Preliminary Figure Request: Azimuthal Anisotropy of Jets in $\sqrt{s_{NN}} = 200$ GeV Ru+Ru and Zr+Zr Collisions

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Physics Motivation

- Jet quenching seems to be a path length dependent effect
- Semi-central heavy-ion collisions produce an approximately elliptical QGP
- Measuring in-plane and out-of-plane jet yields insight into path length dependence
  - In-plane jets experience less medium than out-of-plane jets

Dataset

- Dataset: Isobar, $\sqrt{s_{NN}} = 200$ GeV Ru+Ru and Zr+Zr collisions
- Year: 2018
- Production tag:
- Triggers used:
  - MinBias for event plane flattening
    - 600001, 600011, 600021, 600031
  - BHT1_VPD30 for jet finding
    - 600221, 600231
  - BHT1_VPD100 for jet finding
    - 600222, 600232
- Embedding request id: n/a

Bad Run List

- Union of bad run lists used in CME analysis
- https://drupal.star.bnl.gov/STAR/system/files/isobarbadrun.txt
- 162 runs

Event level cuts

v_z	-35 cm – 25 cm
v_r	< 2 cm
$\lvert v_z - v_{z,vpd} \rvert$	< 5 cm

Track Level Cuts

p_T	0.2 GeV -30 GeV
DCA	< 1 cm
nHitsFit	> 15
nHitsFit/nHitsMax	> 0.52

Systematic Uncertainties

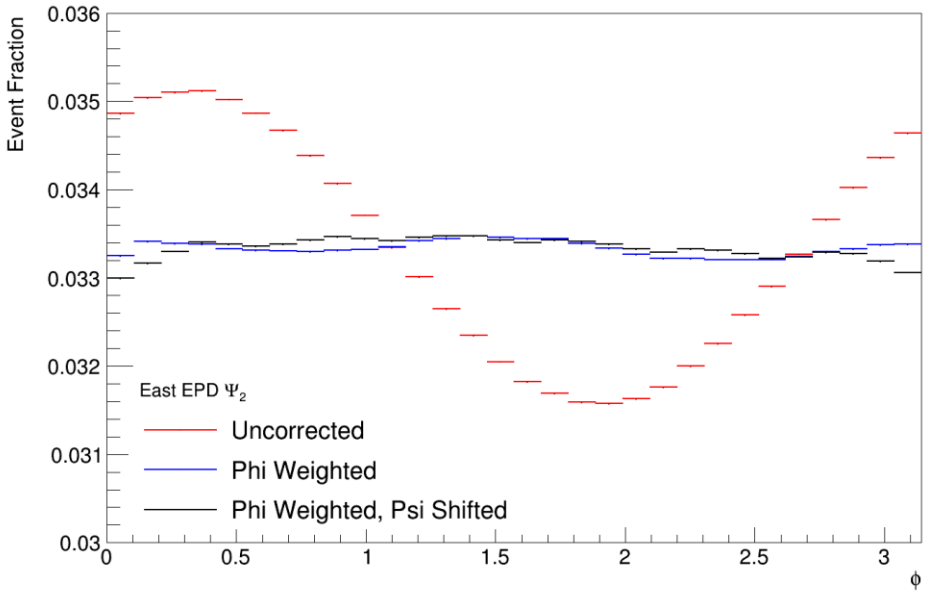
- None currently considered

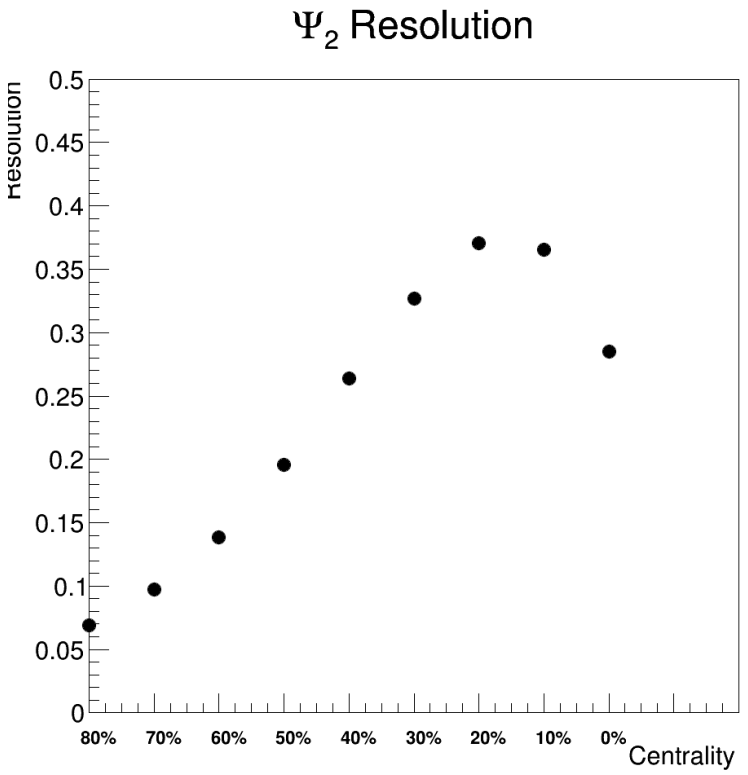
Analysis Procedure - Broadly

- The dataset is processed three times
  - The first pass produces the phi-weighting values to flatten the event plane
  - The second pass produces the psi-shifting values to flatten the event plane
  - These passes use the minbias triggers
- The third pass finds R=0.2 Anti-kT jets and hard cores and saves these events to a tree for later processing
- The new tree is processed
- Jets which do not fall within 0.2 in $\eta - \phi$ space of a hard core are cut
- Jet yield is plotted as a function $\Delta\phi = \left|\phi_{jet} - \Psi_2\right|$
- Fit to $A(1 + 2v_2 \cos(2\Delta\phi))$ to extract v_2^{ch}

Analysis Procedure – Event Plane Finding

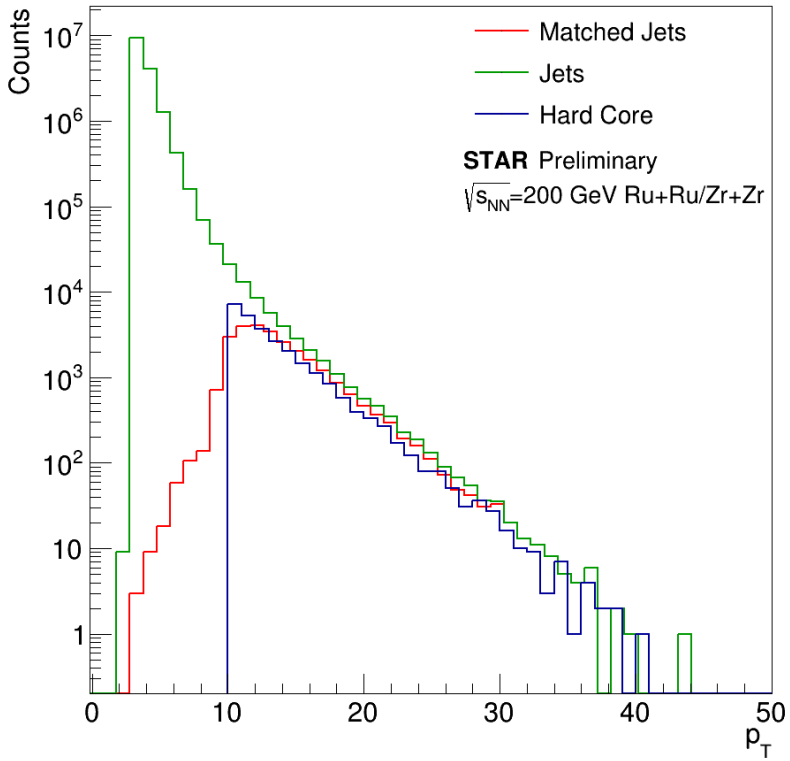
- The dataset is processed three times
  - The first pass produces the phi-weighting values to flatten the event plane
  - The second pass produces the psi-shifting values to flatten the event plane
  - $R = \sqrt{2 < \cos\left(2(\psi_{east} - \psi_{west})\right) >}$





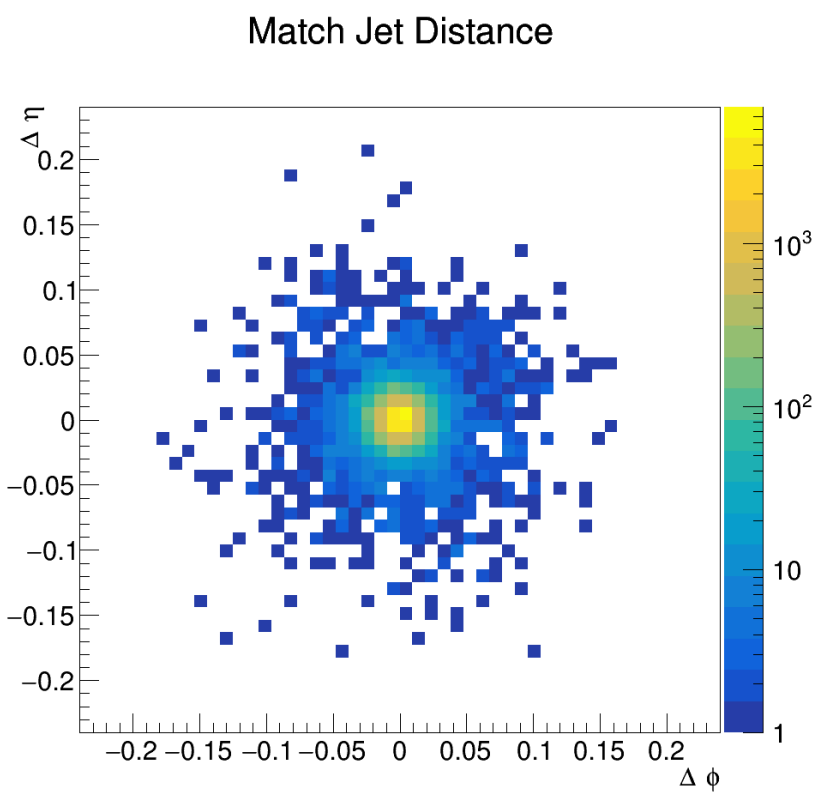
Analysis Procedure – Jet Finding

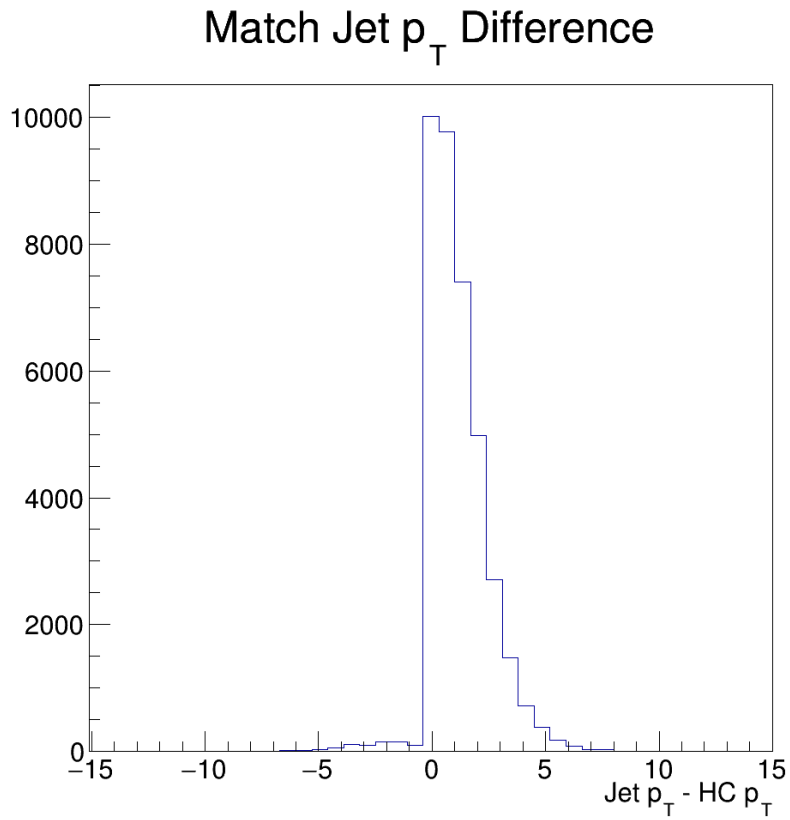
- Anti-kT R=0.2 jets are found on all tracks passing QA
- Anti-kT R=0.2 hard cores are found with tracks with pT > 2 GeV
- Jets are matched to nearest hard core with dR < 0.2 in $\eta - \phi$ space
- Matched jet tail to left because of background subtraction



Analysis Procedure – Jet Matching

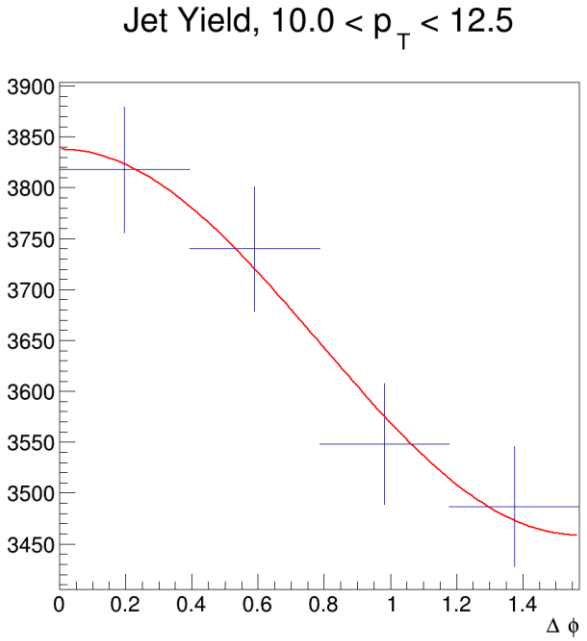
- Most matches are very close in $\eta - \phi$
- Variation in pT from background subtraction

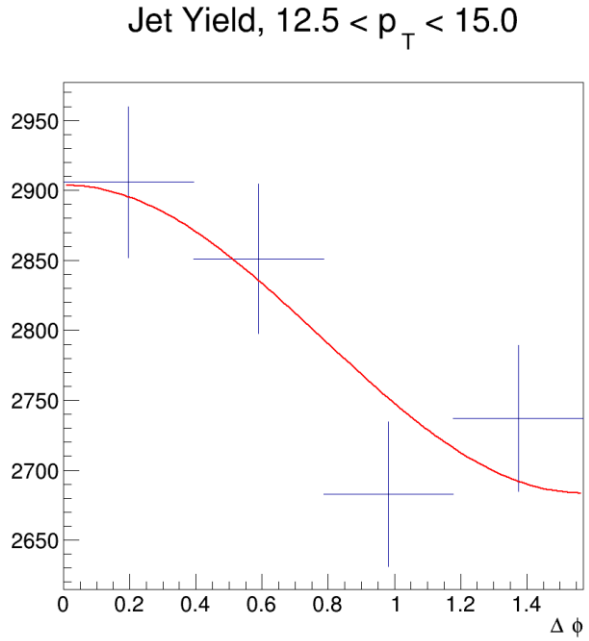


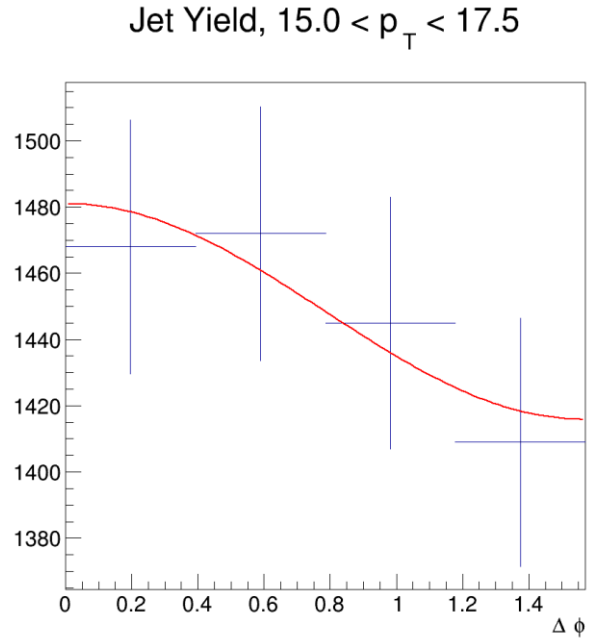


Analysis Procedure – Yield Relative to Ψ_2

- Distribution folded into $0 < \Delta\phi < 2\pi$
- Binned in jet momentum
- Fit with $A(1 + 2v_2^{obs}\cos(2\Delta\phi))$

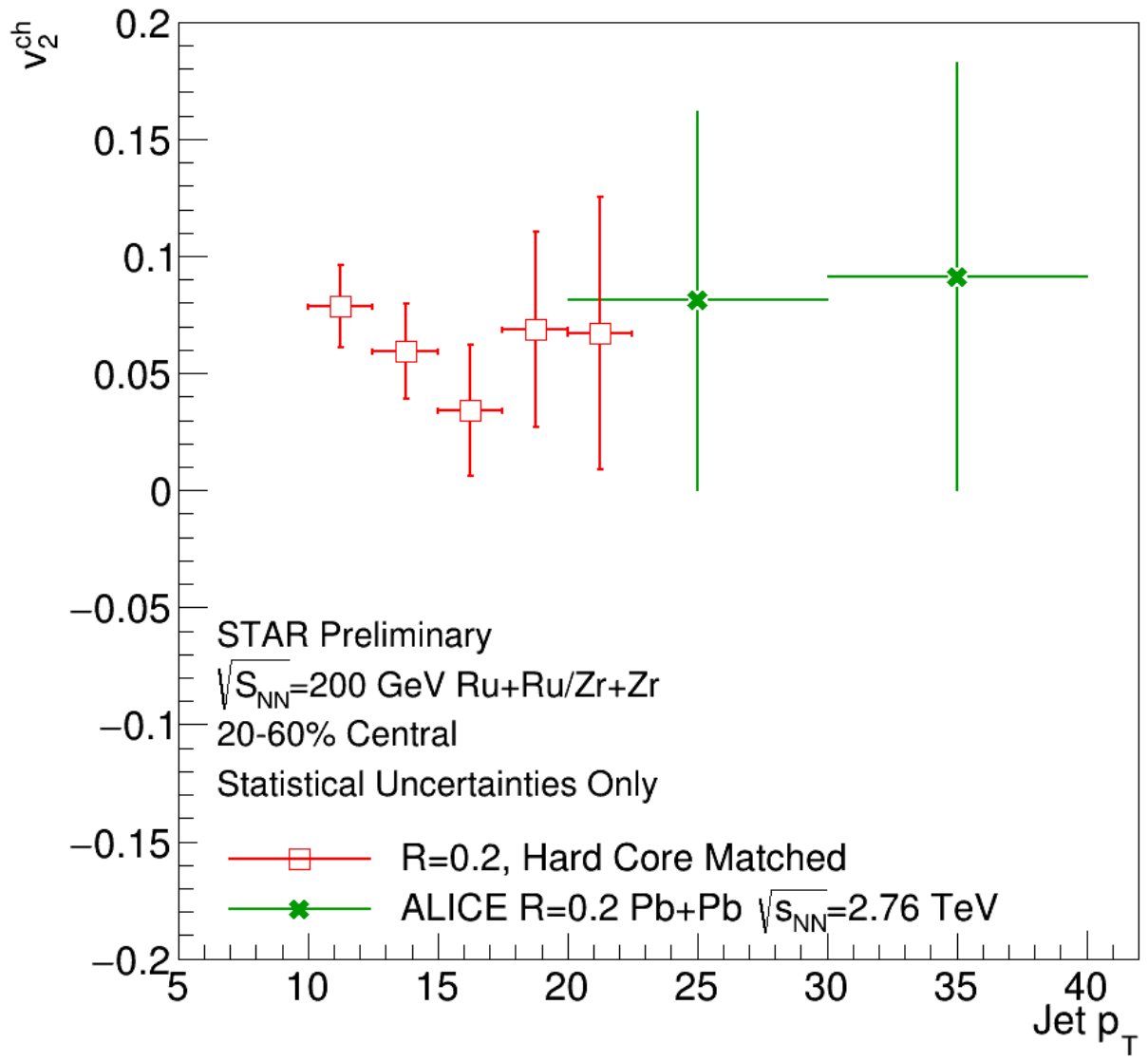






Figure

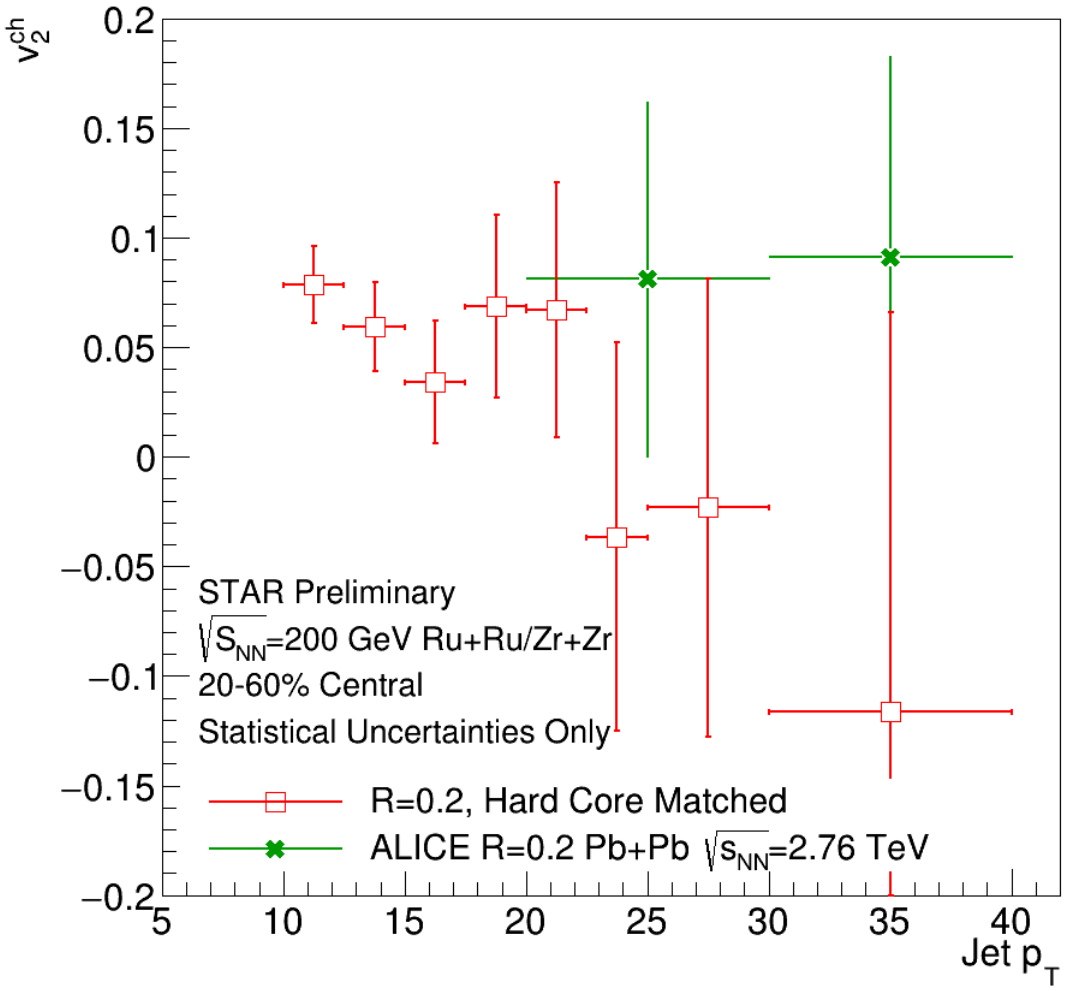
- Observed v_2 corrected for resolution
  - $v_2 = \frac{v_2^{obs}}{R(\Psi_2)}$
- Errors from error in fit



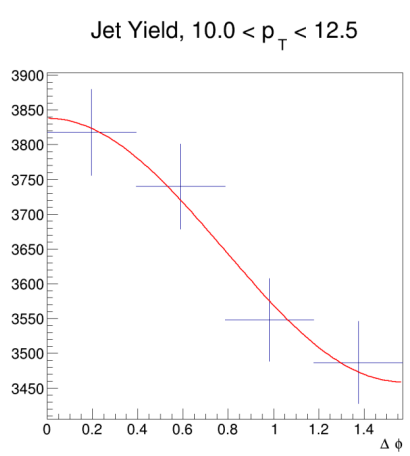
Backup

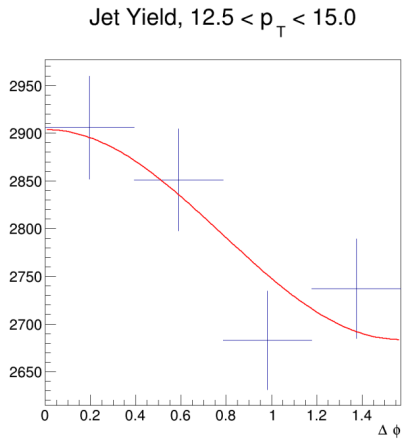
Figure

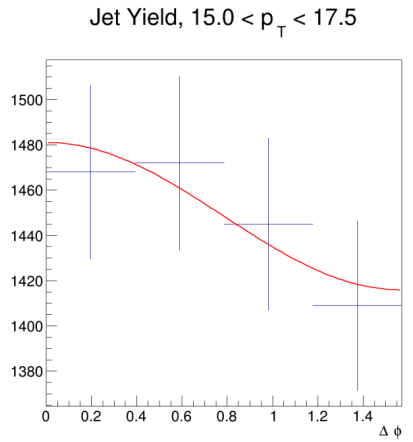
- Larger pT bins

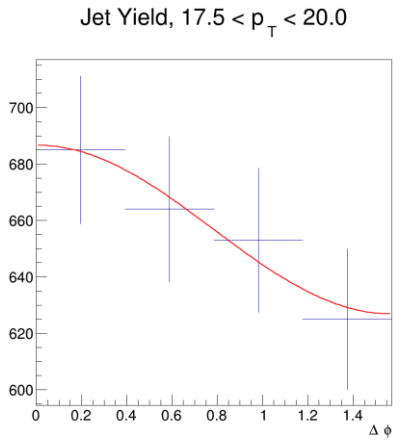


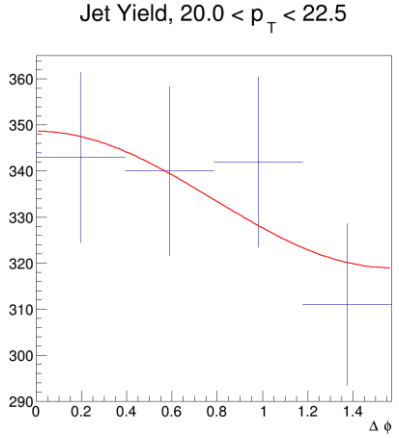
All pT bins

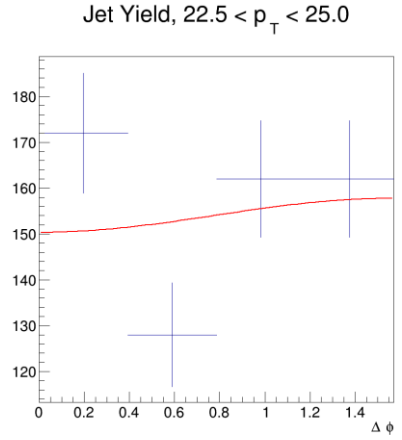

Jet Yield, 10.0 < p T < 12.5
3900
3850
3800
3750
3700
3650
3600
3550
3500
3450
0 0.2 0.4 0.6 0.8 1 1.2 1.4
Δ ϕ

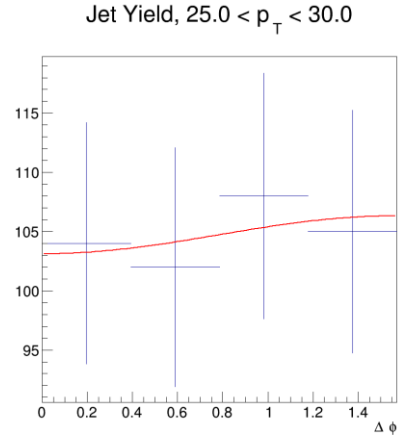

Jet Yield, 12.5 < p T < 15.0
2950
2900
2850
2800
2750
2700
2650
0 0.2 0.4 0.6 0.8 1 1.2 1.4
Δ ϕ

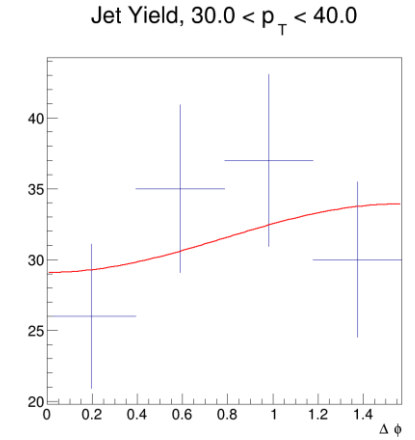

Jet Yield, 15.0 < p T < 17.5
1500
1480
1460
1440
1420
1400
1380
0 0.2 0.4 0.6 0.8 1 1.2 1.4
Δ ϕ


Jet Yield, 17.5 < p T < 20.0
700
680
660
640
620
600
0 0.2 0.4 0.6 0.8 1 1.2 1.4
Δ ϕ


Jet Yield, 20.0 < p T < 22.5
360
350
340
330
320
310
300
290
0 0.2 0.4 0.6 0.8 1 1.2 1.4
Δ ϕ


Jet Yield, 22.5 < p T < 25.0
180
170
160
150
140
130
120
0 0.2 0.4 0.6 0.8 1 1.2 1.4
Δ ϕ


Jet Yield, 25.0 < p T < 30.0
115
110
105
100
95
0 0.2 0.4 0.6 0.8 1 1.2 1.4
Δ ϕ


Jet Yield, 30.0 < p T < 40.0
40
35
30
25
20
0 0.2 0.4 0.6 0.8 1 1.2 1.4
Δ ϕ