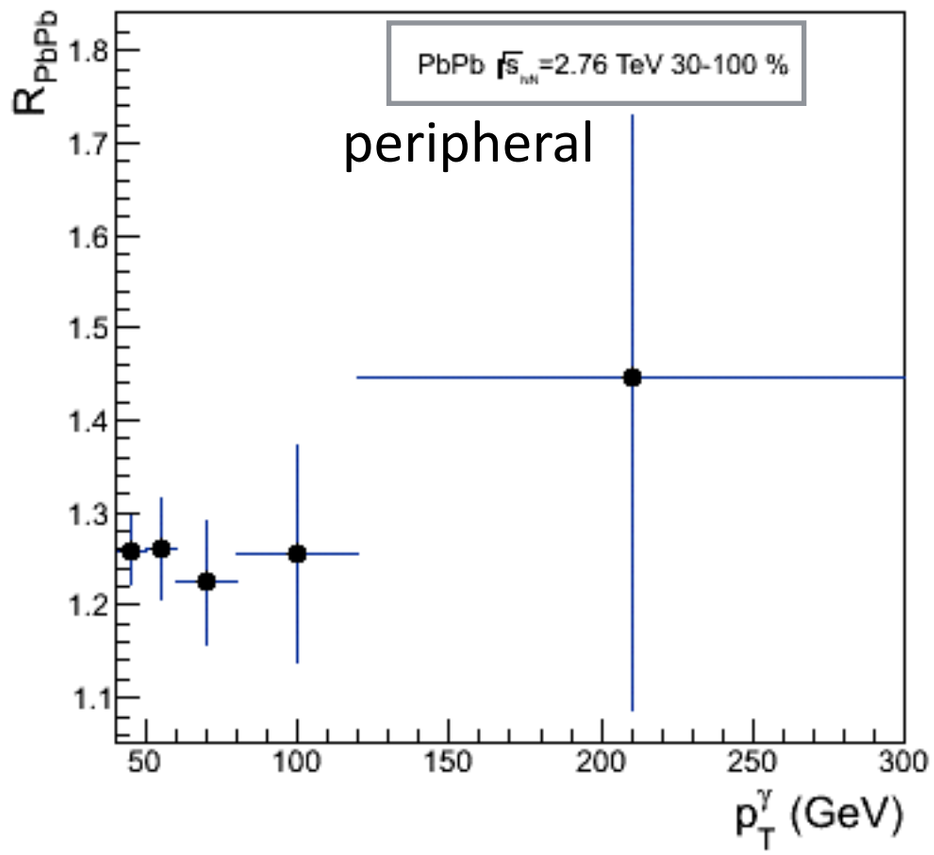


R_pbpb

PbPb

$$R_{AA}(p_T) = \frac{d^2 N_{ch}^{AA} / dp_T d\eta}{\langle T_{AA} \rangle \, d^2 \sigma_{ch}^{NN} / dp_T d\eta}$$





<PbPb 0-30%>
- N_{MB} = 7.66 * (150 * 1e6) * 0.3
- $\langle T_{AA} \rangle$ = 15.5 mb^{-1}

<PbPb 30-100%>
- N_{MB} = 7.66 * (150 * 1e6) * 0.7
- $\langle T_{AA} \rangle$ = 1.44 mb^{-1}

Plan

- It also need centrality re-weighting correction.