# Checks on low $p_T$ bins

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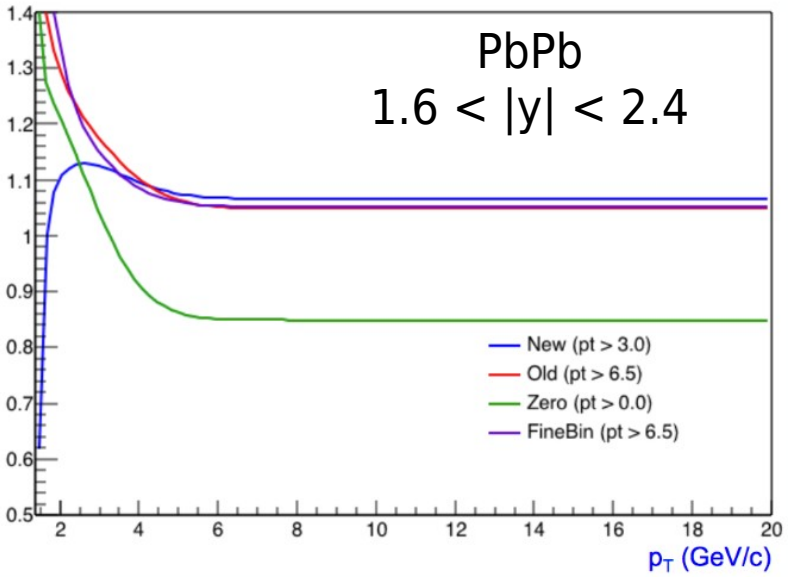
# Status

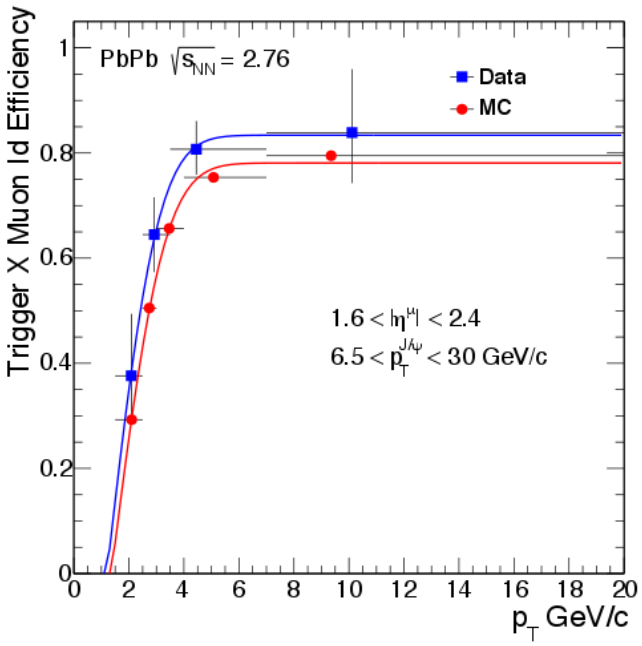
- Single muon efficiency correction function with TnP was re-tested
  - With AIC test, single muon efficiency $p_T$ curve is tested
- New PbPb and pp TnP corrections are determined
  - In $1.6 < |y| < 2.4$ region, $p_T > 3$ GeV/c is going to be used
  - Among many of TnP single muon efficiency curves, the best fit curve is chosen



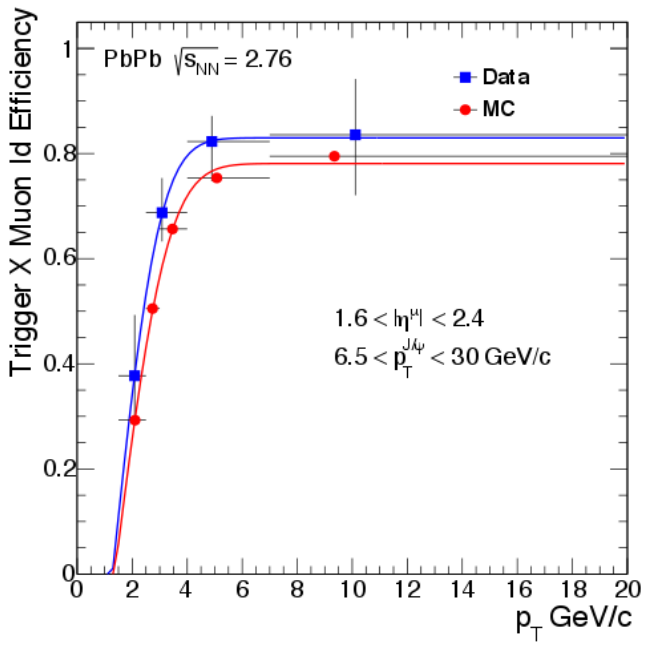

- New $R_{AA}$ and $v_2$ results came out
  - In all rapidity regions, high-$p_T$ $R_{AA}$ look reasonable
  - Again, low-$p_T$ region has bigger discrepancy compare to high-$p_T$
  - Investigating on a dedicated fit method for low-$p_T$ region

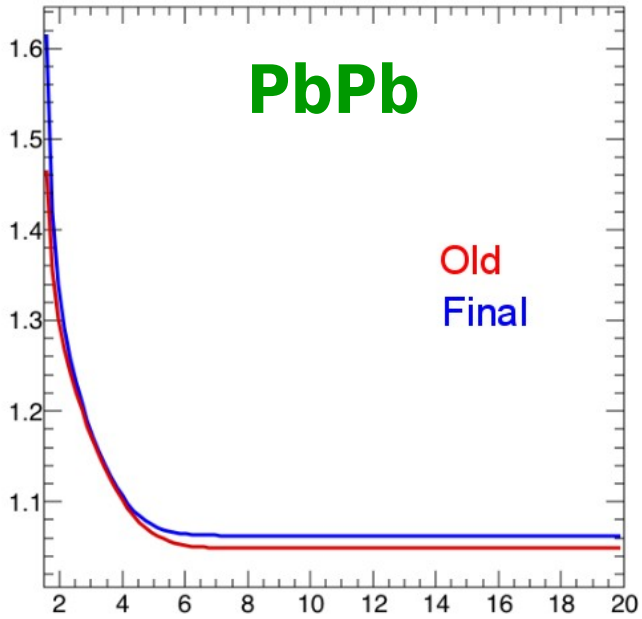
# TnP correction curves

Old

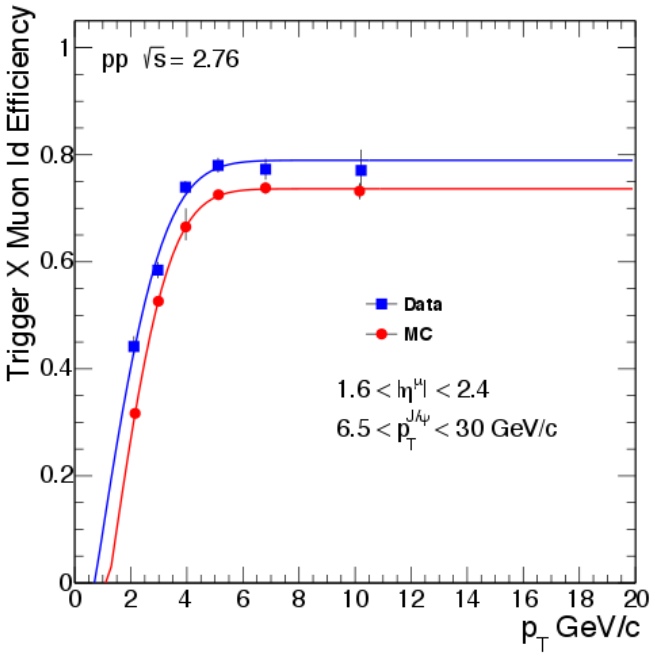



Final

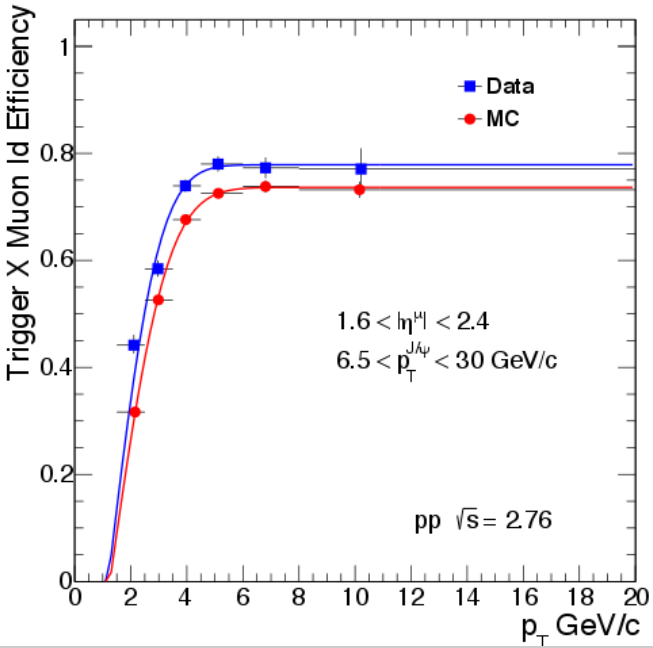


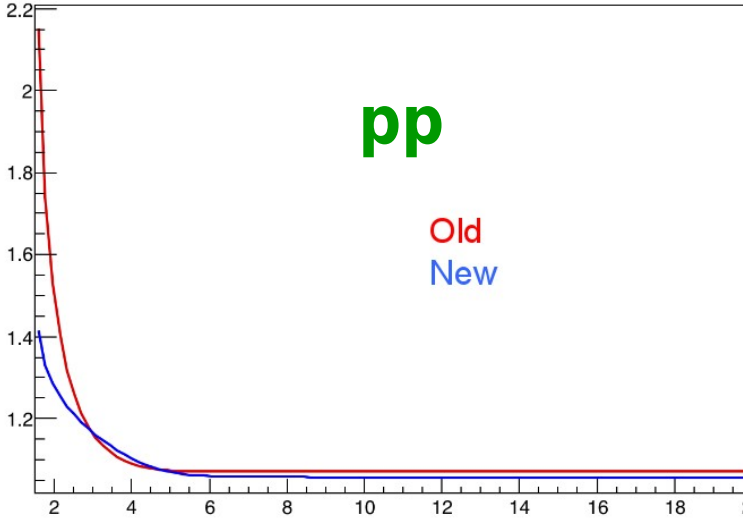




Previous One

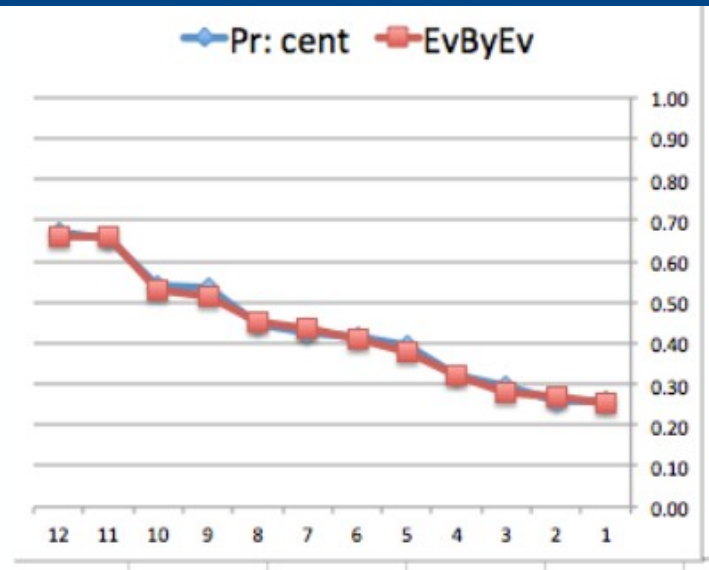


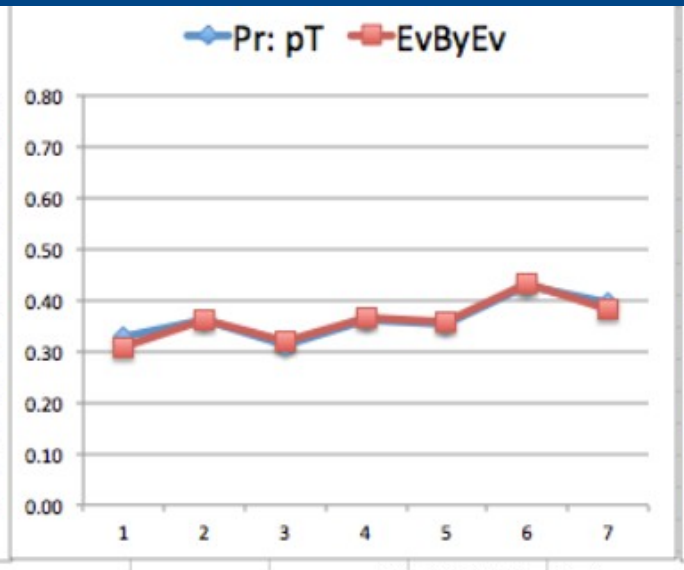

New One

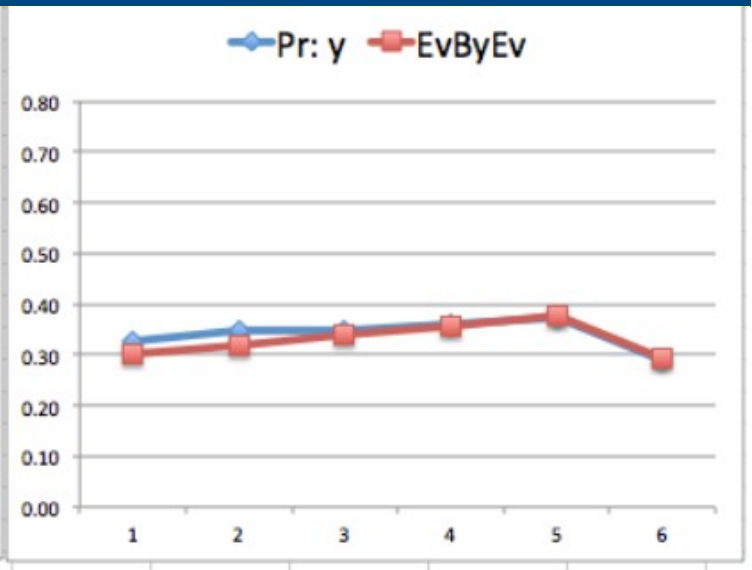


# $R_{AA}$ in 1D

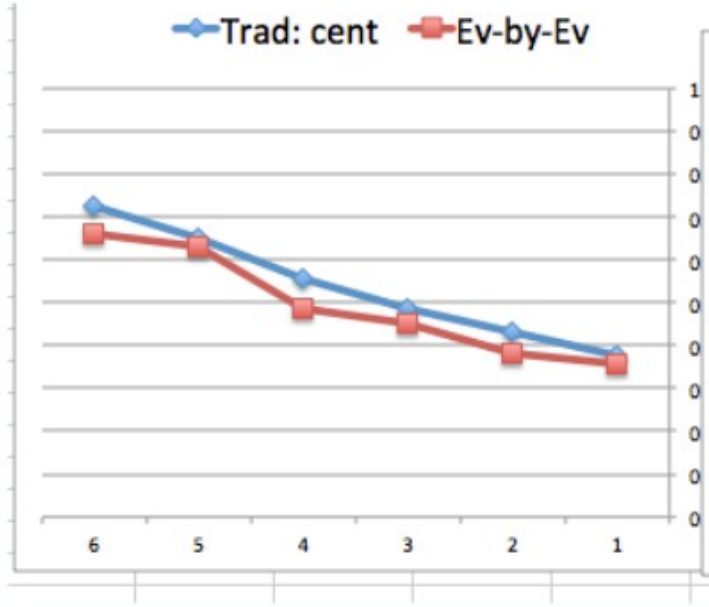


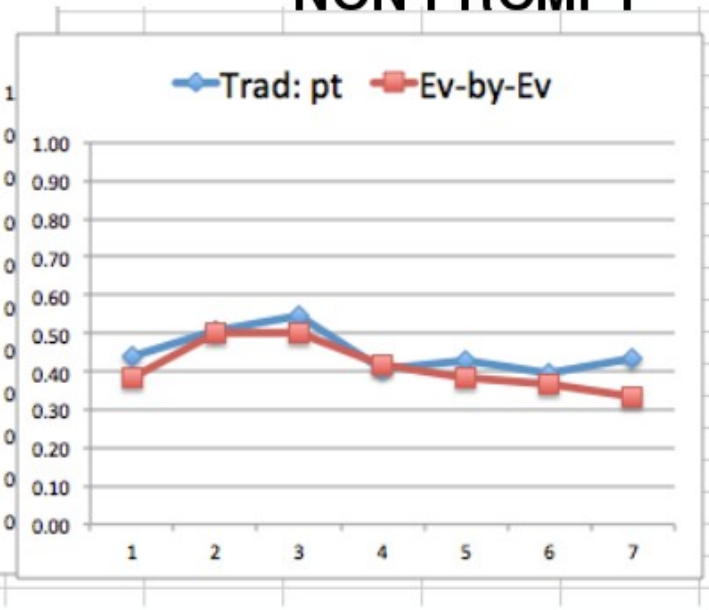



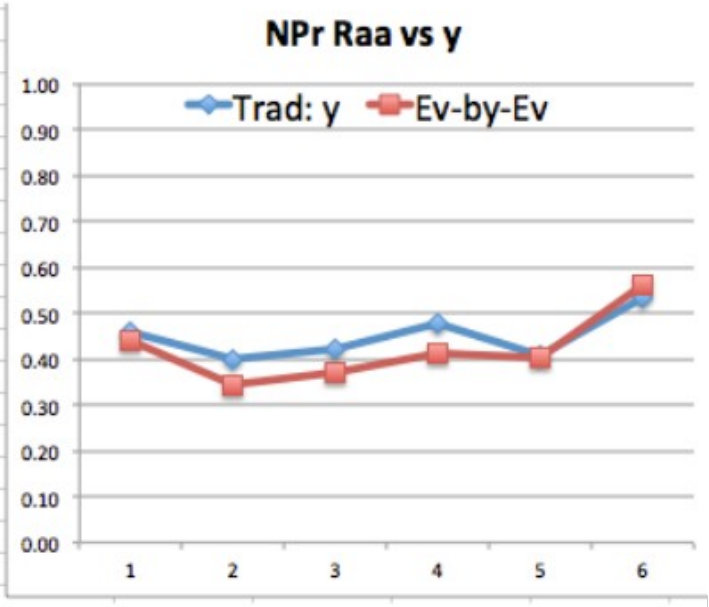




**PROMPT**

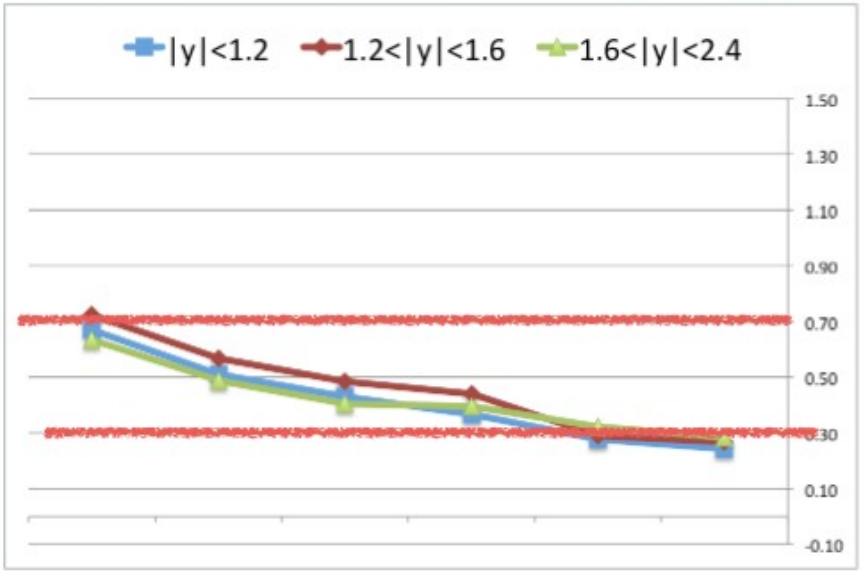
**NON-PROMPT**

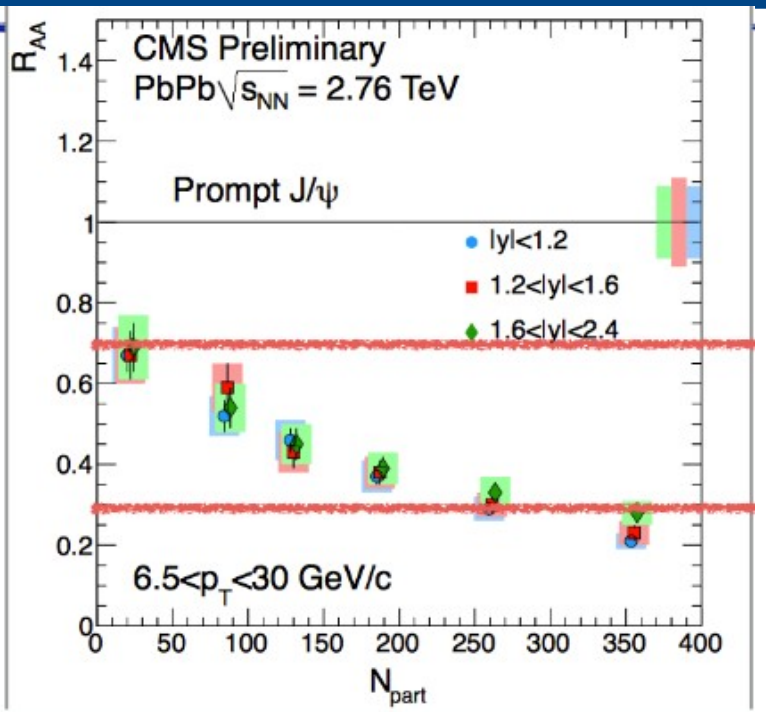


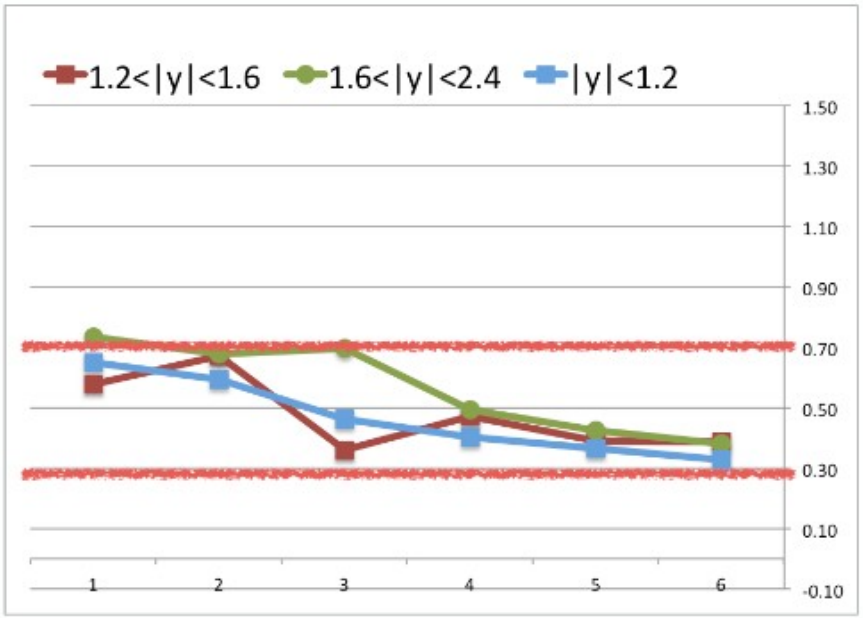



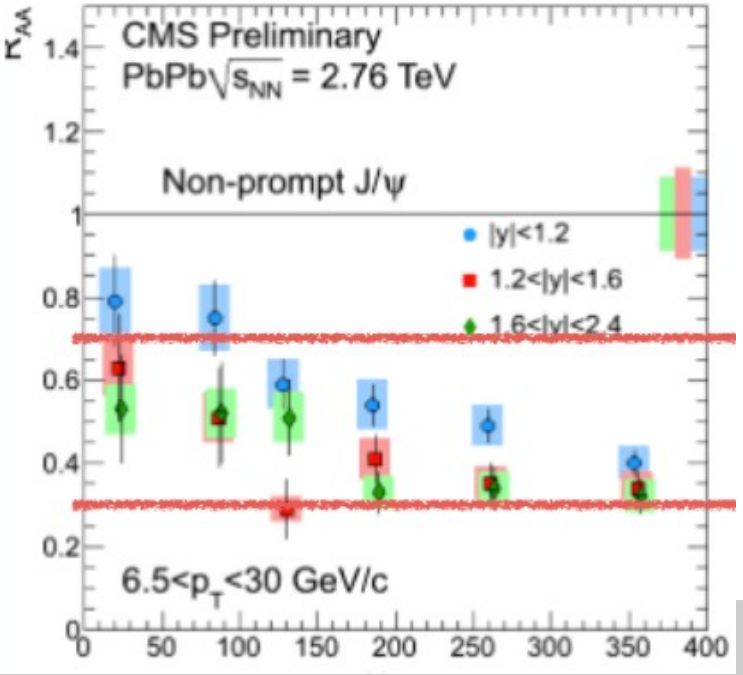



# $R_{AA}$ in 2D

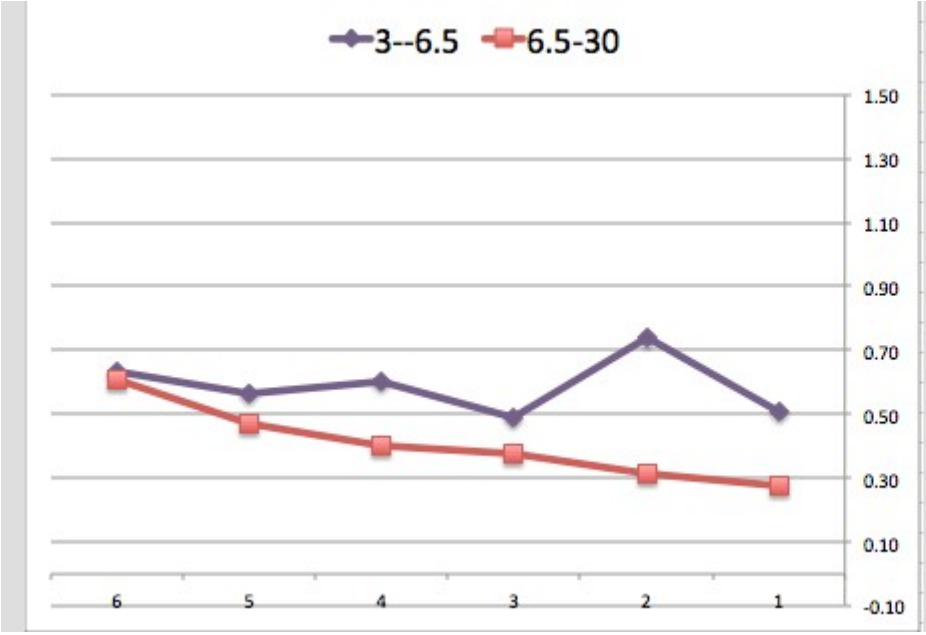

|y|<1.2
1.2<|y|<1.6
1.6<|y|<2.4
1.50
1.30
1.10
0.90
0.70
0.50
0.30
0.10
-0.10

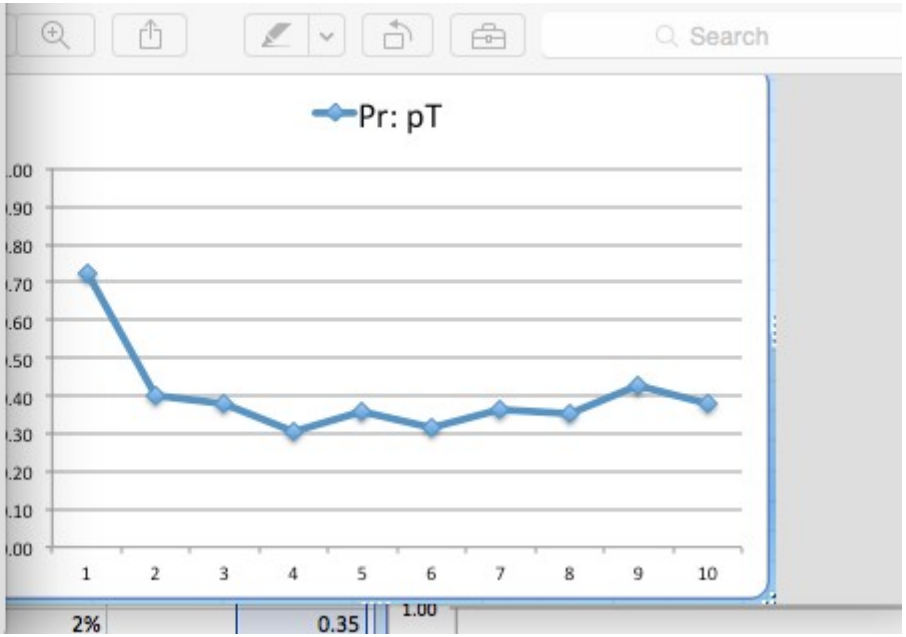

CMS Preliminary
PbPb$\sqrt{s_{NN}}$ = 2.76 TeV
Prompt J/ψ
|y|<1.2
1.2<|y|<1.6
1.6<|y|<2.4
6.5<p$_T$<30 GeV/c
$R_{AA}$
$N_{part}$

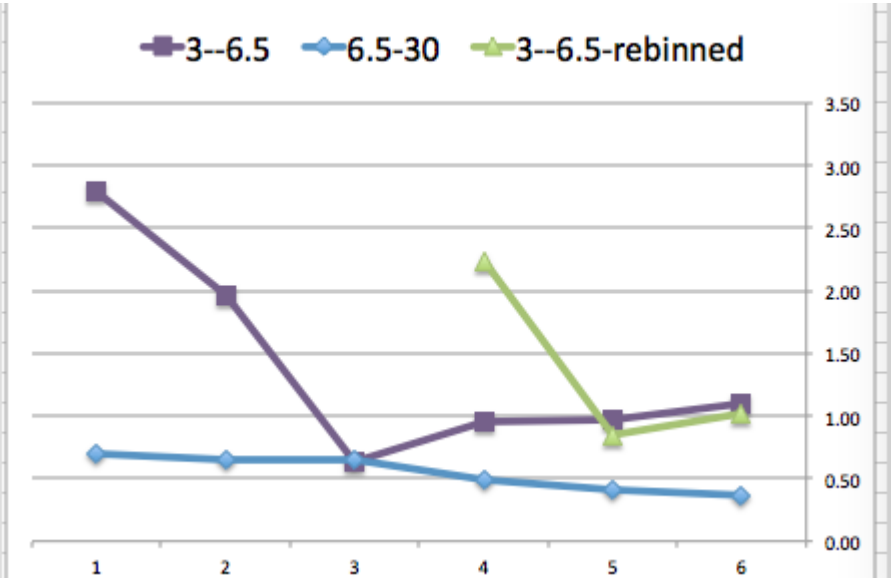

1.2<|y|<1.6
1.6<|y|<2.4
|y|<1.2
1.50
1.30
1.10
0.90
0.70
0.50
0.30
0.10
-0.10
1
2
3
4
5
6

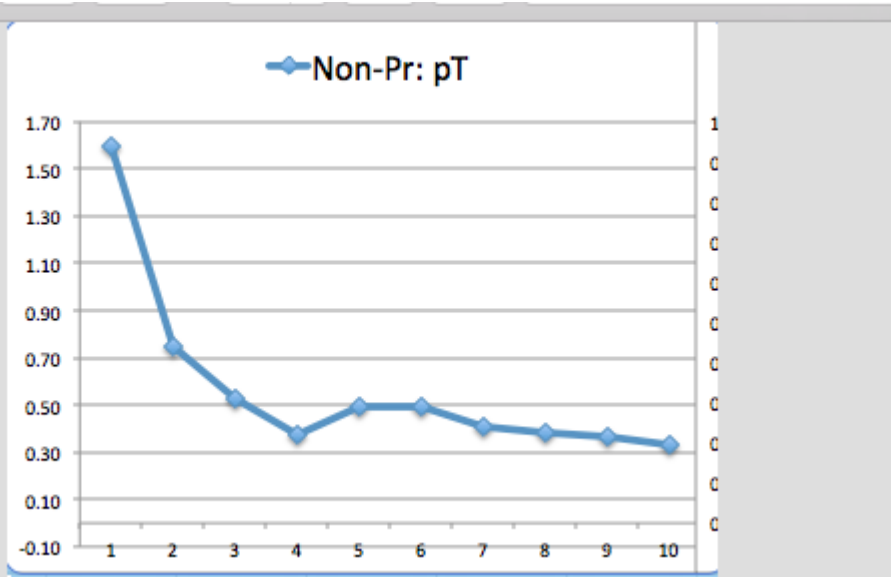

CMS Preliminary
PbPb$\sqrt{s_{NN}}$ = 2.76 TeV
Non-prompt J/ψ
|y|<1.2
1.2<|y|<1.6
1.6<|y|<2.4
6.5<p$_T$<30 GeV/c
$R_{AA}$

# $R_{AA}$ in low-$p_T$ (event by event weighting)

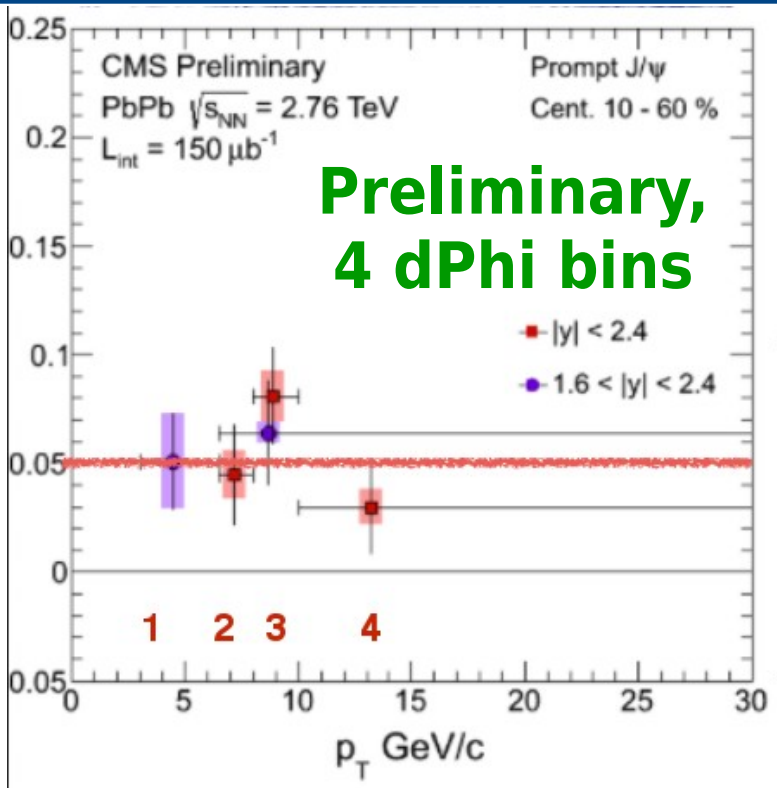


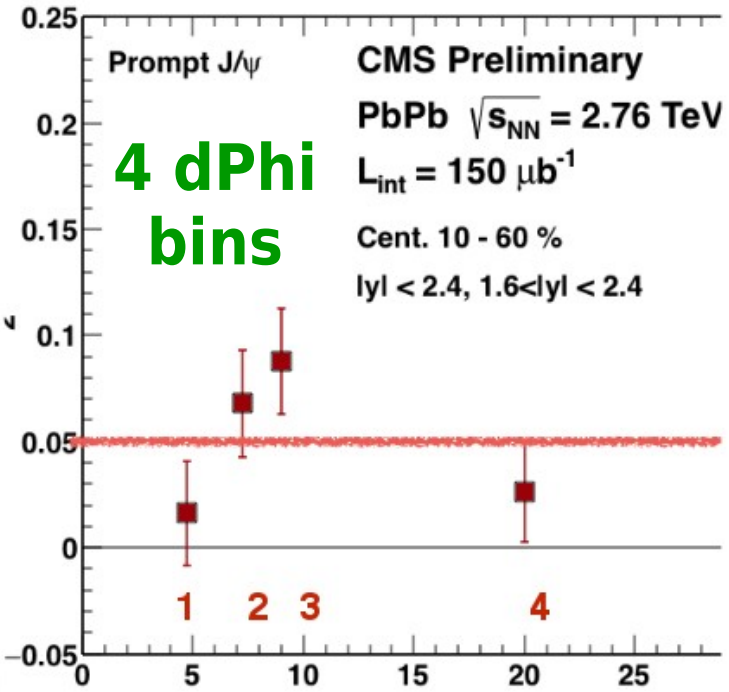



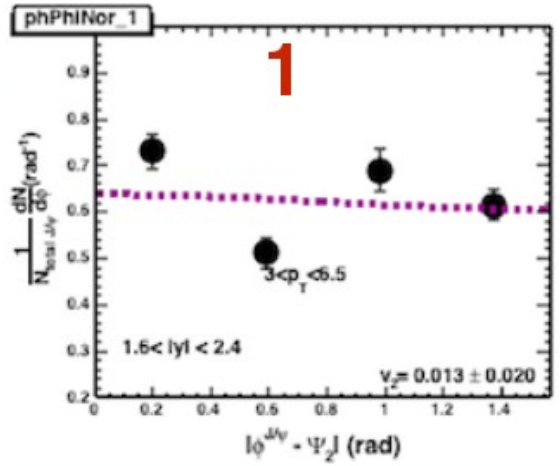



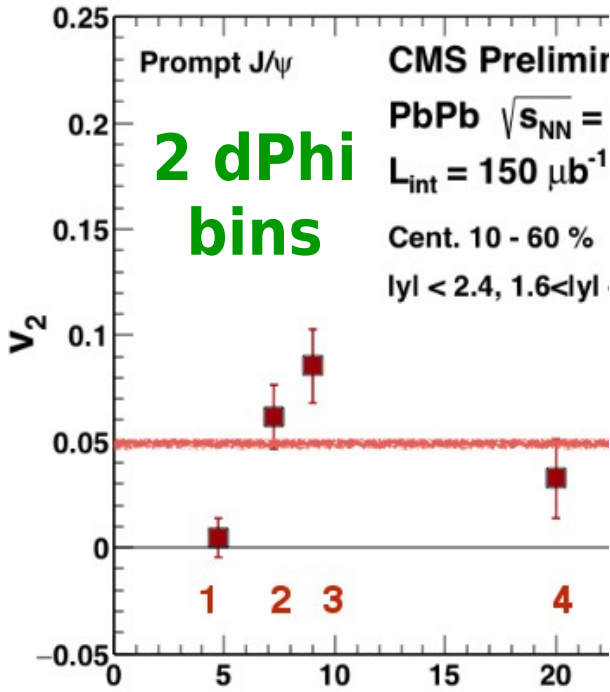



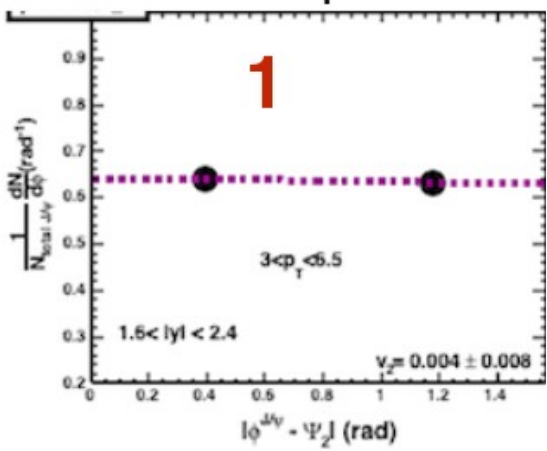
# Elliptic flow



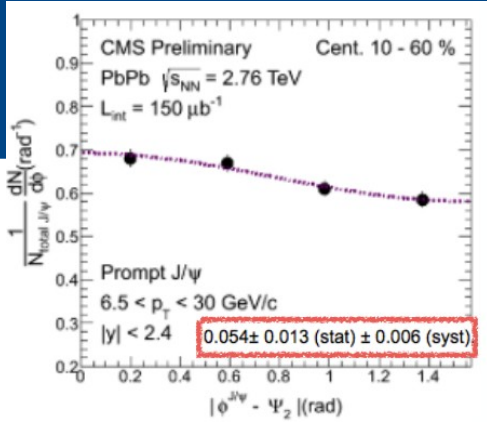



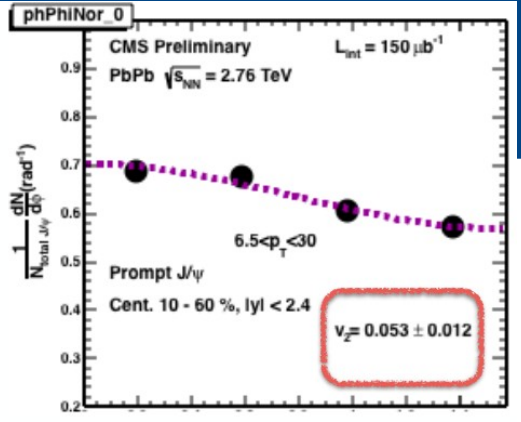



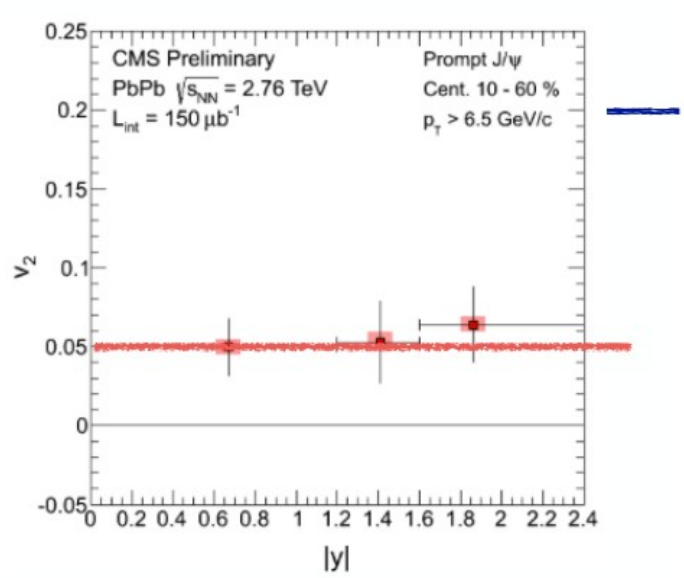

- 1: Low-pt much lower (due to a failed bin in dPhi?)
- 2: first high-pt point slightly higher

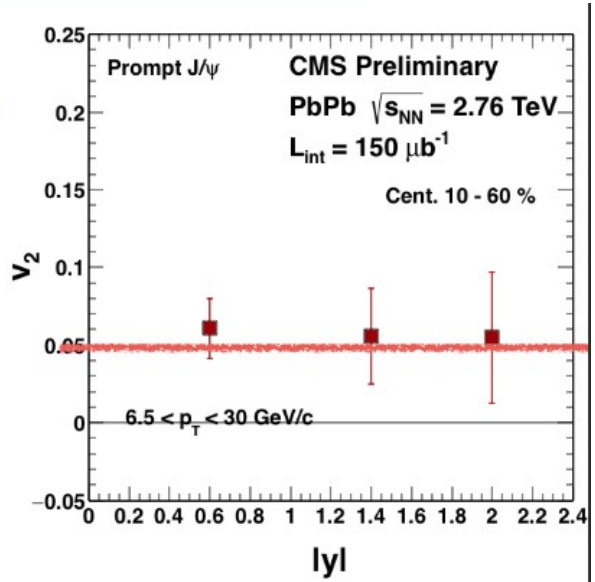
# Elliptic flow

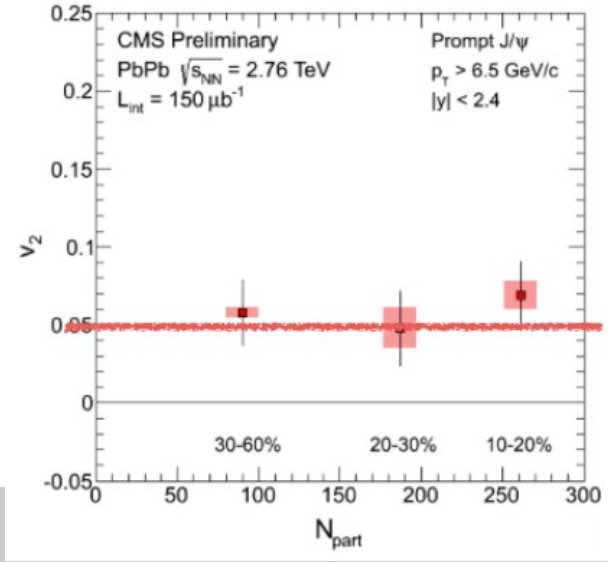


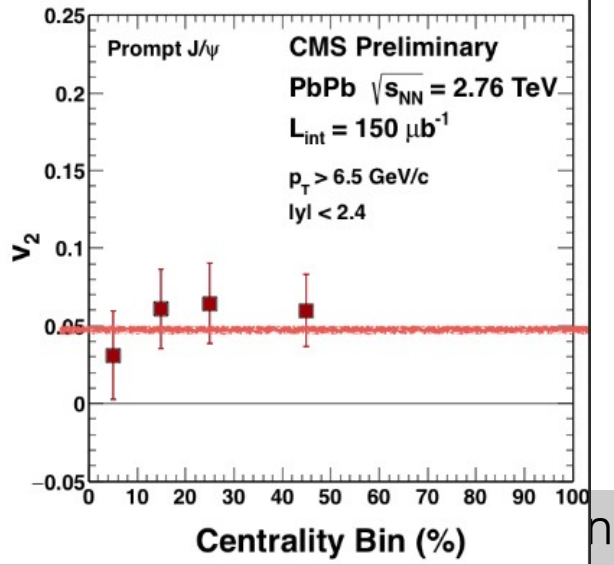




- Prompt J/ψ $v_2$ is on the same level compare to the preliminary results

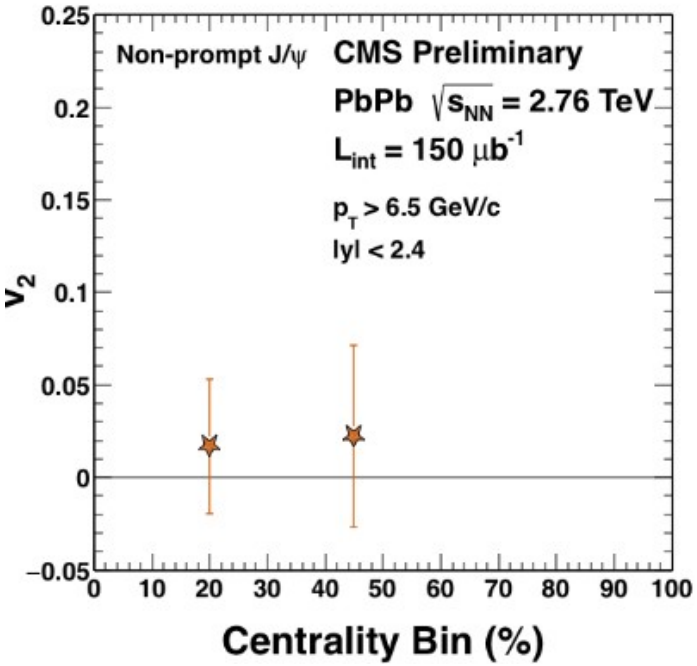


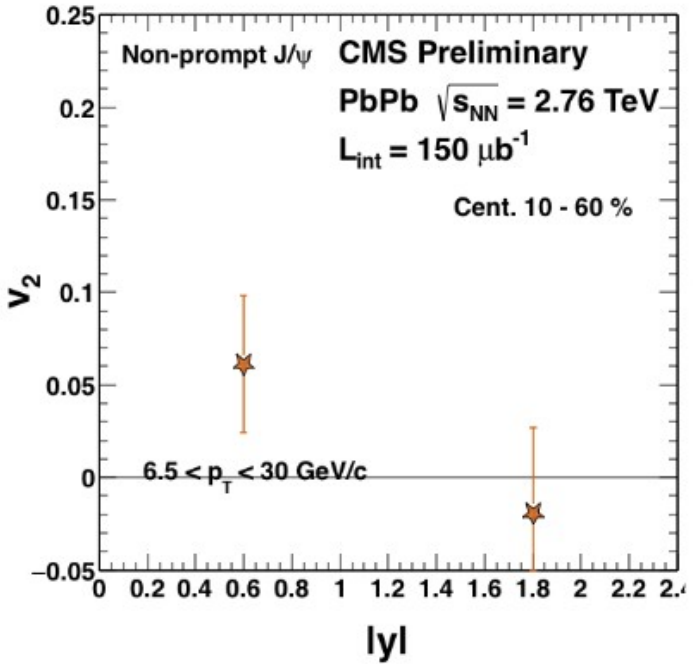



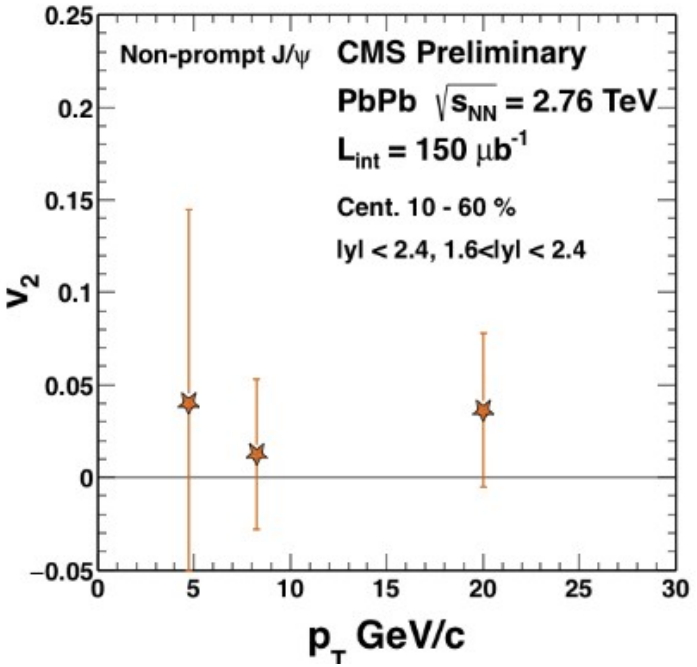



# Elliptic flow



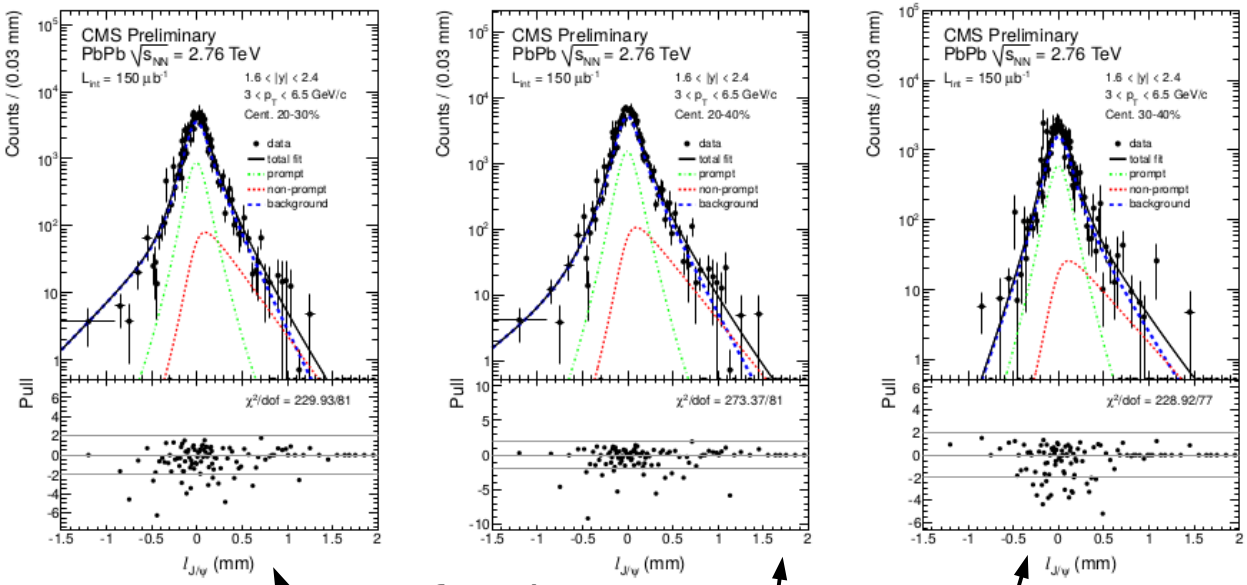




- Non-prompt J/ψ $v_2$ has bigger uncertainties
- On average, $v_2 \approx 0$

# PbPb low $p_T$ bins

- Peripheral bins have 25~29% b-fraction while central bins have 11~15%
  - This causes non-prompt J/ψ $R_{AA}$ higher than normal
  - Wider shapes are not described properly
    - Need narrower widths at [-1, -0.5] mm and [0.5, 1] mm regions



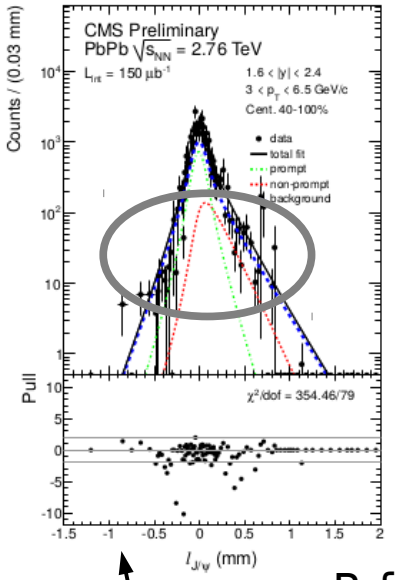


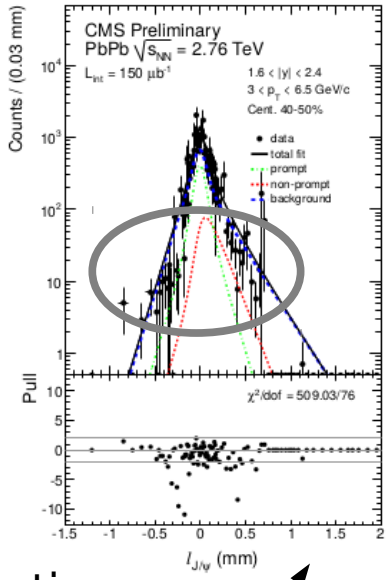





B-fraction
= 11~15%

Data points are well described over all ctau regions




B-fraction
= 25~29%

Circled area is over-estimated by total fit (black curve)

# Solutions?

- There are 2 resolution function widths: Narrower, wider widths
- Narrower width is a free parameter
- Wider width is determined with PRMC
  - Maybe resolutions in low $p_T$ & forward region is not well defined in MC
  - Hence it may have to be determined by data in the last step
  - Changing also other fit parameters in various ways to have better fit results

# Other business

- RelVal HI muon samples
  - CMSSW_7_3_0_pre2 is going to be released with new HI tracking algorithm
  - Z → mm MC sample with HI reco is presented from CMSSW_7_3_0_pre1
    - But this sample doesn't produce automatic RelMon plots
    - Have to be fixed by central production team for next release
  - So far, pp and HI community shared RelVal reports
  - But pp and HI will have separate reports from CMSSW_7_3_0_pre2
  - Summary of RelVal for last months will be reported in the next muon POG meeting
- pA J/ψ MC sample production
  - The principle was using pure PYTHIA without background events
    - Doesn't need much change in gen fragments
  - But it seems gen fragments have a background mixing module inside
    - Going to have a discussion with Yetkin for details