

ϕ -meson Global Spin Alignment Update

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Current State of Analysis

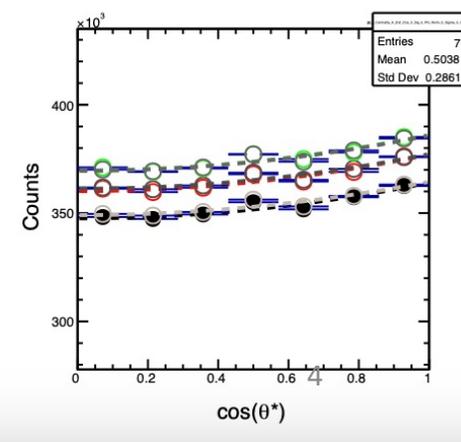
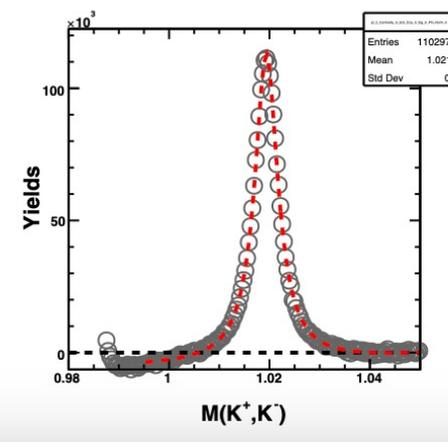
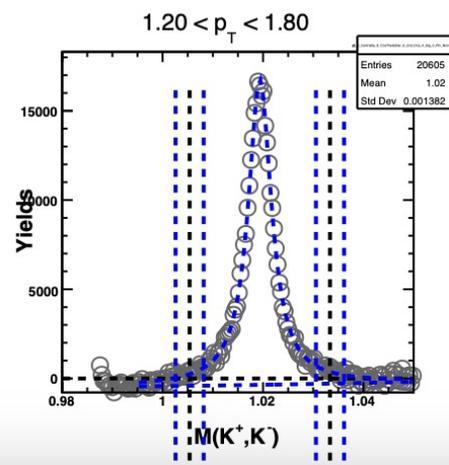
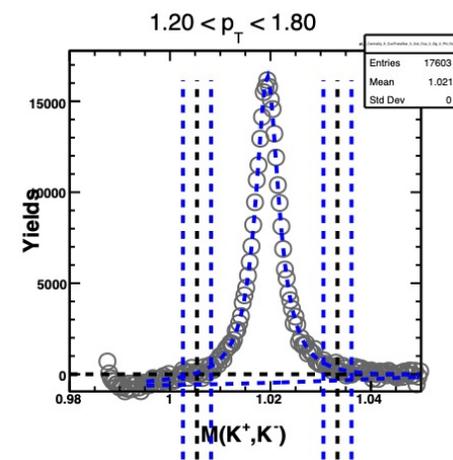
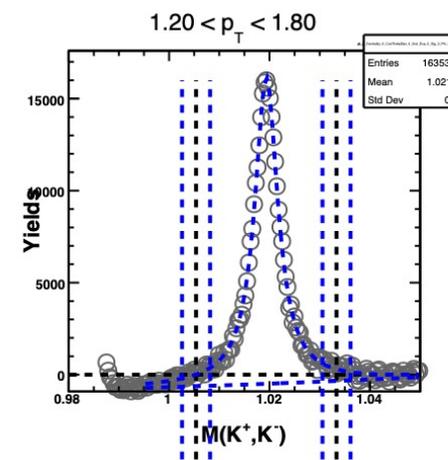
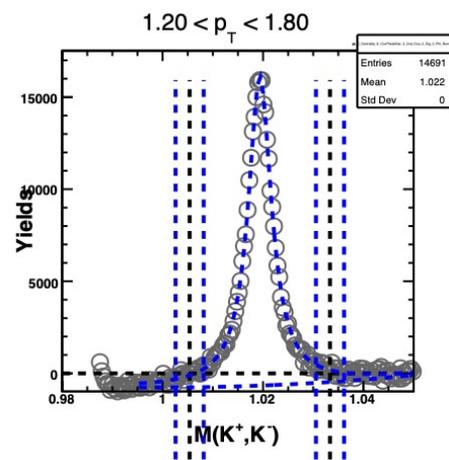
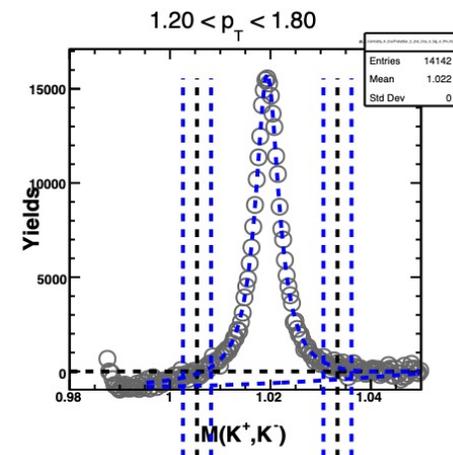
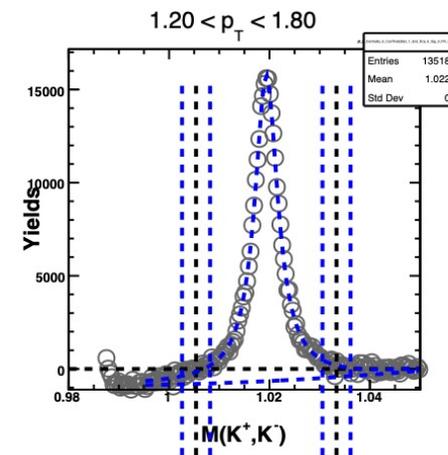
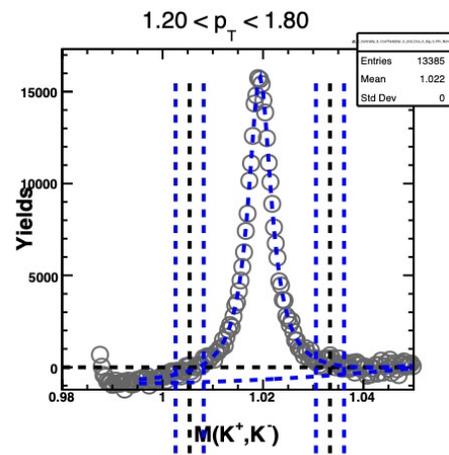
- Divided ϕ -meson analysis into 3 bins based on daughter Kaon η acceptance with $|y| < 1.5$ for all ϕ -mesons.
 - $K^{+/-} |\eta| < 1.0$ && $K^{-/+} |\eta| < 1.0$ (All particles require TOF + TPC)
 - $K^{+/-} |\eta| < 1.0$ (TOF + TPC) && $K^{-/+} 1.0 < |\eta| < 1.5$ (TPC Only)
 - $K^{+/-} 1.0 < |\eta| < 1.5$ && $K^{-/+} 1.0 < |\eta| < 1.5$ (TPC Only)
- Perform each analysis separately:
 - Raw p_0 extraction
 - Efficiency correction
 - Acceptance correction

Current State of Analysis

- Code is in place for efficiency and acceptance calculations.
 - Acceptance correction needs some thought.
 - Distribution deviates from $1+F\cos^2\theta^*$ for individual rapidity bins.
- Efficiency simulation is currently running for some of the pT bins.
 - We have a first look at the efficiency distributions for different rapidity bins.
- Analysis in the $|\eta| < 1.0$ acceptance bin is straight forward, but there are some problems to address with other acceptance bins.

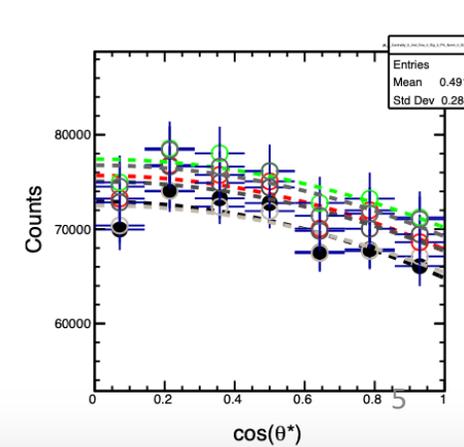
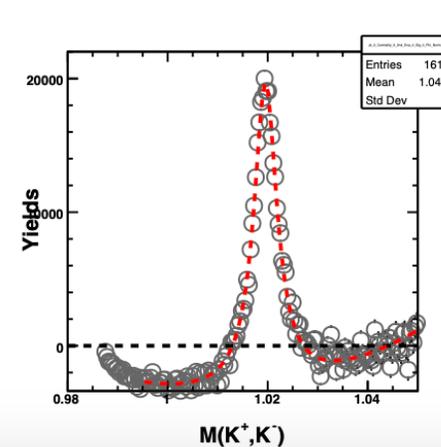
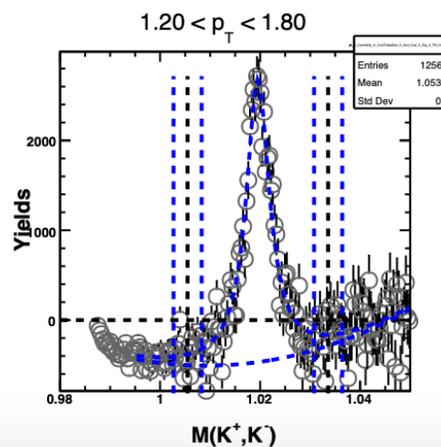
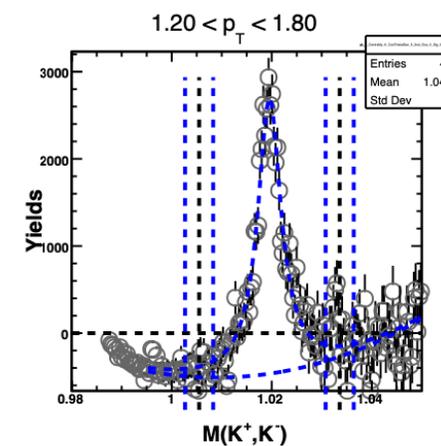
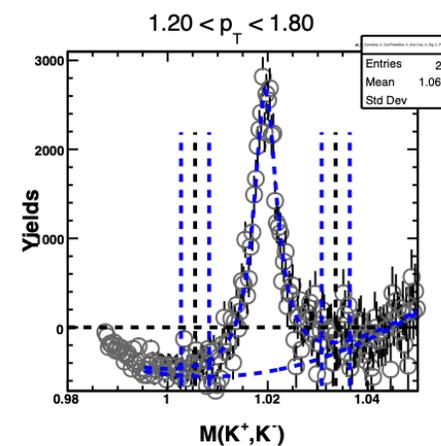
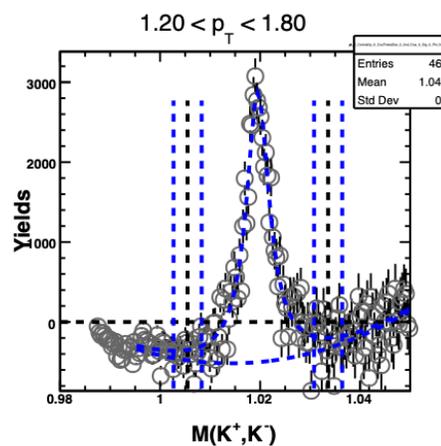
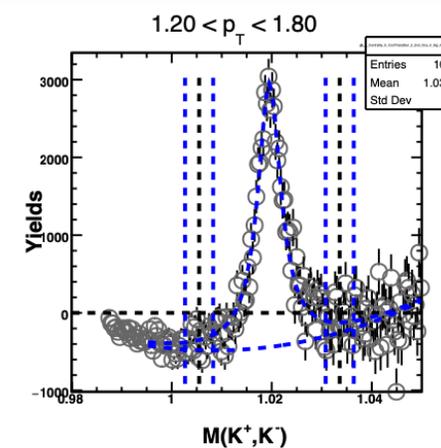
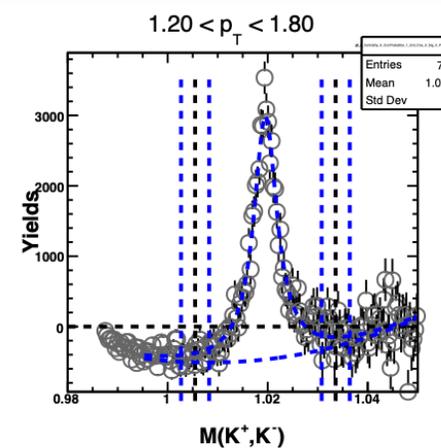
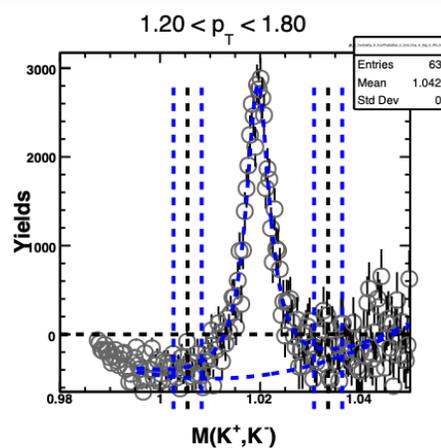
$$|\eta| < 1.0$$

$$|\eta| < 1.0$$



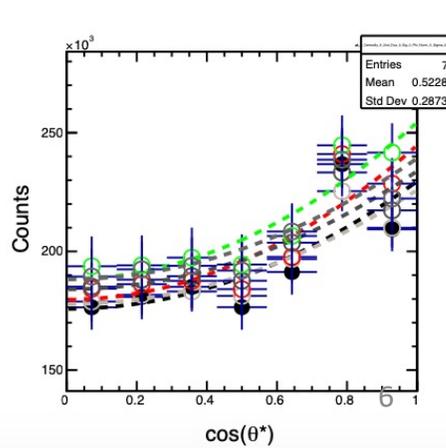
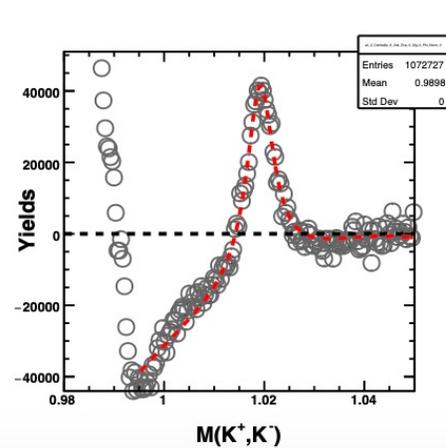
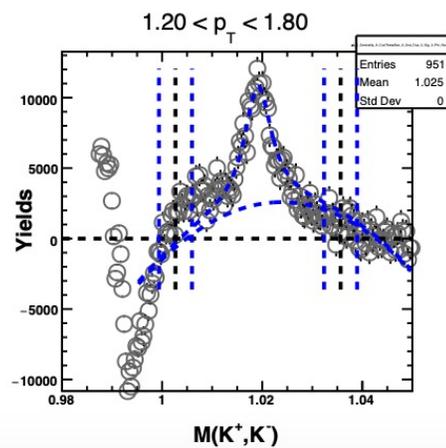
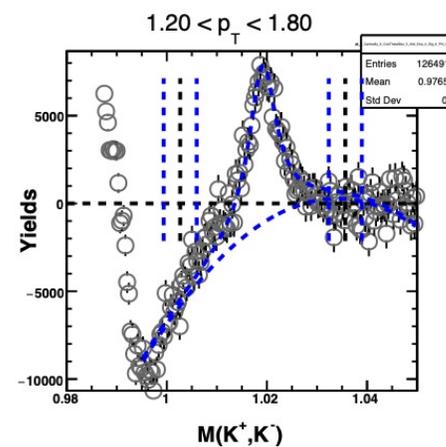
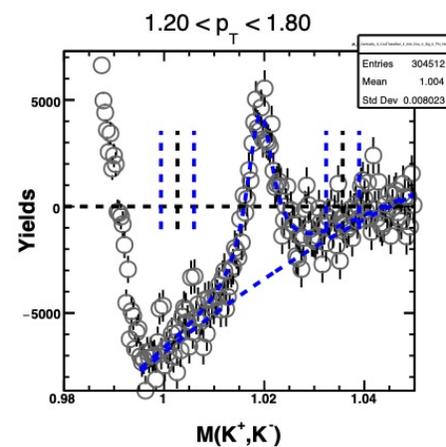
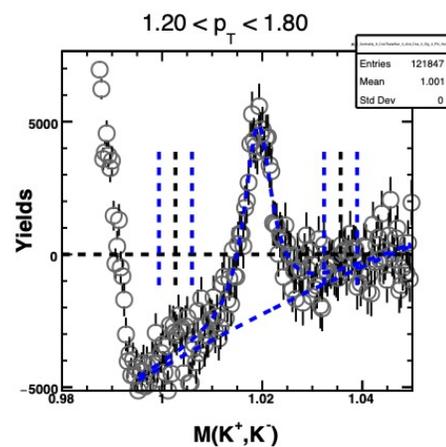
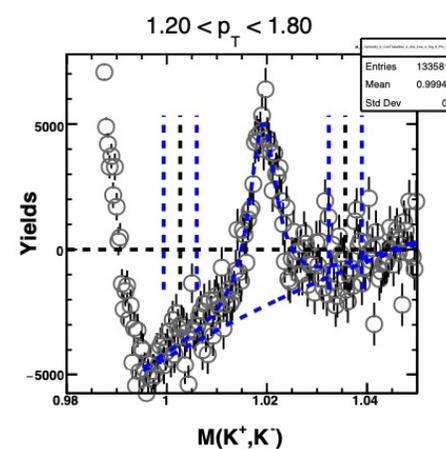
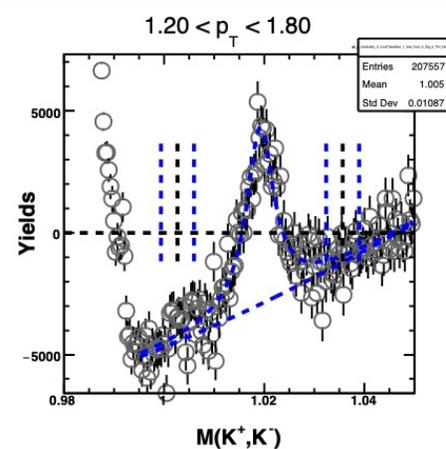
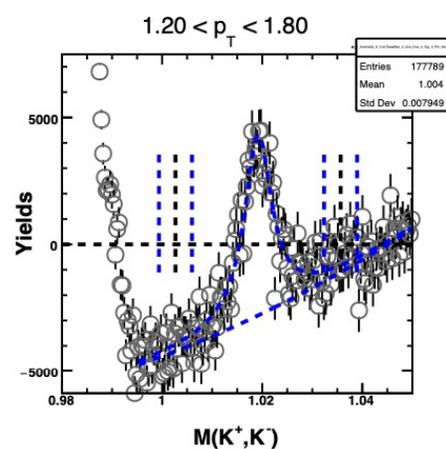
$|\eta| < 1.0$

$1.0 < |\eta| < 1.5$



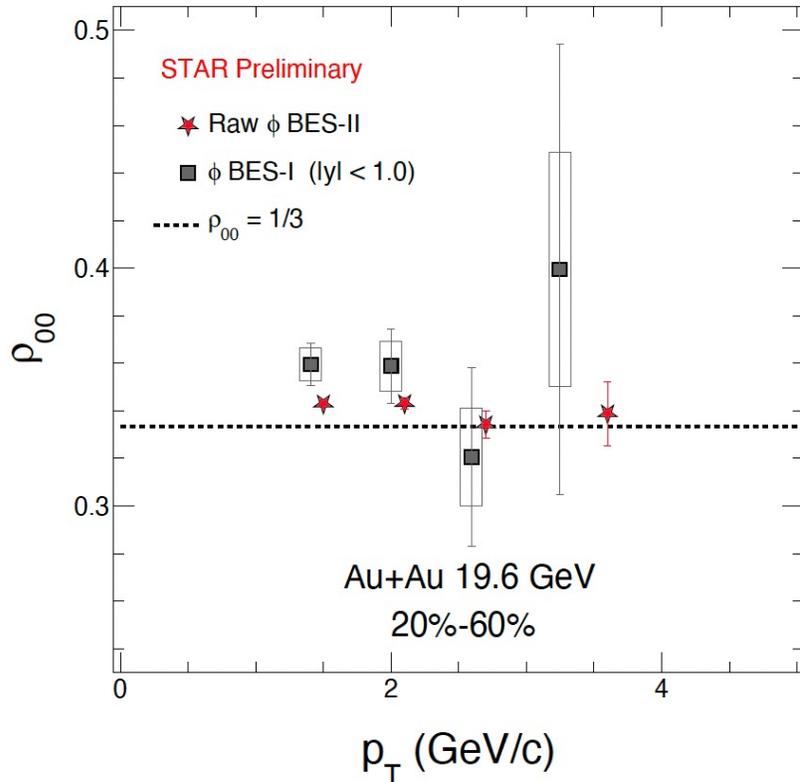
$1.0 < |\eta| < 1.5$

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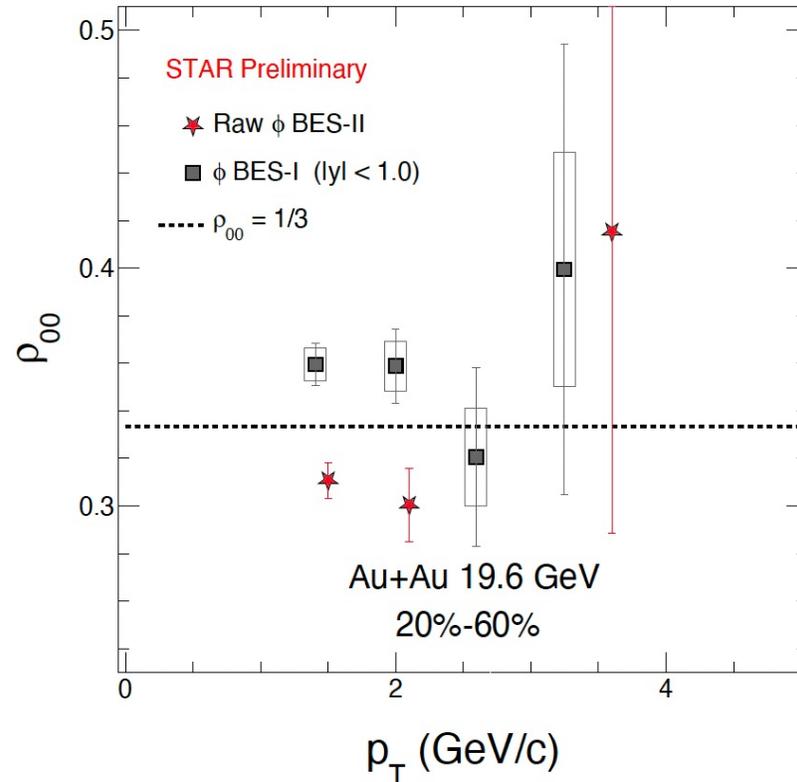


pT dependence of ρ_{00}

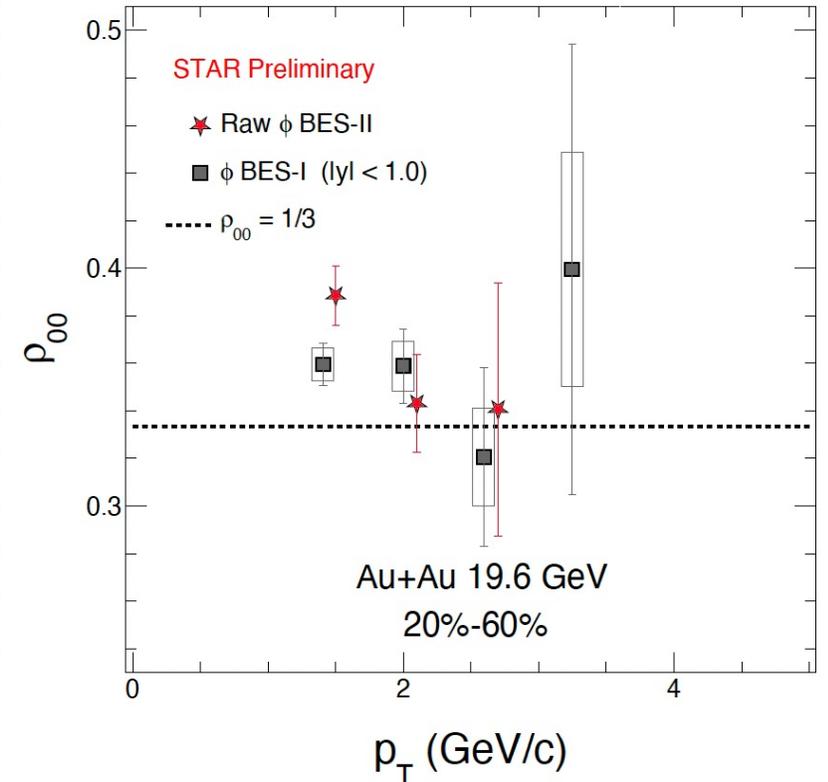
$|\eta| < 1.0$
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$|\eta| < 1.0$
 $1.0 < |\eta| < 1.5$

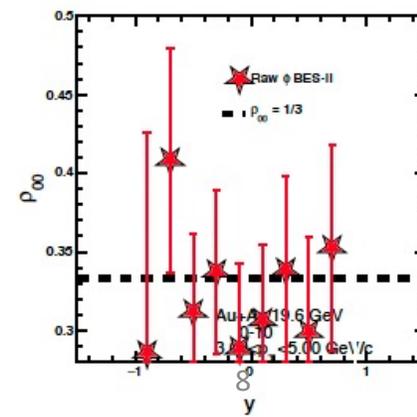
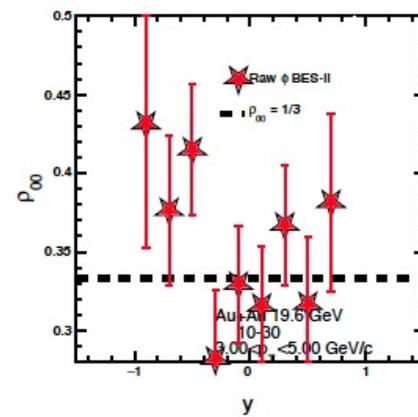
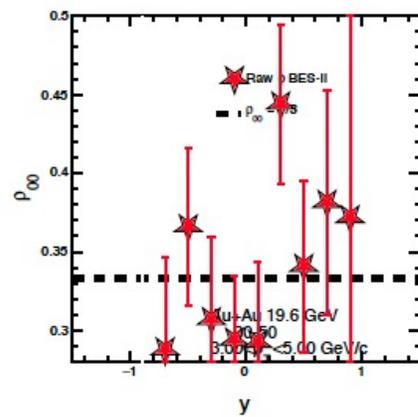
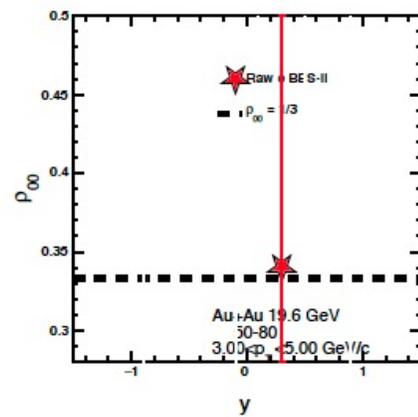
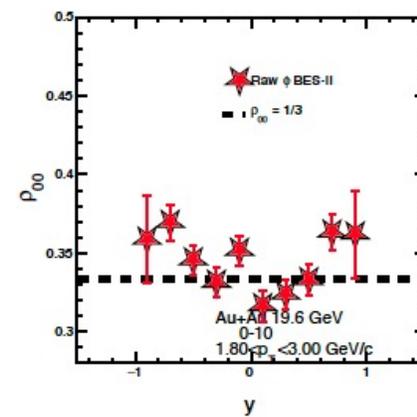
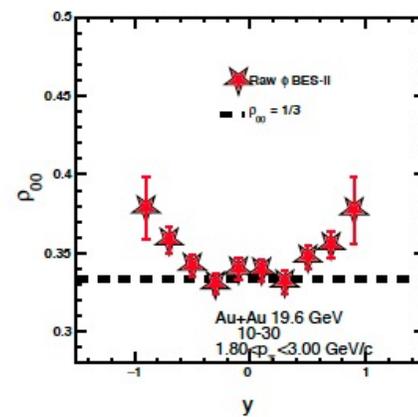
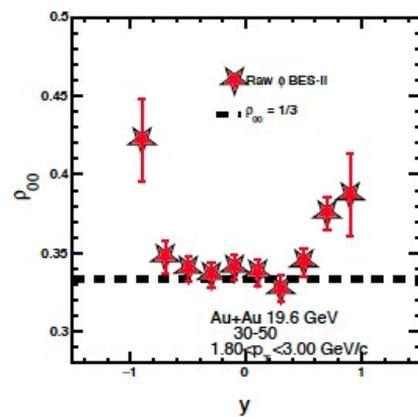
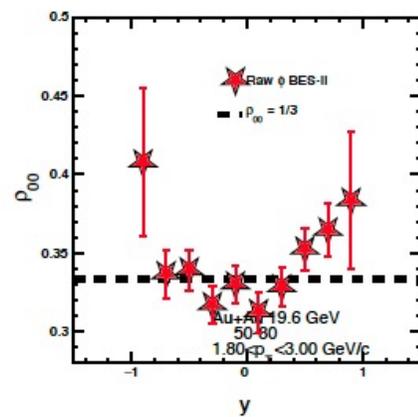
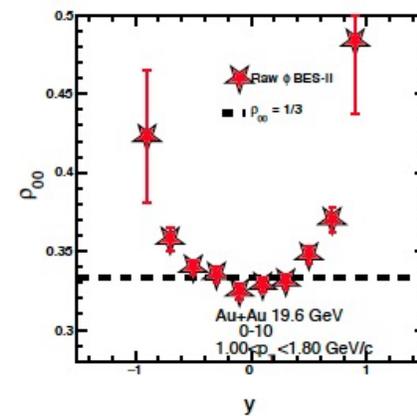
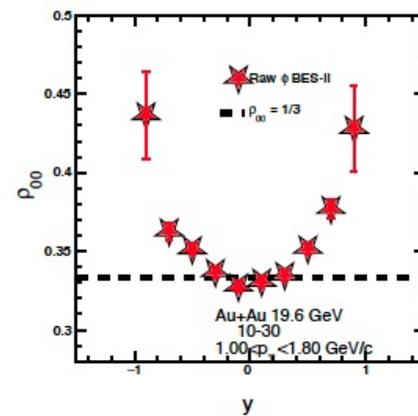
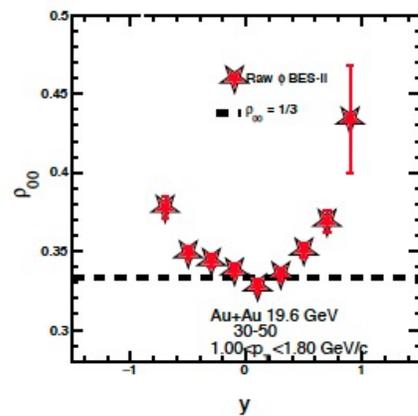
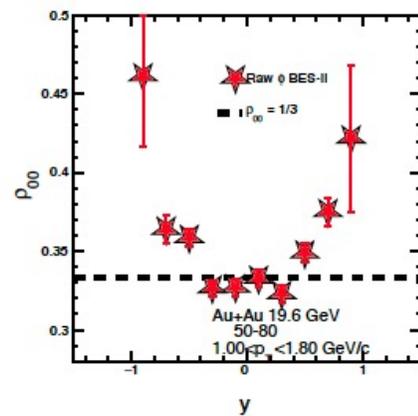


$1.0 < |\eta| < 1.5$
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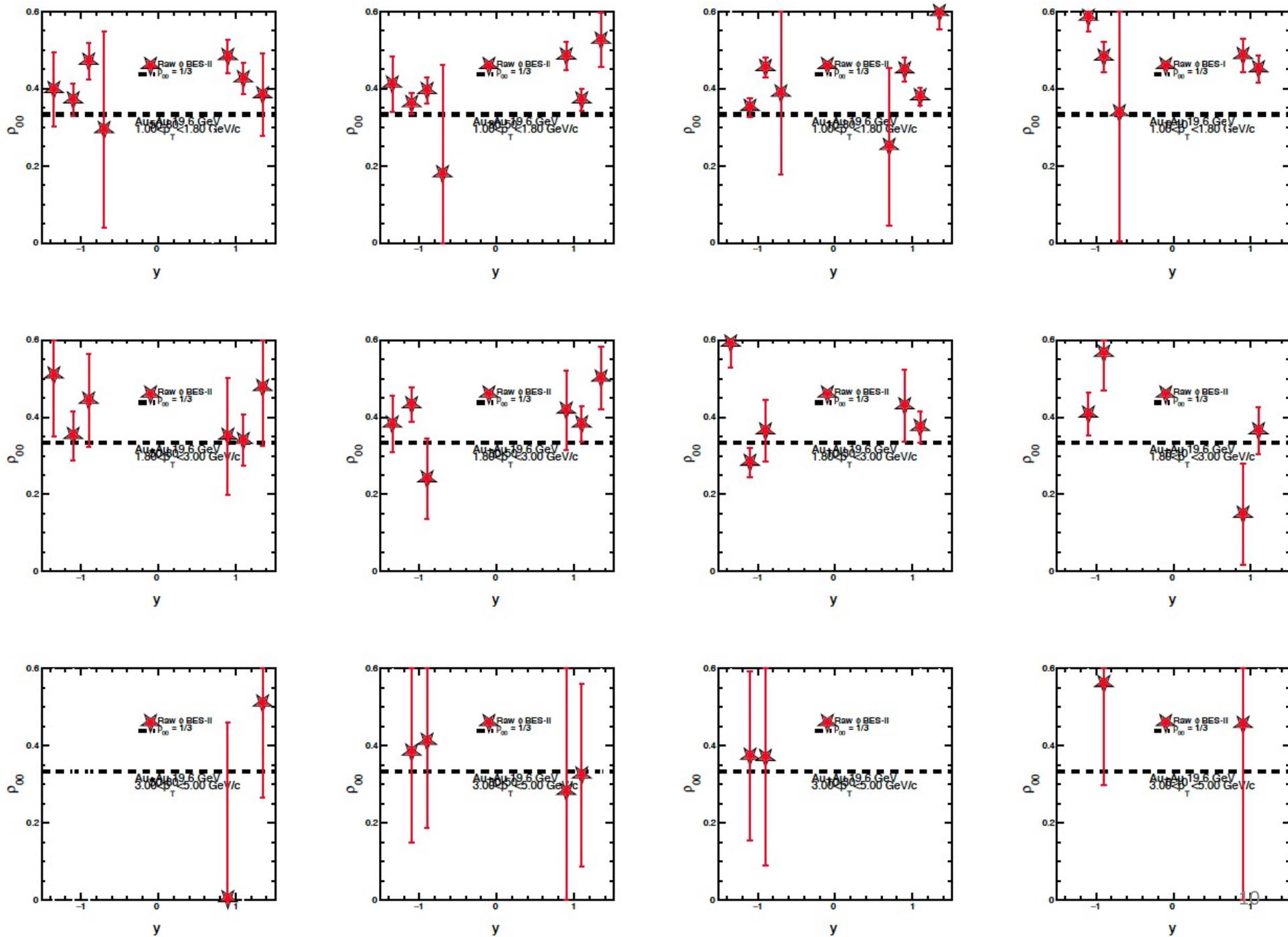
$|\eta| < 1.0$

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$1.0 < |\eta| < 1.5$

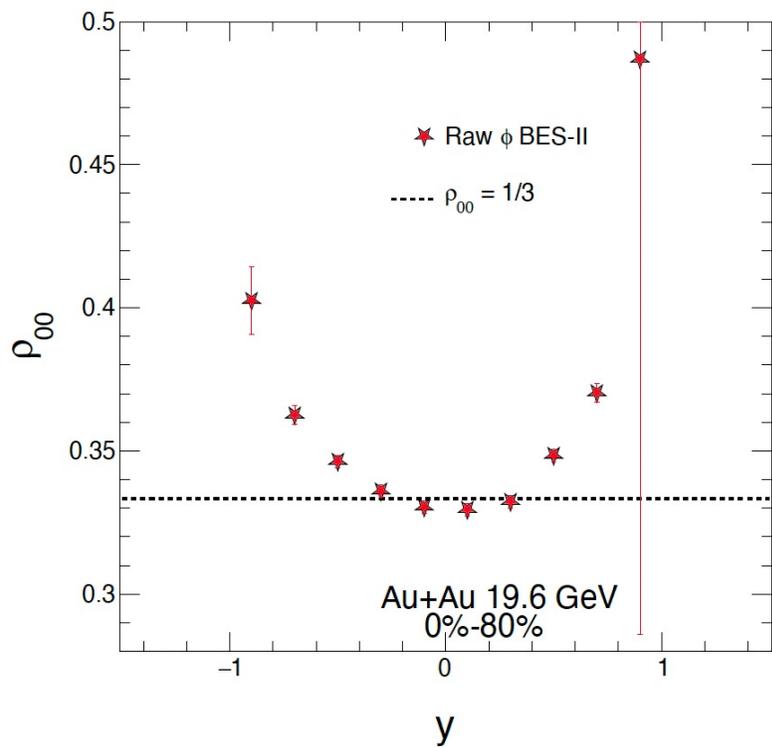
$1.0 < |\eta| < 1.5$



rapidity dependence of ρ_{00}

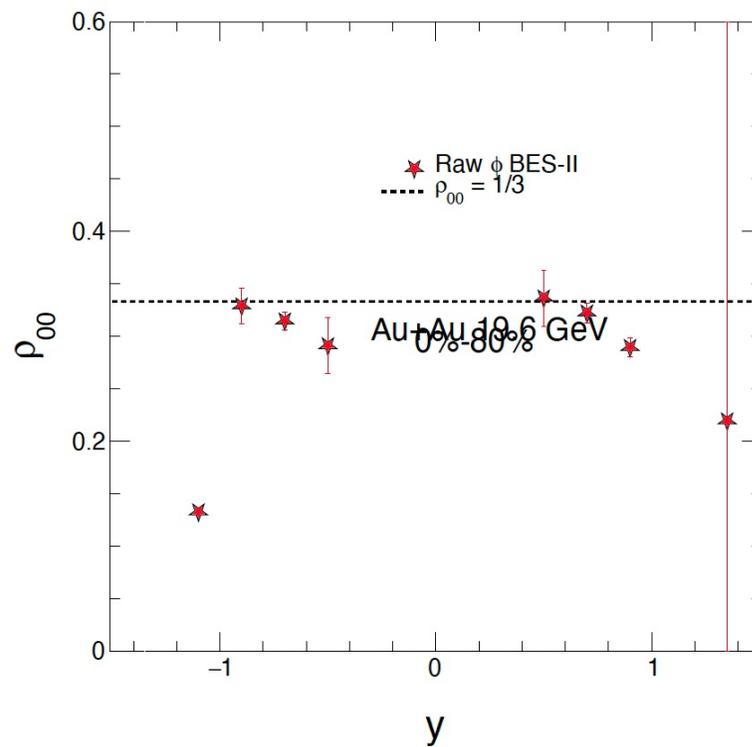
$|\eta| < 1.0$

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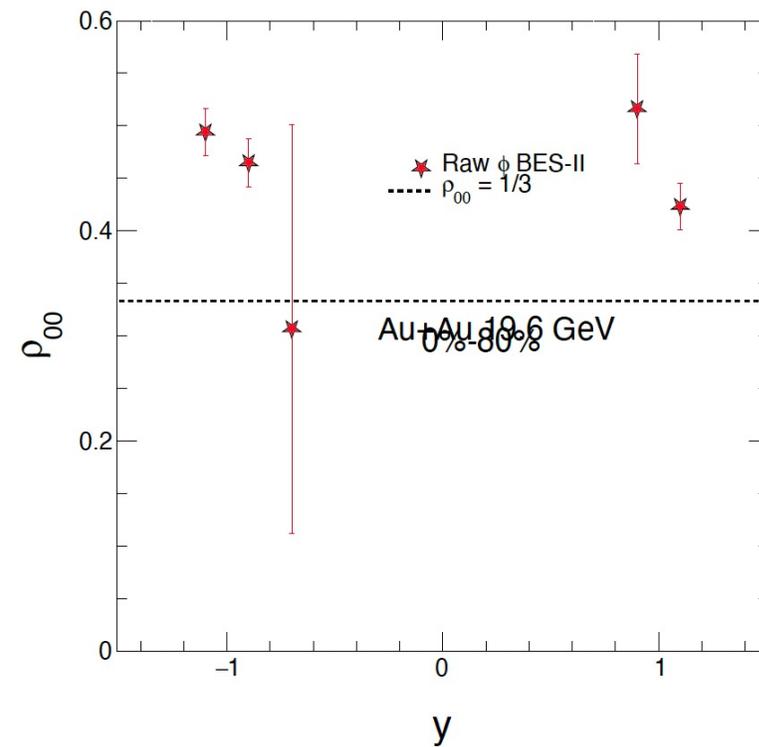
$|\eta| < 1.0$

$1.0 < |\eta| < 1.5$



$1.0 < |\eta| < 1.5$

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centrality dependence of ρ_{00}

$|\eta| < 1.0$

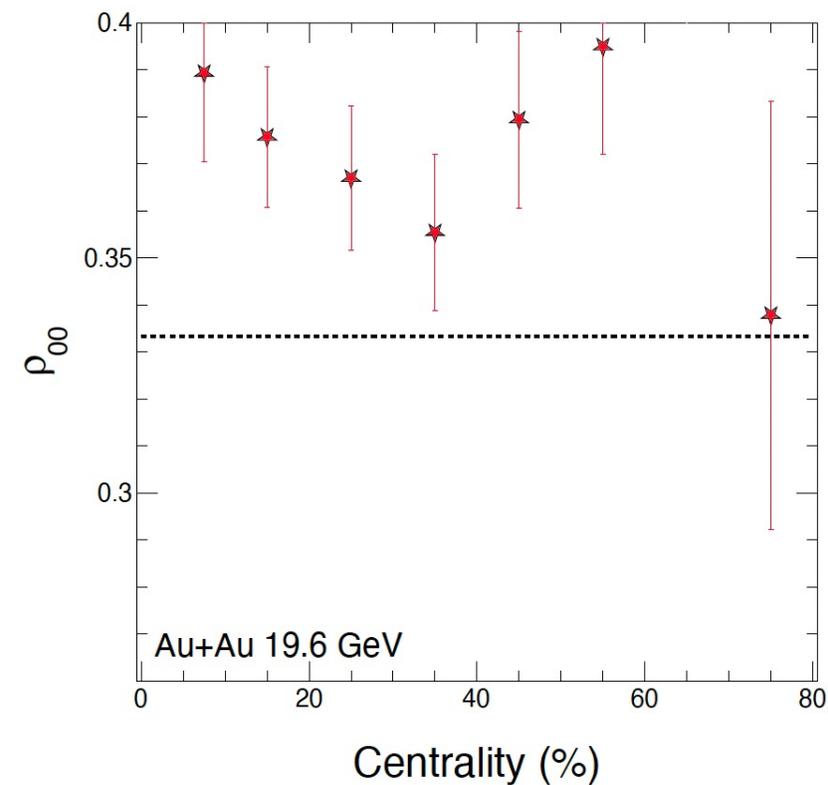
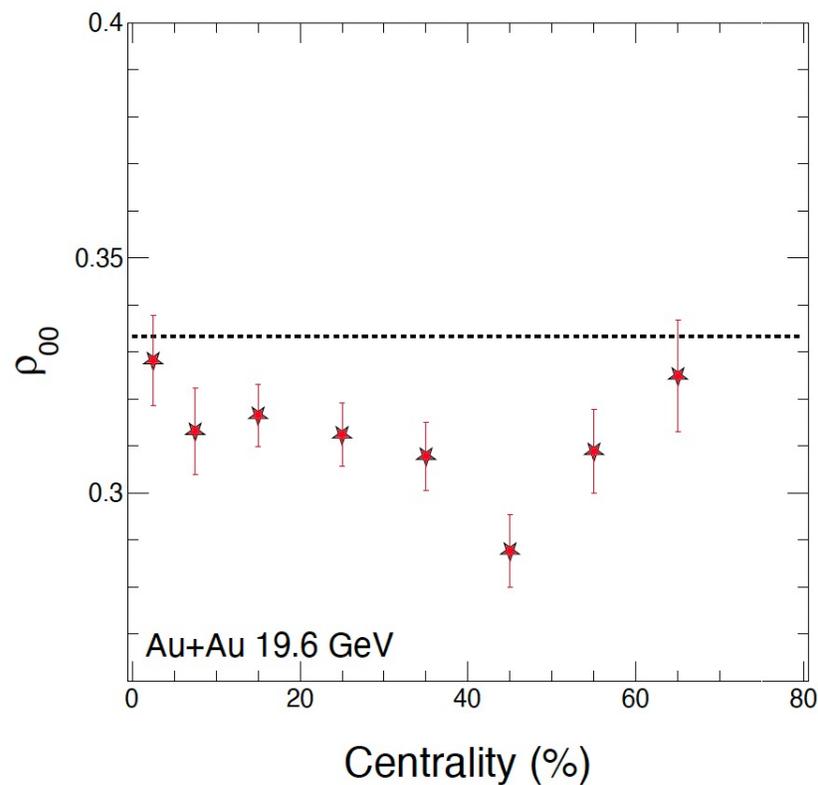
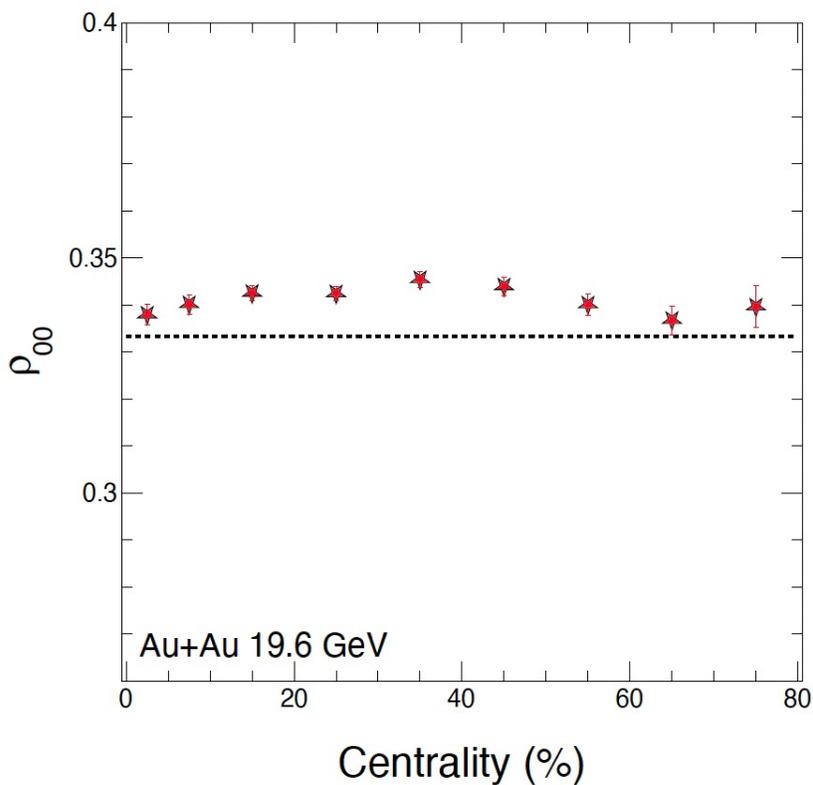
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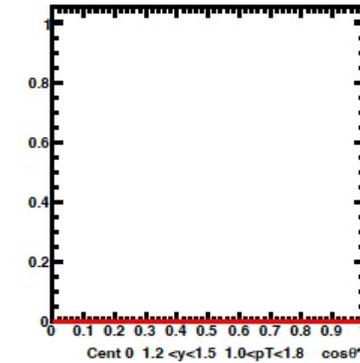
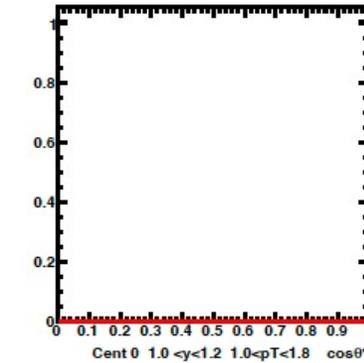
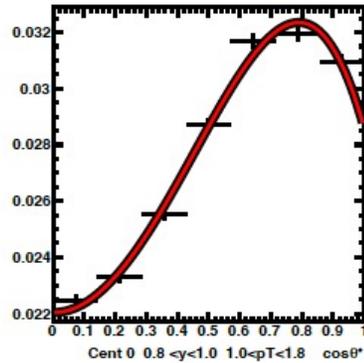
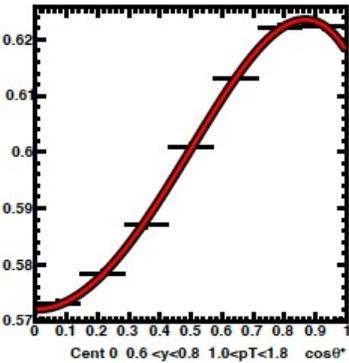
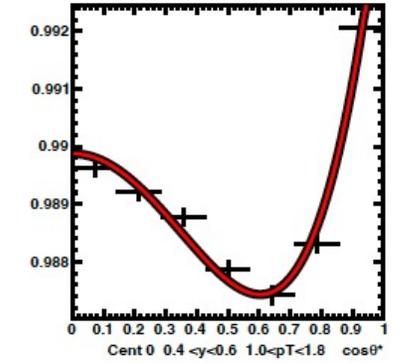
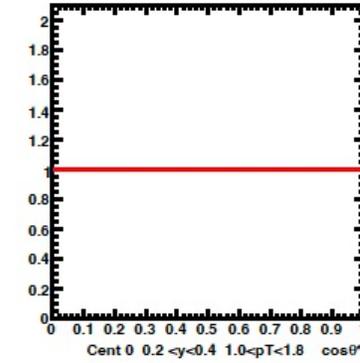
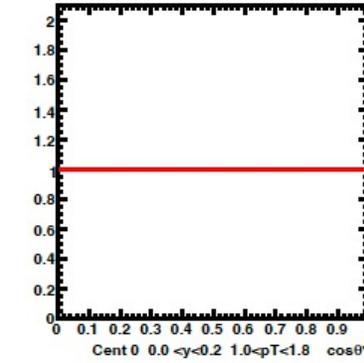
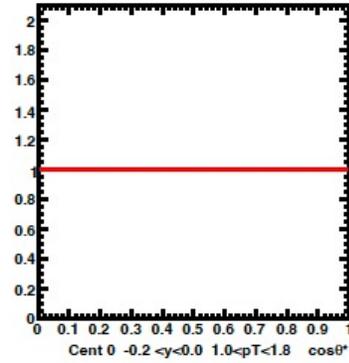
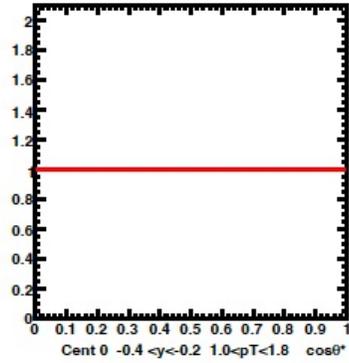
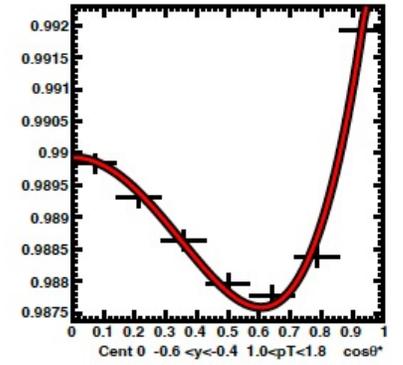
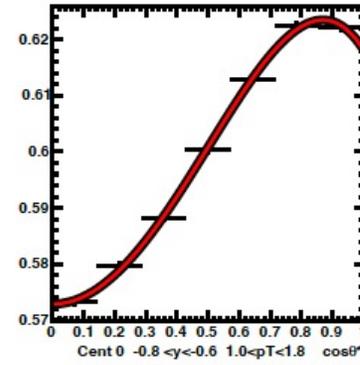
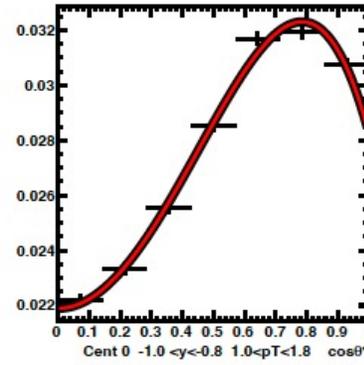
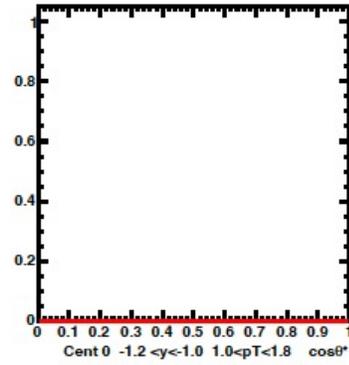
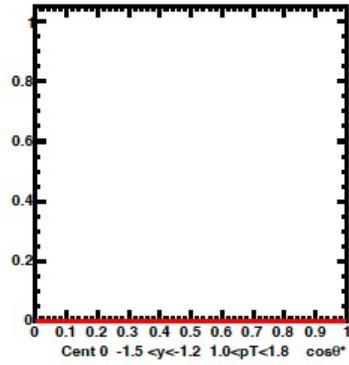
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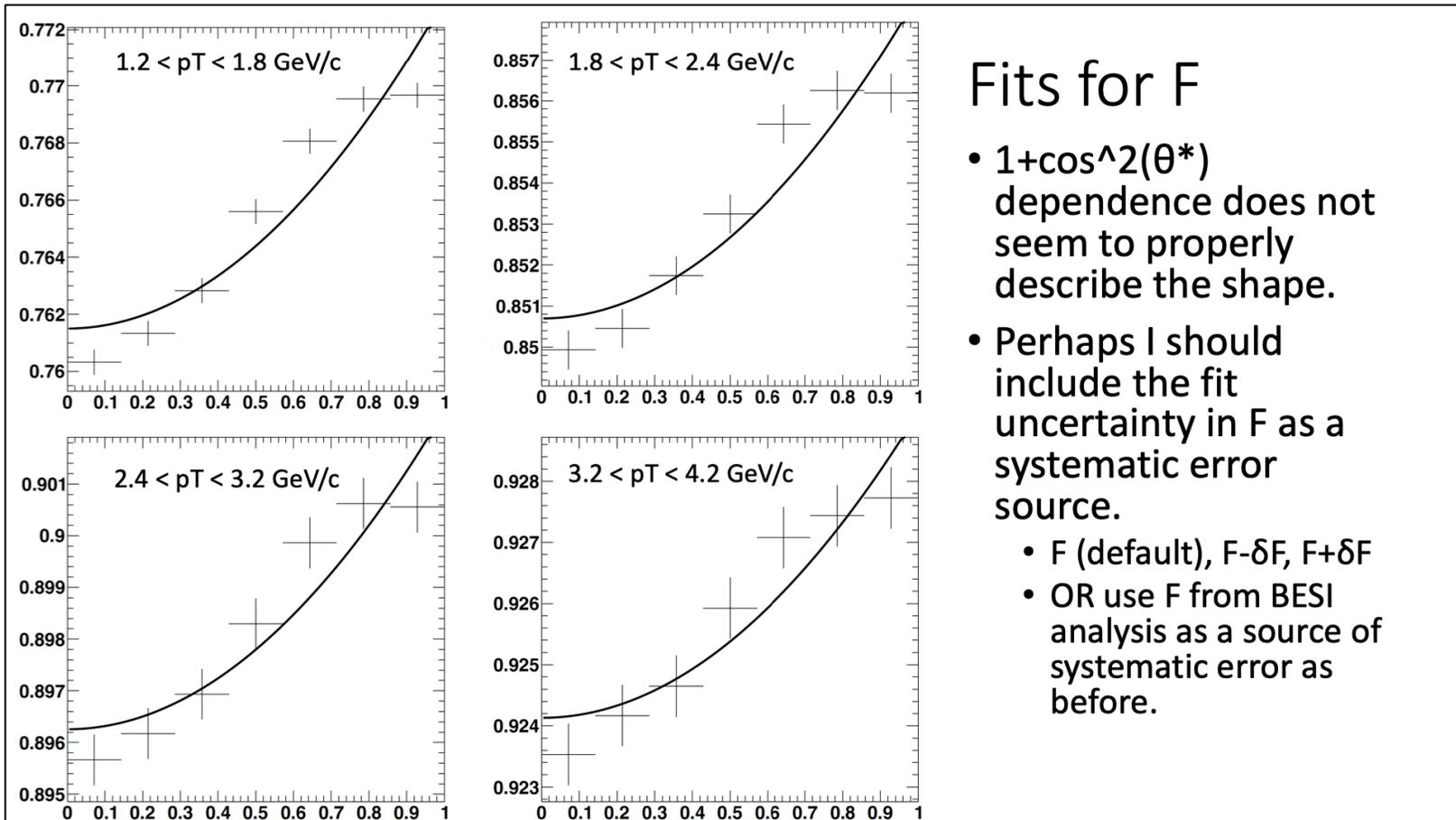


Rapidity dependence of acceptance ($|\eta| < 1.0$)



Revisiting Acceptance Correction

Slide from 09/01/2022



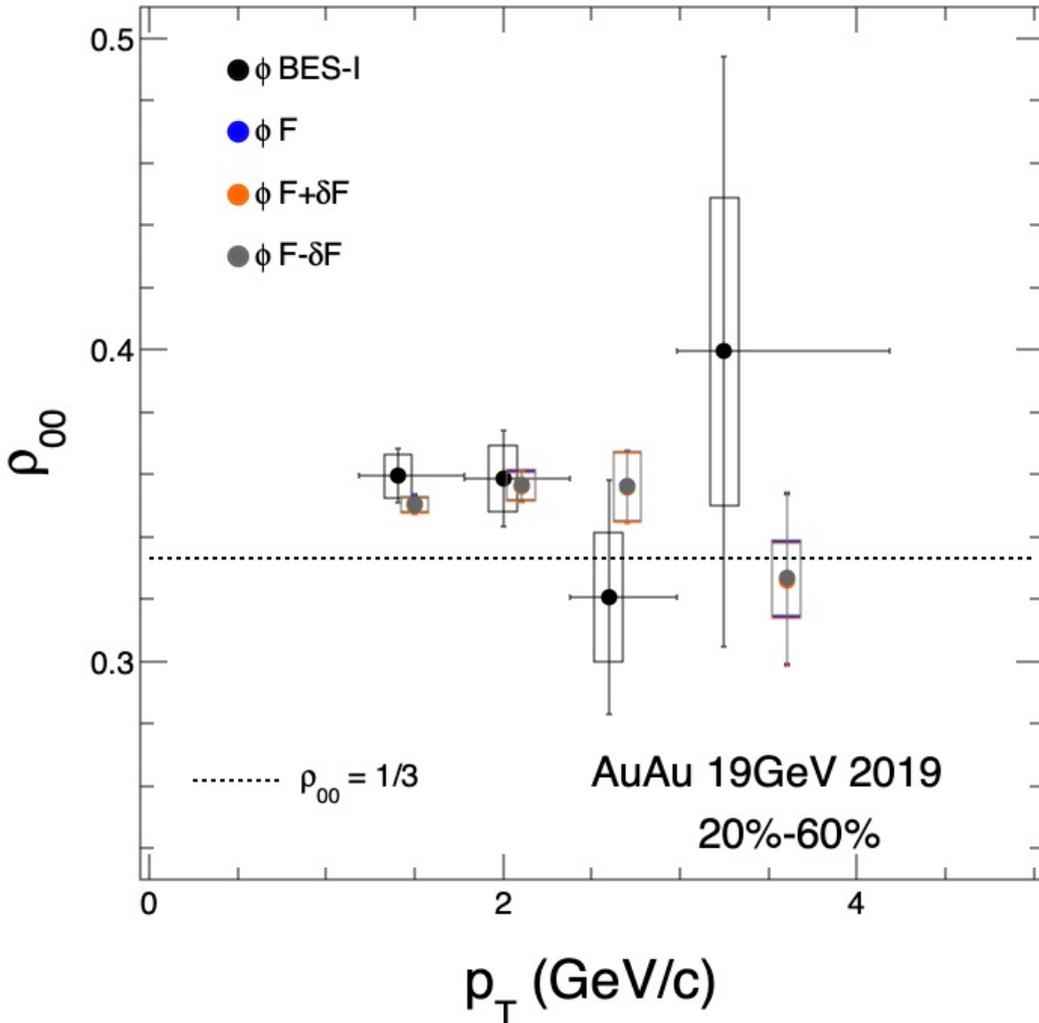
Fits for F

- $1 + \cos^2(\theta^*)$ dependence does not seem to properly describe the shape.
- Perhaps I should include the fit uncertainty in F as a systematic error source.
 - F (default), $F - \delta F$, $F + \delta F$
 - OR use F from BES I analysis as a source of systematic error as before.

Coming back:

- -Should we be concerned with the fit function not fully describing the shape

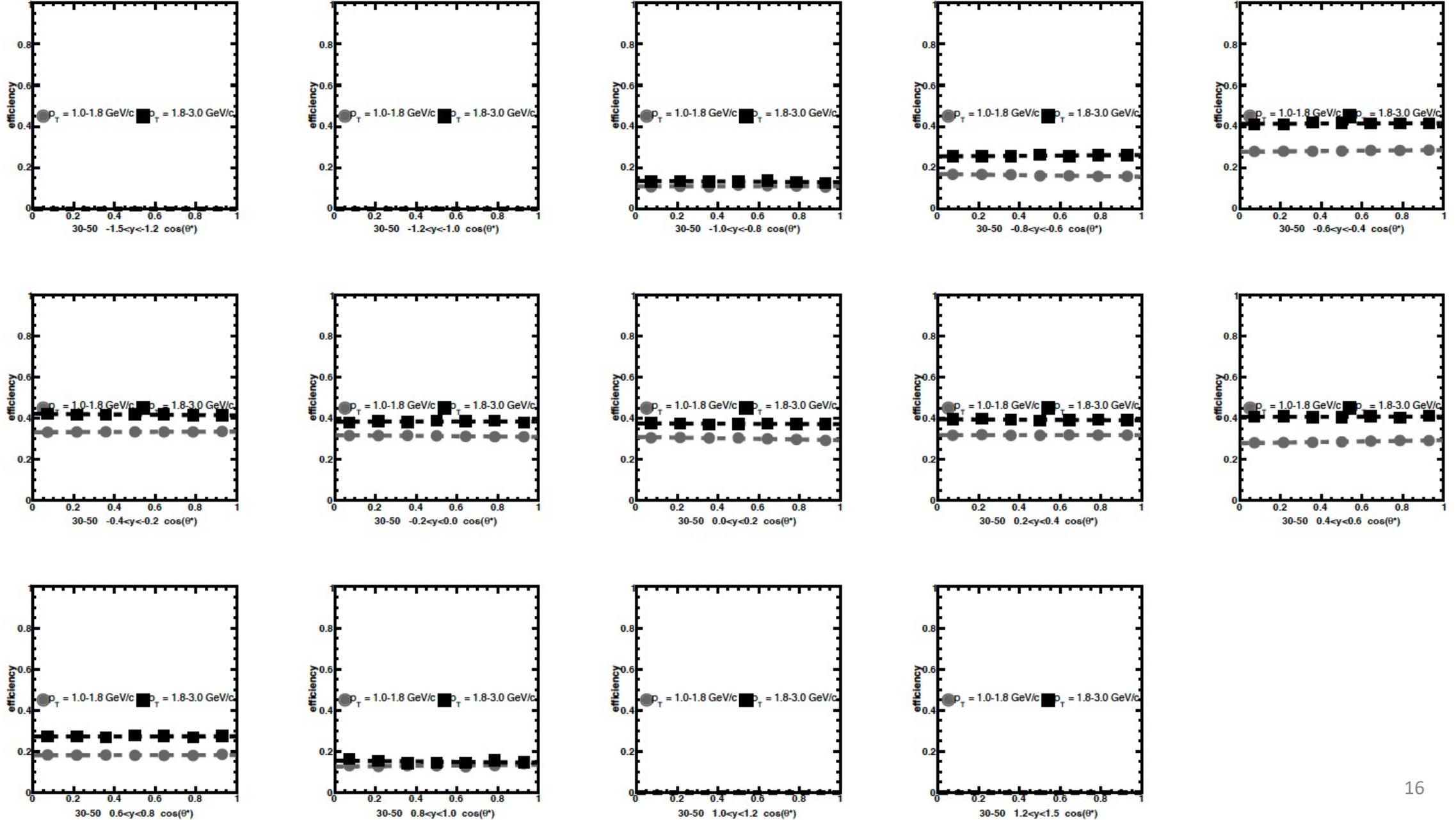
Revisiting Acceptance Correction



p_T bin (GeV/c)	BESI F (Jinhui)	BESII F (Gavin)
1.2-1.8	0.0155811	0.0151739 ± 0.0007378
1.8-2.4	0.00968584	0.0092919 ± 0.0007136
2.4-3.2	0.00738826	0.0068791 ± 0.0007020
3.2-4.2	0.00498759	0.0054043 ± 0.0006965

Acceptance Parameter, F	ρ_{00} integrated over p_T
F	0.3516 ± 0.0026 (stat) ± 0.0028 (sys)
F+ δ F	0.3512 ± 0.0026 (stat) ± 0.0028 (sys)
F- δ F	0.3519 ± 0.0026 (stat) ± 0.0028 (sys)

Rapidity dependence of Efficiency ($|\ln| < 1.0$)



Summary and Outlook

- Much of the code is in place for the rapidity, p_t , and centrality dependent p_{00} studies.
- How to deal with η bins other than $|\eta| < 1.0$?
- How to address η acceptance?