

Two-Particle Azimuthal Correlation of Identified Particle in High-Energy Heavy-Ion Collisions at RHIC-PHENIX

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Contents

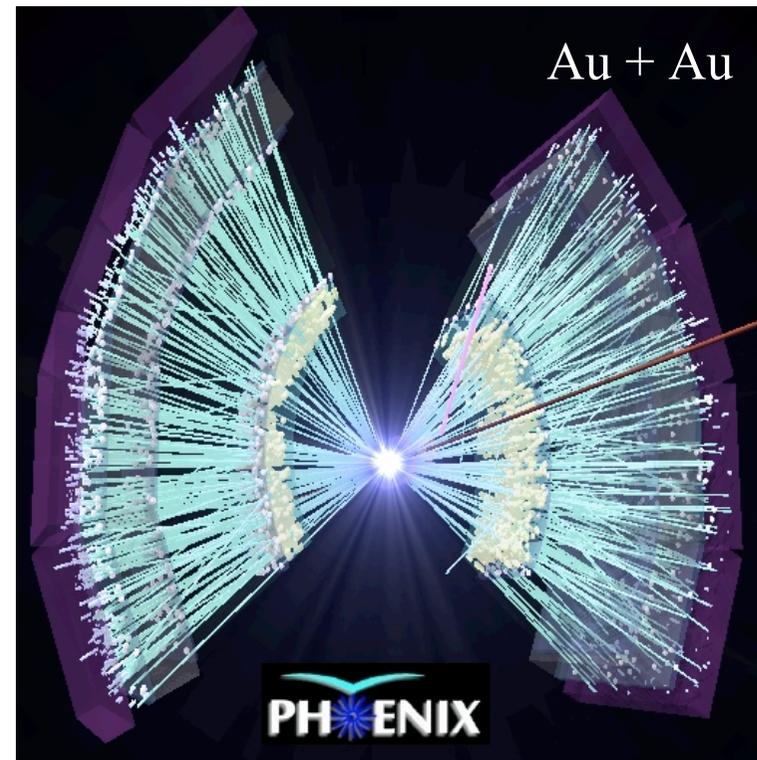
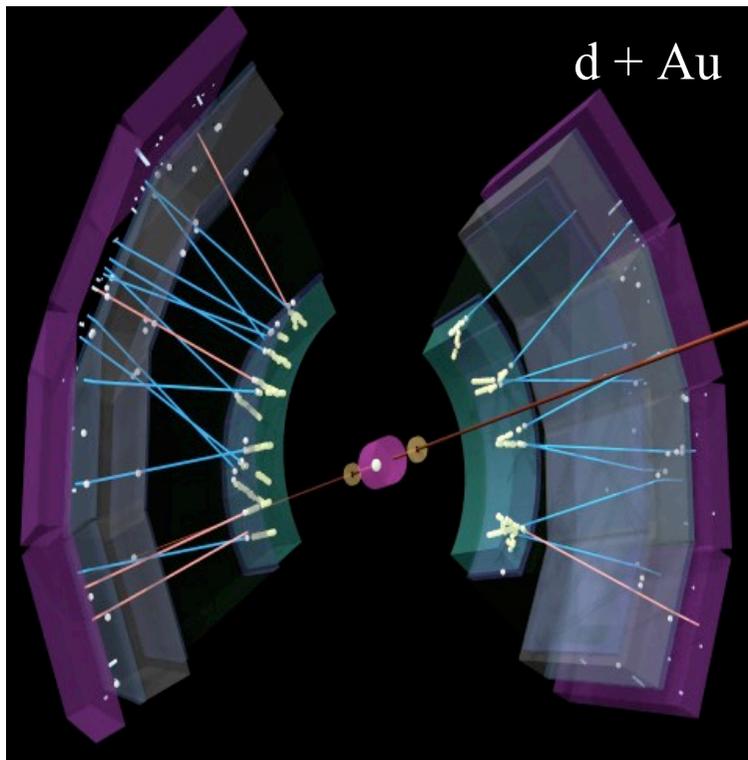
- Jet-Suppression and Modification
- Mach-cone and Ridge
- Identified Particle Correlation
- Correlation w.r.t. Reaction Plane

PHENIX

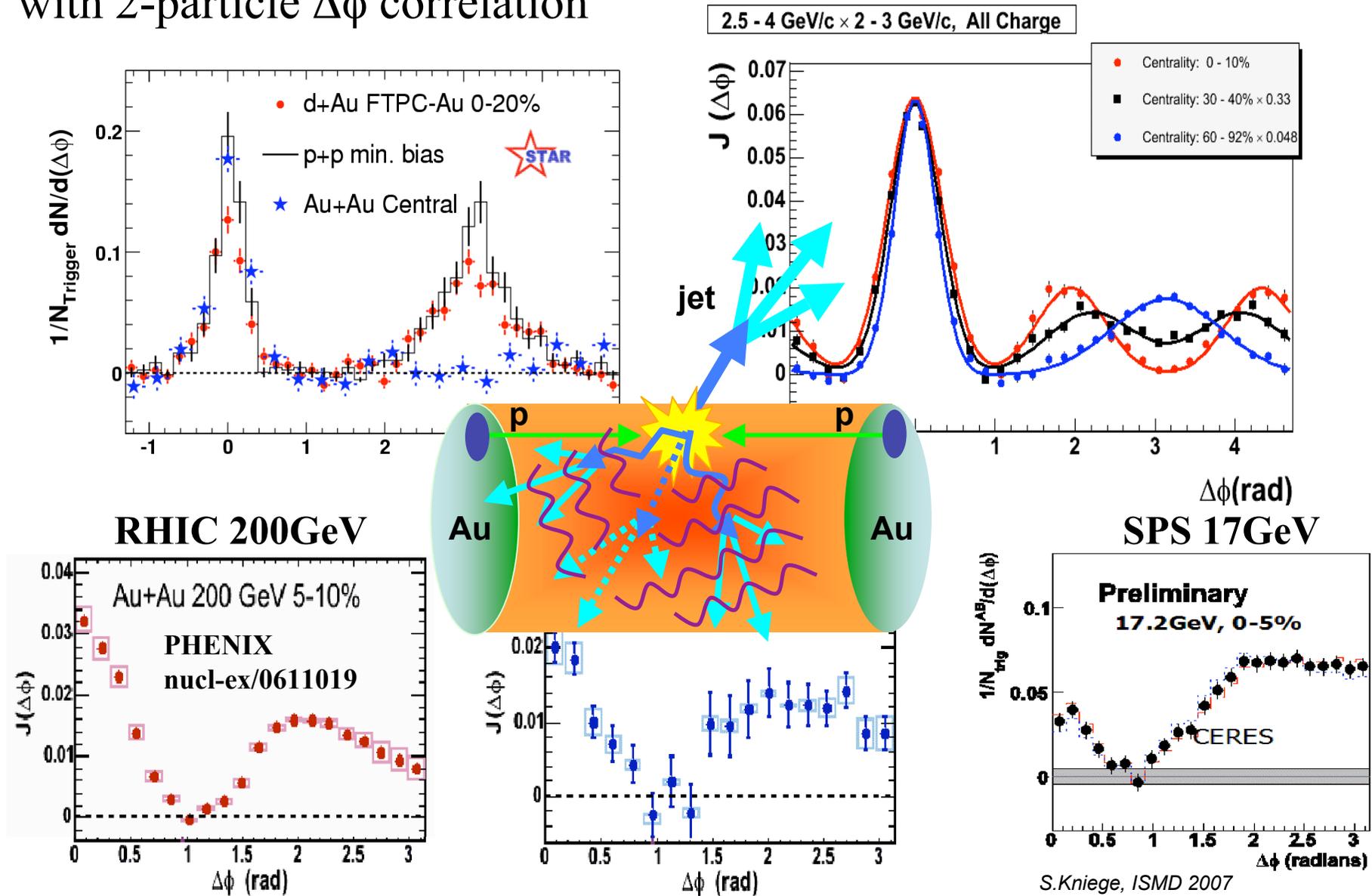


Use Jet as a probe of High-Energy and Density Matter

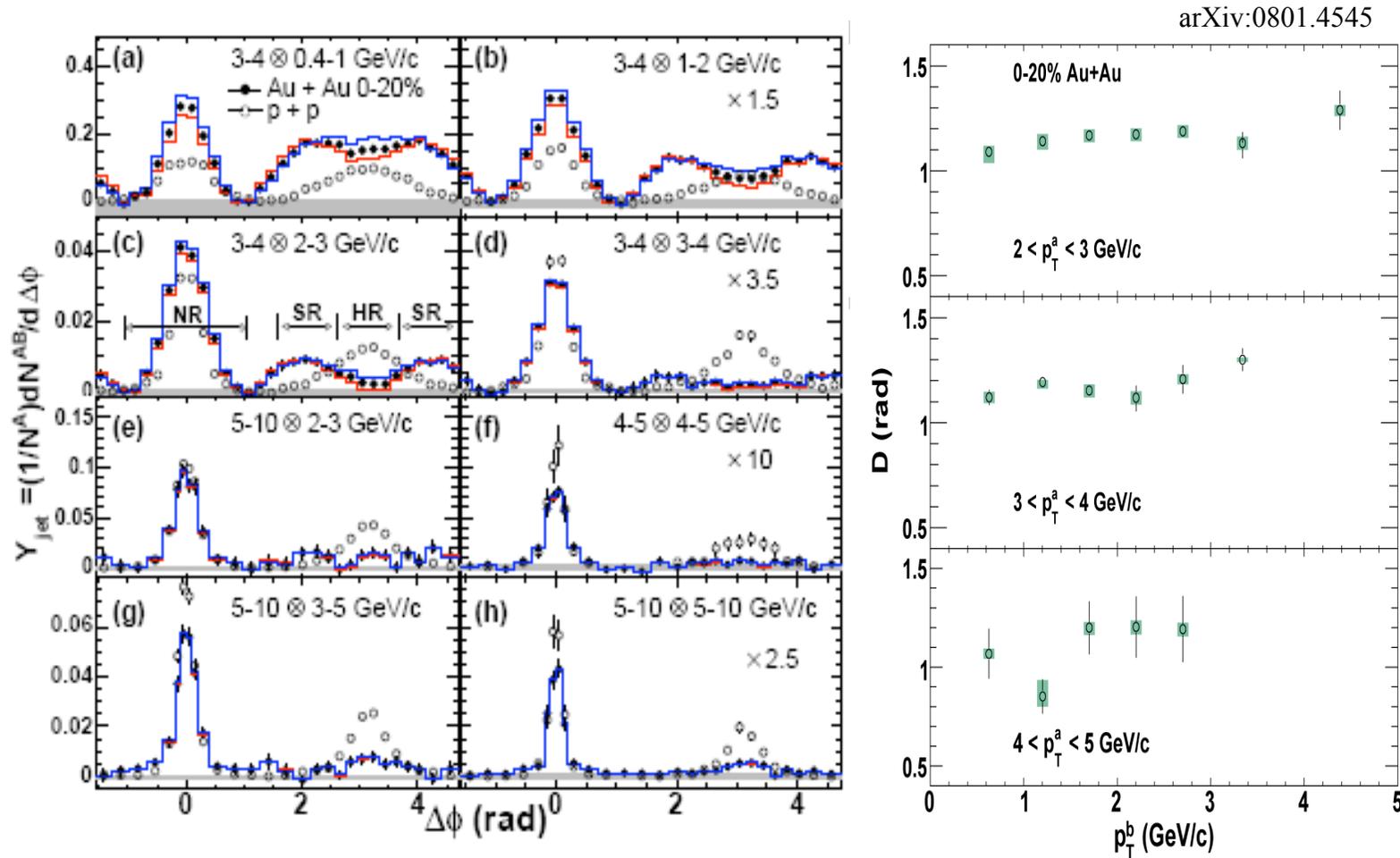
Jet in p+p, d+Au or Peripheral Au+Au Collision as a Base Line
Subtraction of Non-Correlated BG in Central Heavy-Ion Collisions



Jet suppression \rightarrow modification with 2-particle $\Delta\phi$ correlation

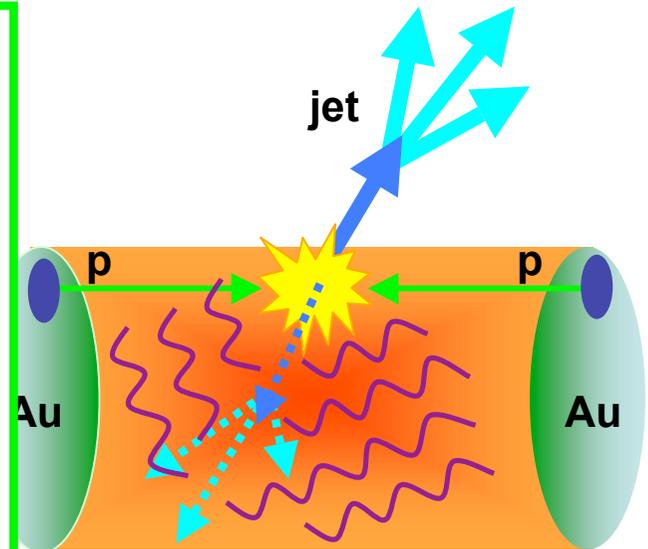
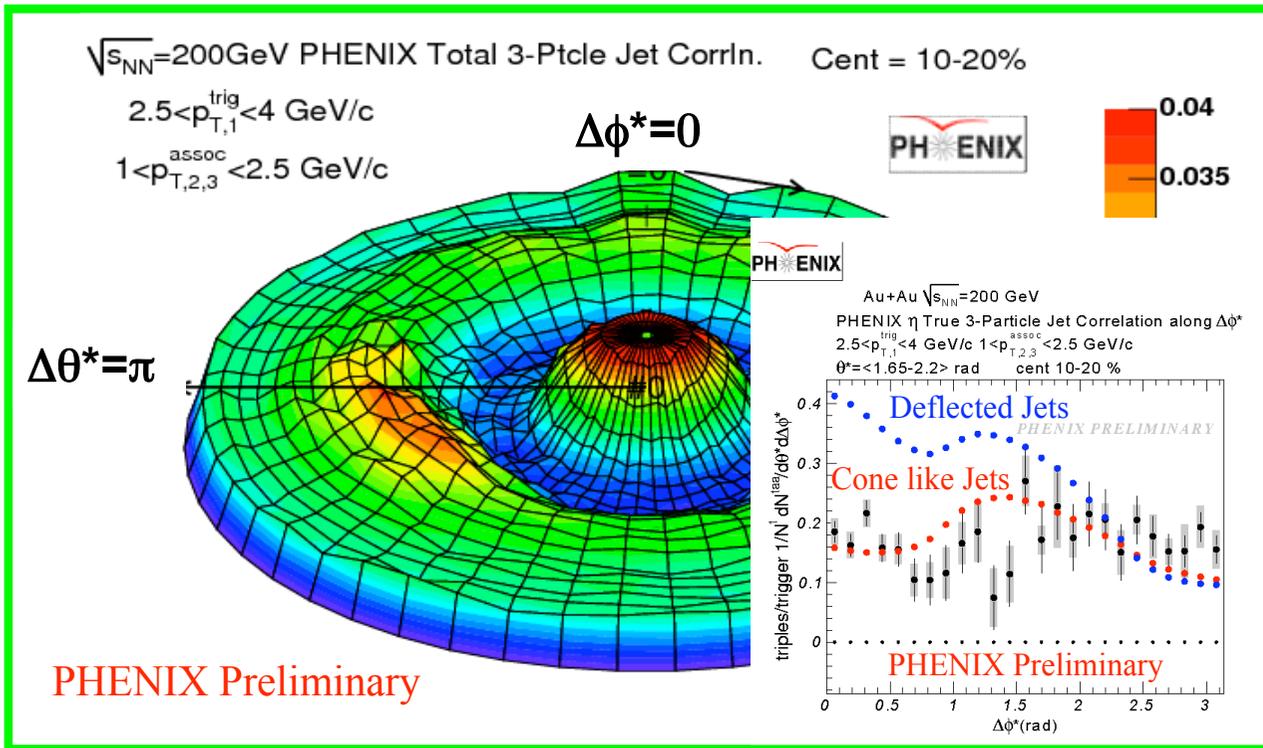


Transverse Momentum (Trigger, Associate) Dependence of Jet Shape

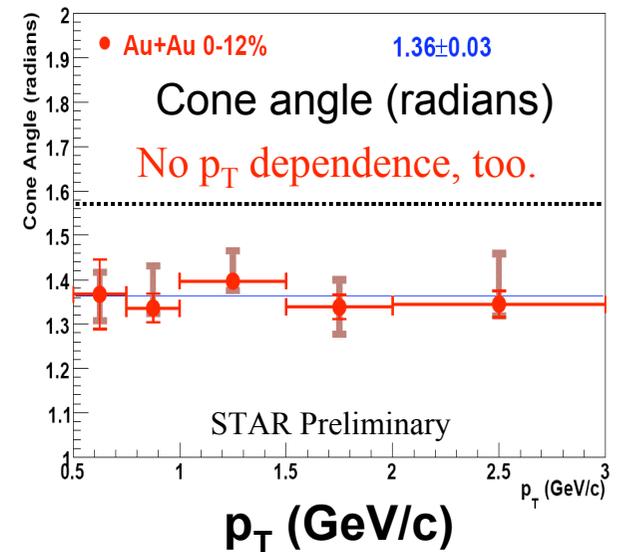
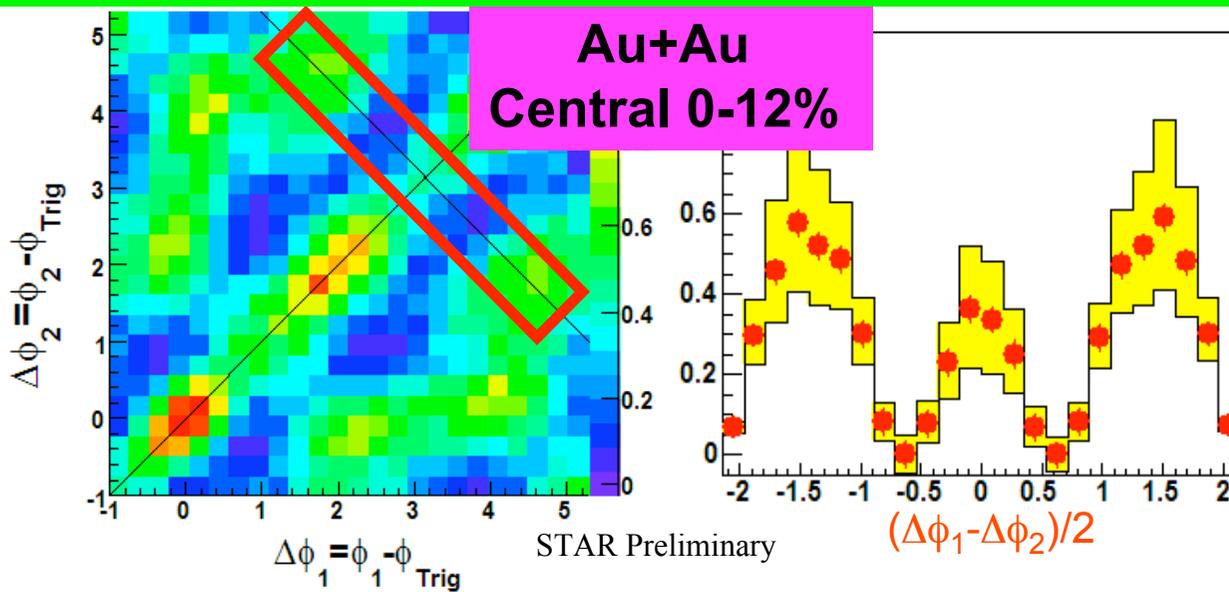


Suppression in both near/away side peak at high p_T
 Enhancement in near side peak at low p_T
 Development of away side shoulder at low p_T

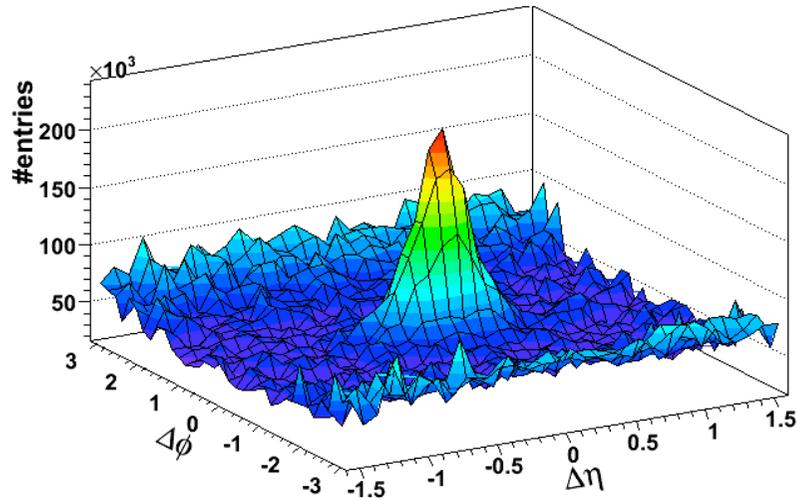
No p_T dependence of
 shoulder peak position



Both measurements prefer
 Mach-cone scenario.

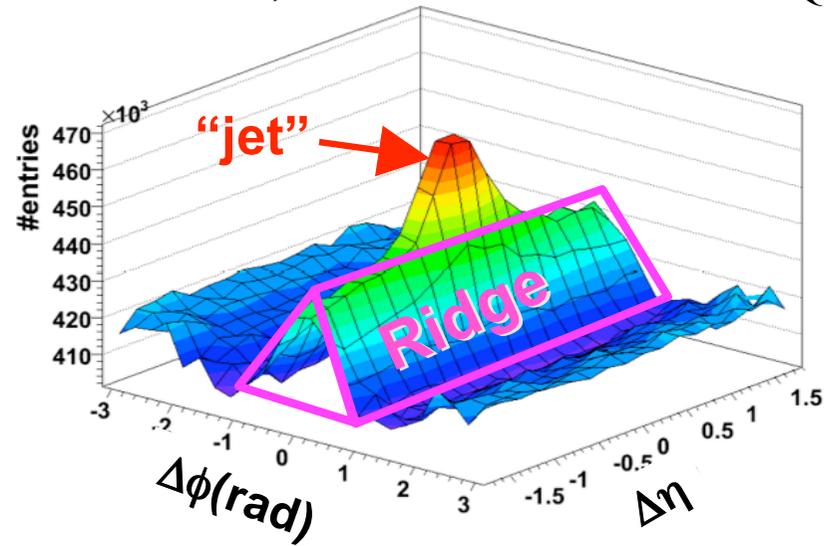


d+Au, 200 GeV

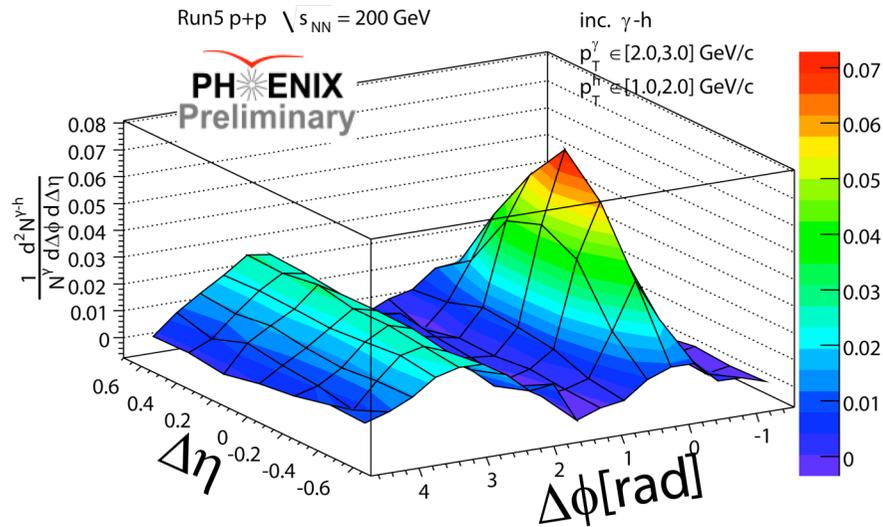


Au+Au, 200 GeV

STAR QM06

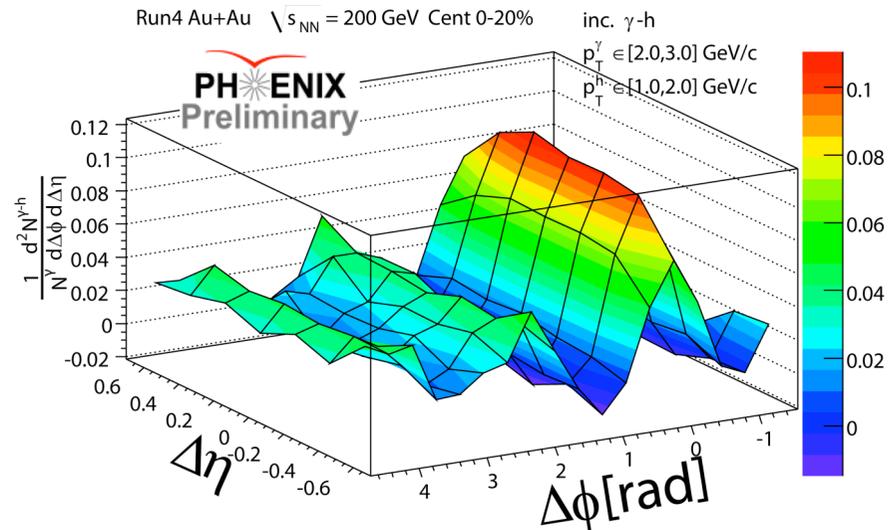


p+p, peripheral Au+Au

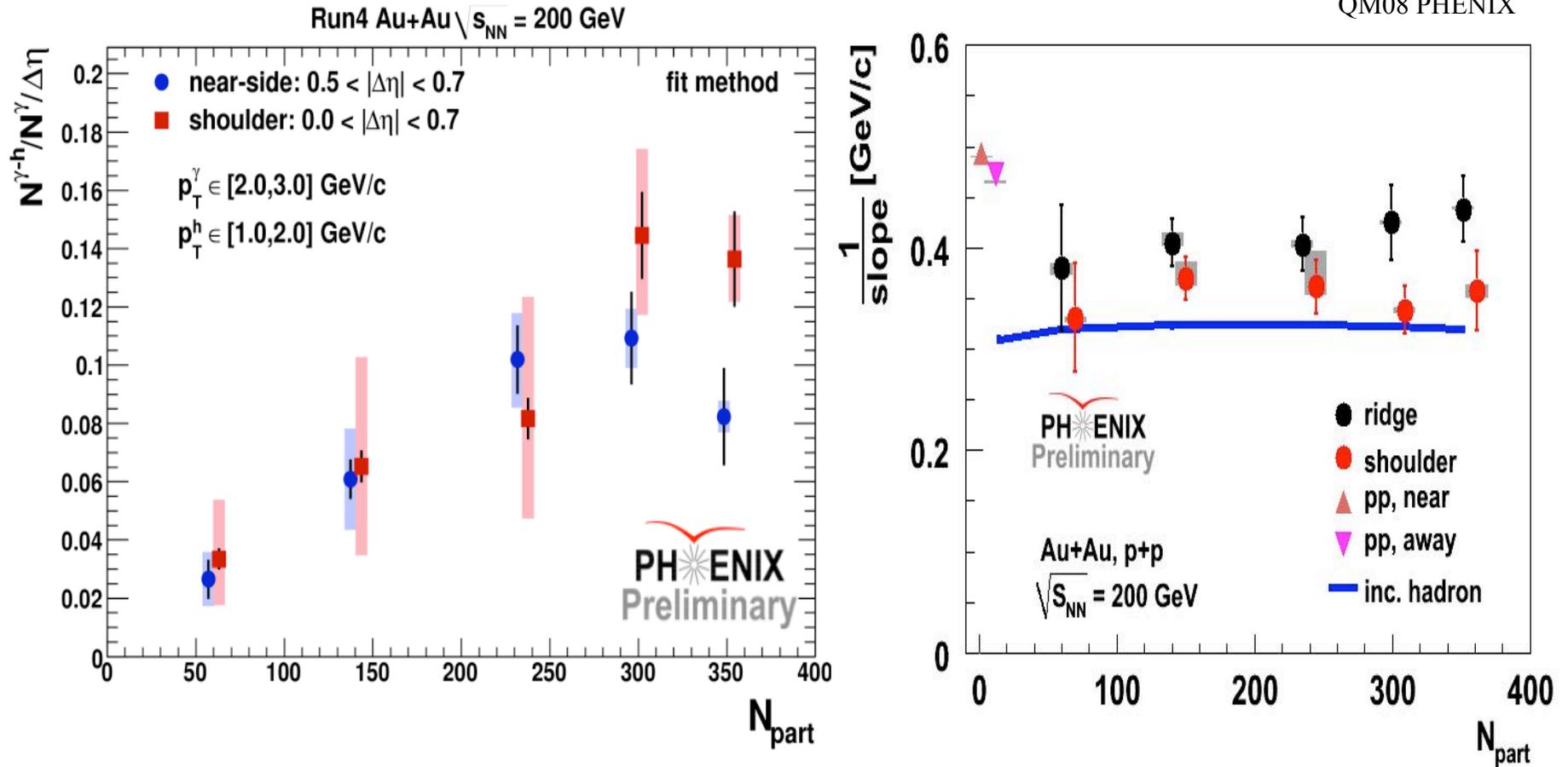


central Au+Au

PHENIX QM08



Centrality Dependence of Ridge and Shoulder Yield and $\langle p_T \rangle$

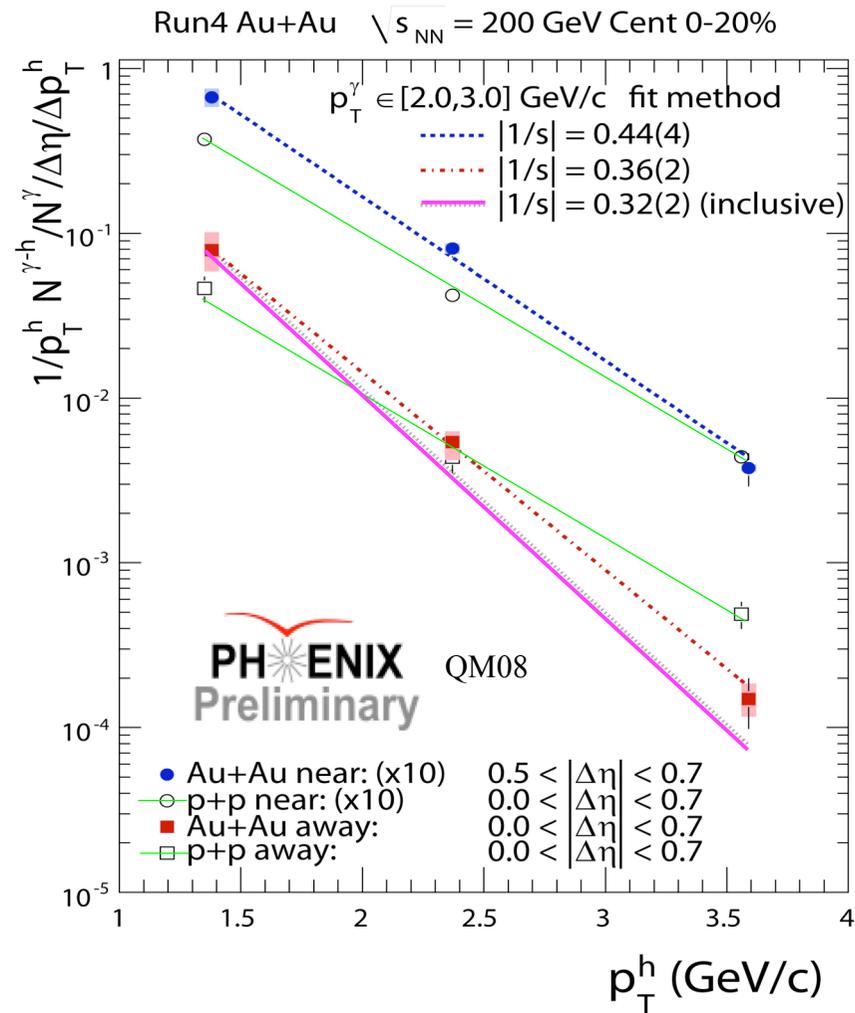
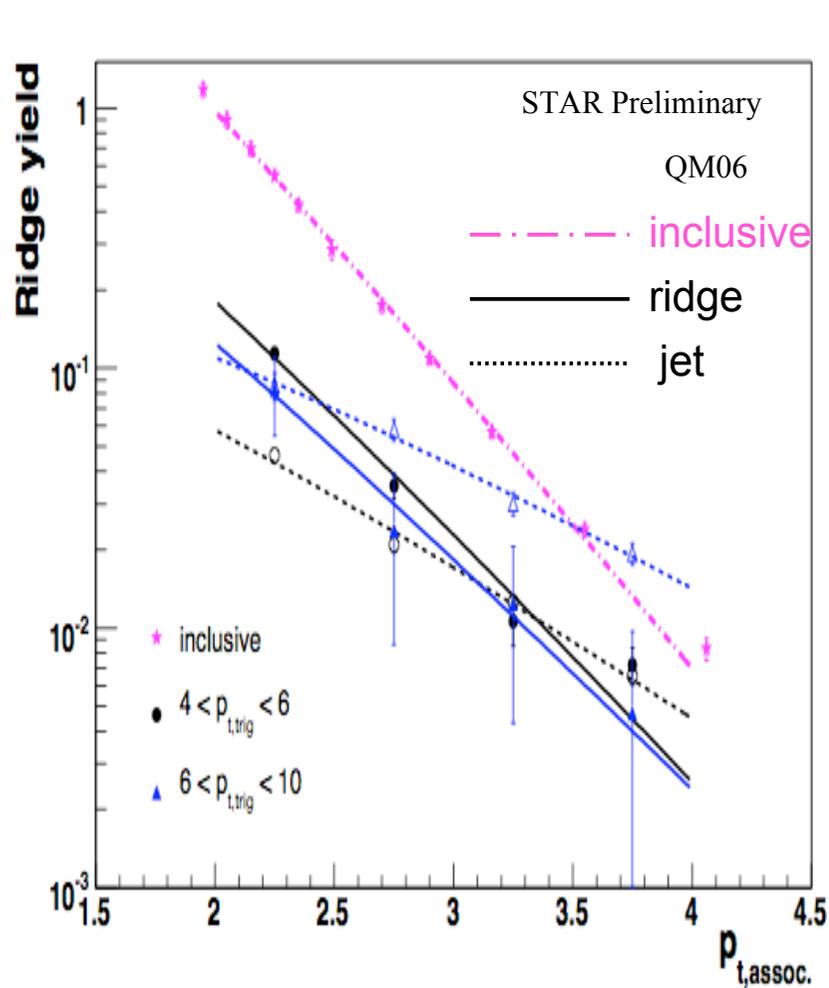


Both ridge and shoulder yields increase linearly with N_{part} .

Similar (flat) centrality dependence on inverse slope parameter for both ridge and shoulder.

Jet (p+p) like p_T shape is harder than ridge, ridge is harder than shoulder, shoulder is similar to inclusive.

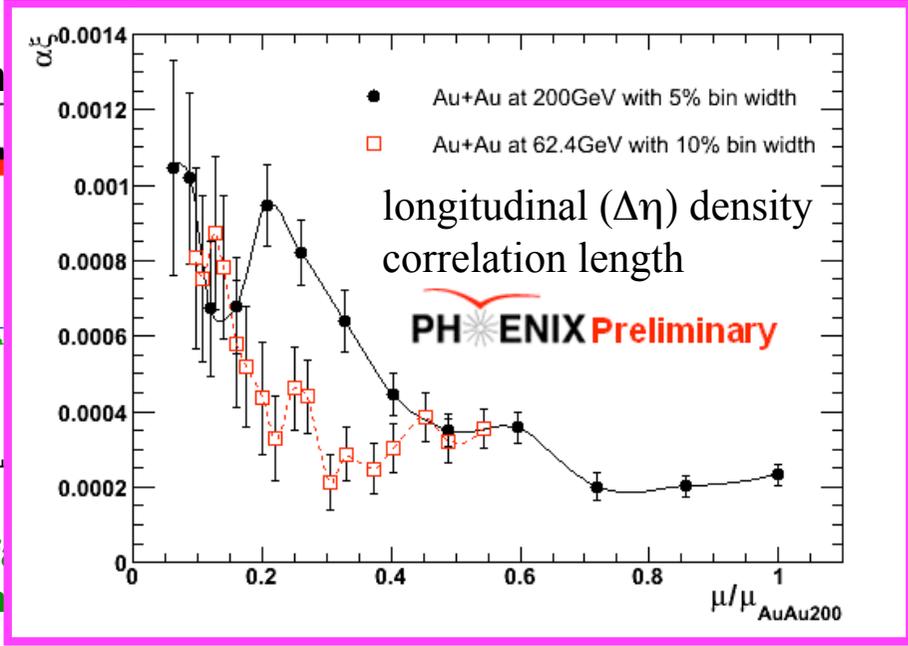
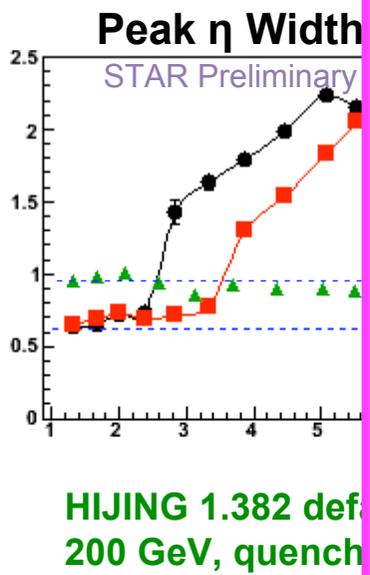
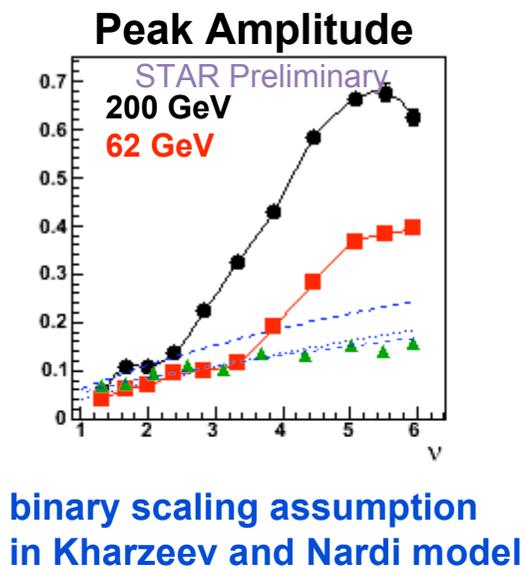
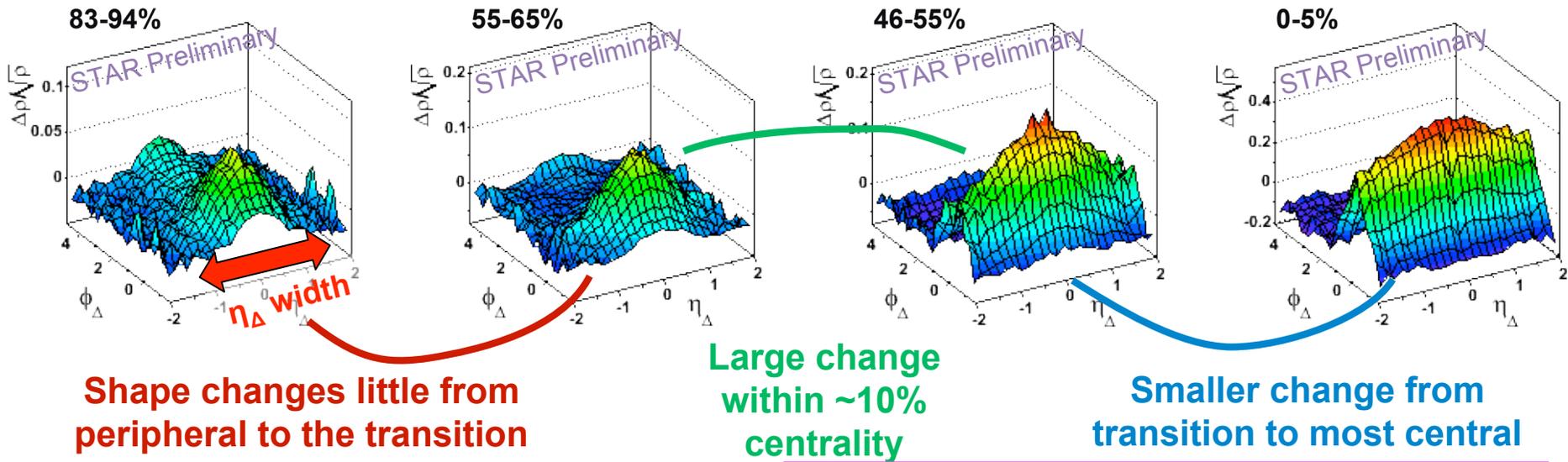
$$T_{\text{Inclusive}} \gtrsim T_{\text{Shoulder}} \gtrsim T_{\text{Ridge}} < T_{\text{Jet}}$$



Both ridge and shoulder $\langle p_T \rangle$ are almost independent with centrality and trigger p_T selections. It's just like a bulk matter... suspicious on BG(bulk) subtraction... but this is what we see...

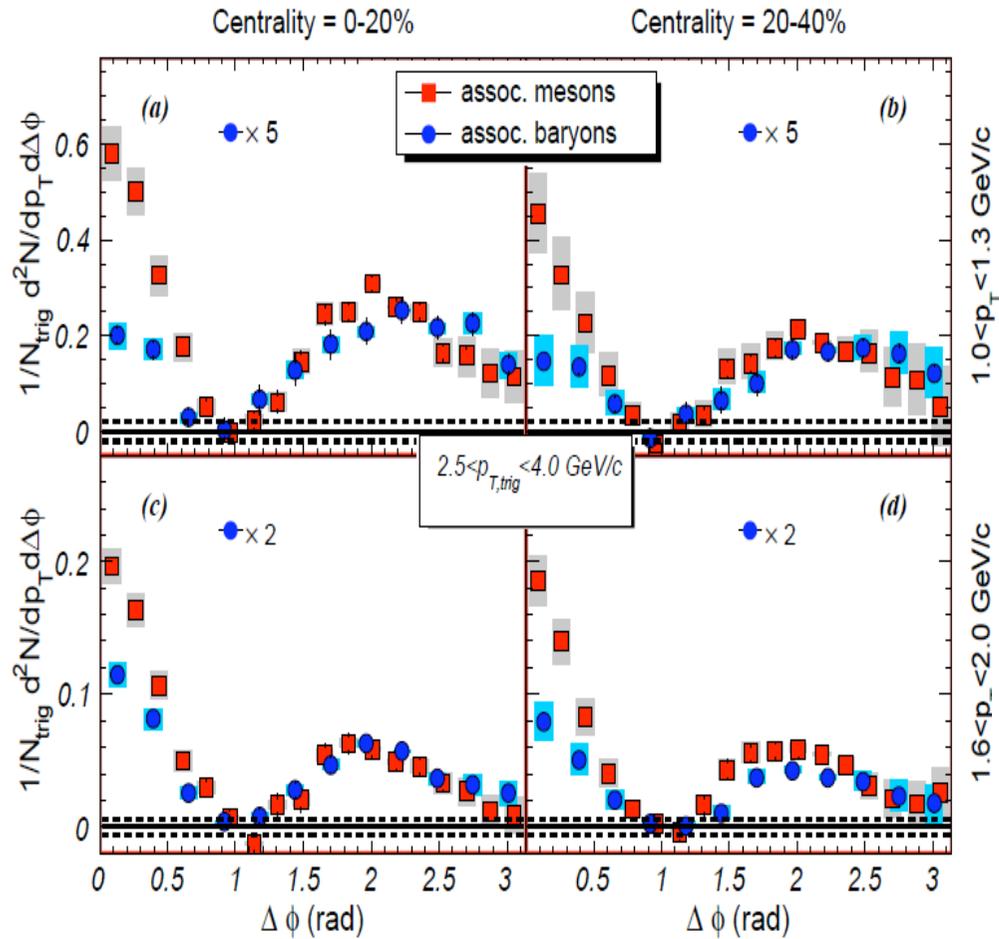
data - fit (except same-side peak)

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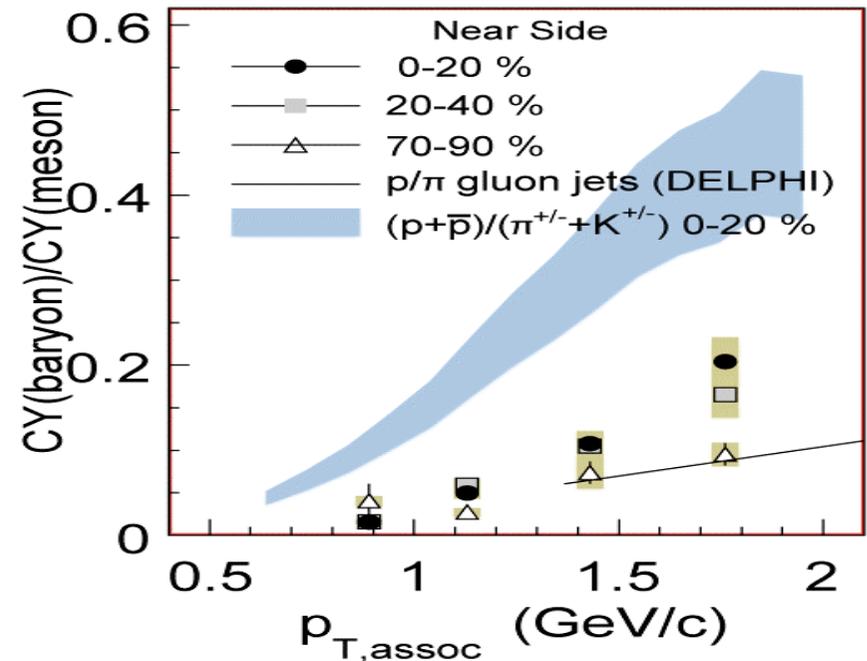
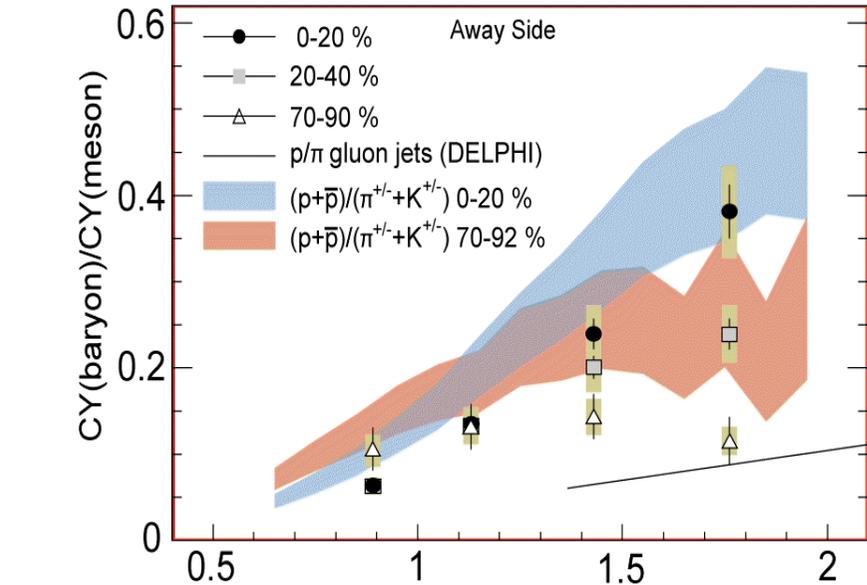


Hadron trigger with identified associate Baryon/Meson

arXiv:0712.3033

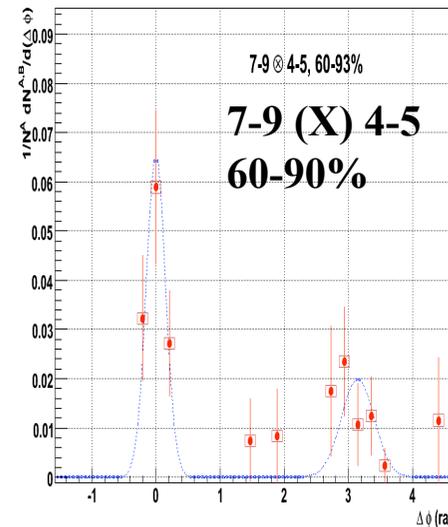
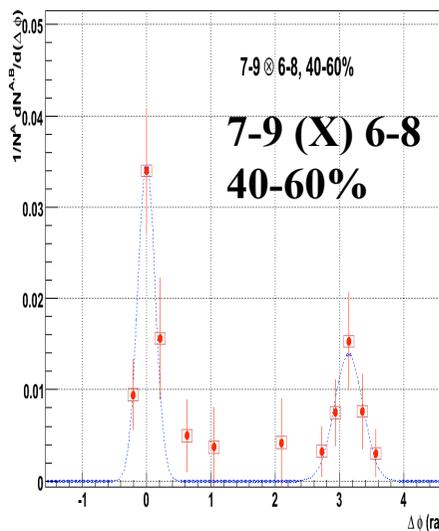
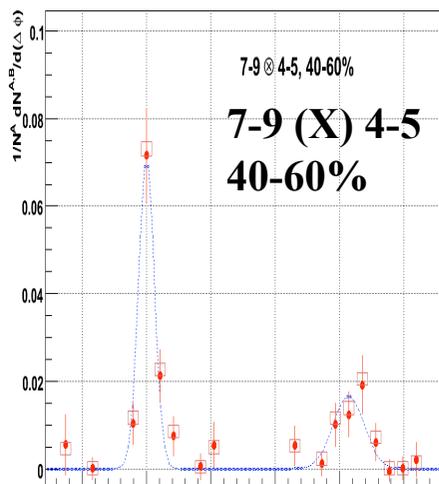
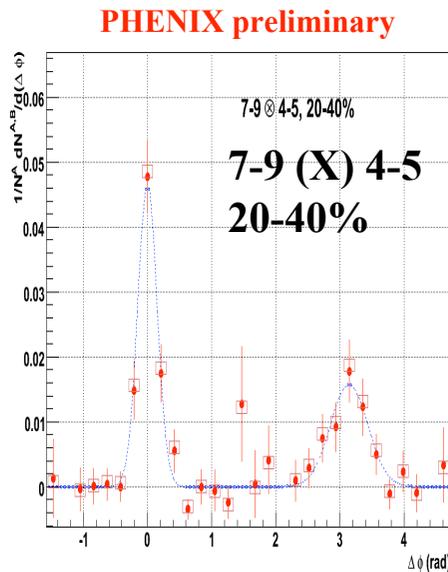
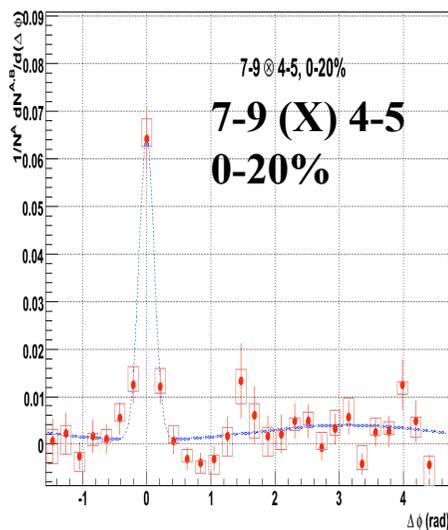
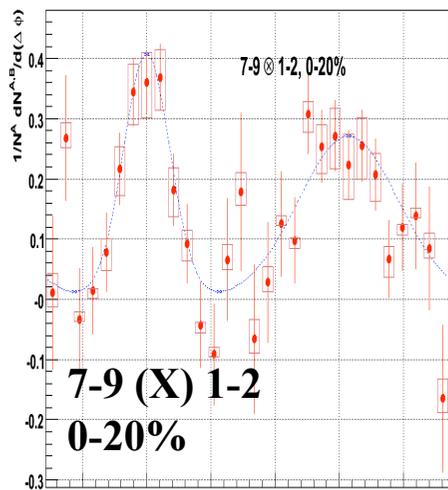


Near/Away-side B/M ratio increases in central
 Away-side B/M ratios approach inclusive values
 Incompatible with in-vacuum fragmentation



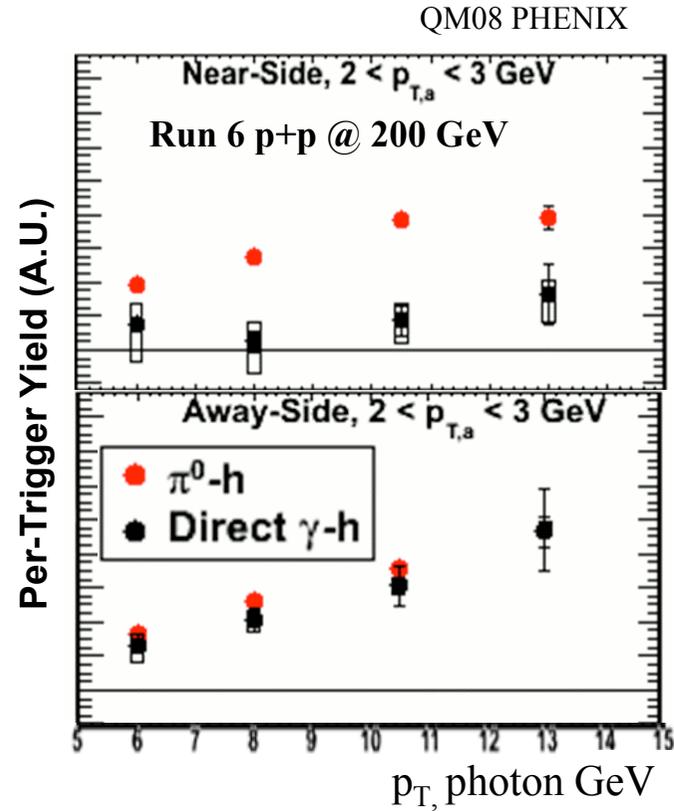
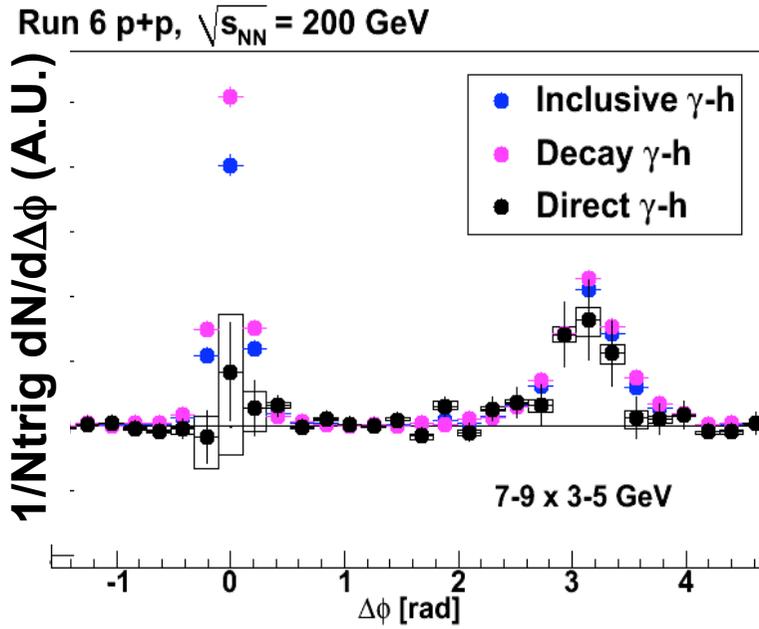
Identified π^0 trigger with associate hadron

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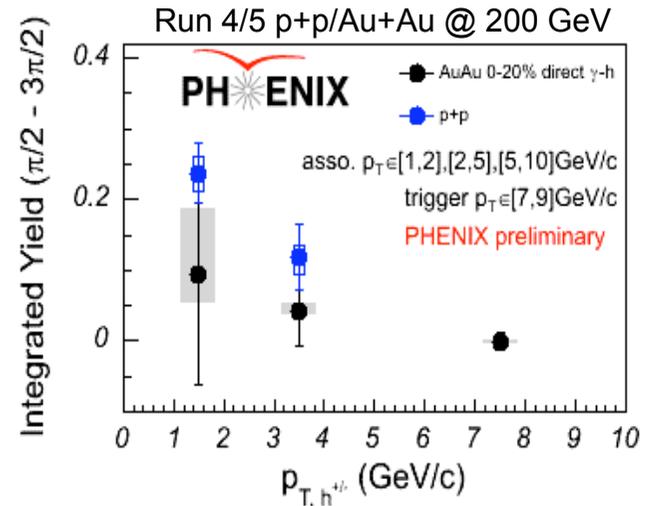
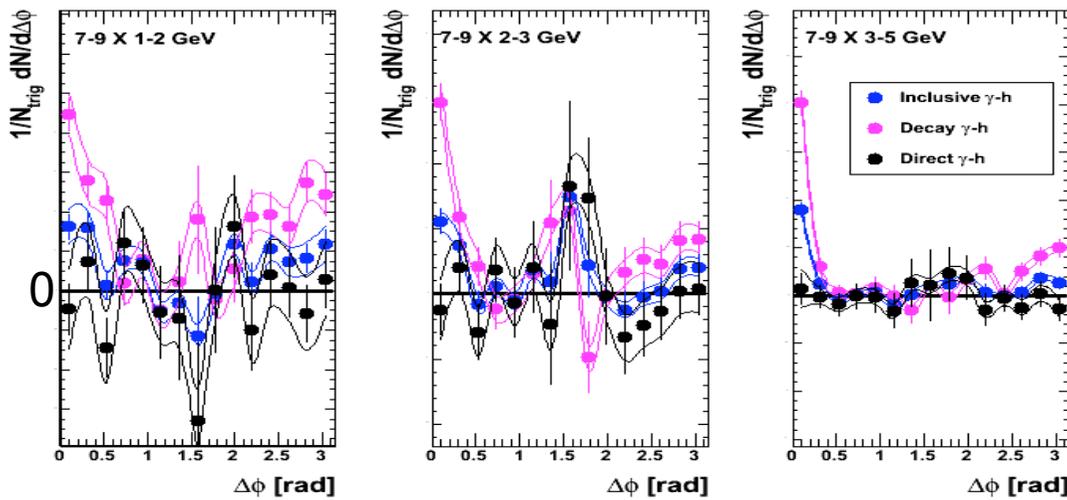
Width does not change with centrality
similar to charged hadron triggered case.

Direct γ trigger with associate hadron



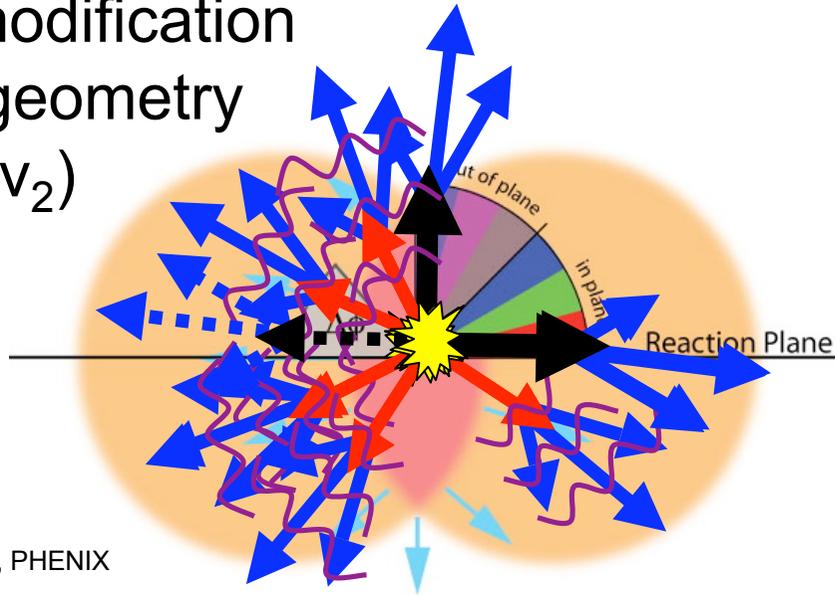
p+p: Consistent with trigger photon carrying the full jet energy, away side jets are similar between π^0 and γ triggers.

Run 7 Au+Au @ 200 GeV, cent=0~20%, preliminary

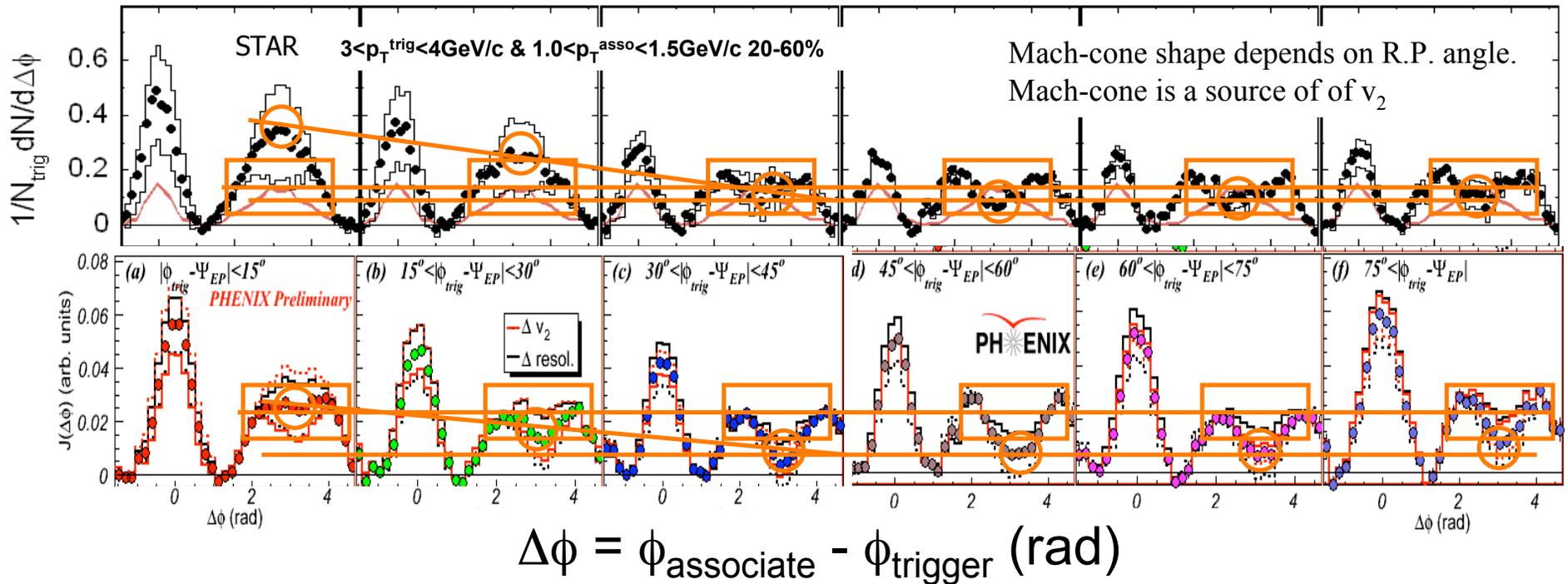
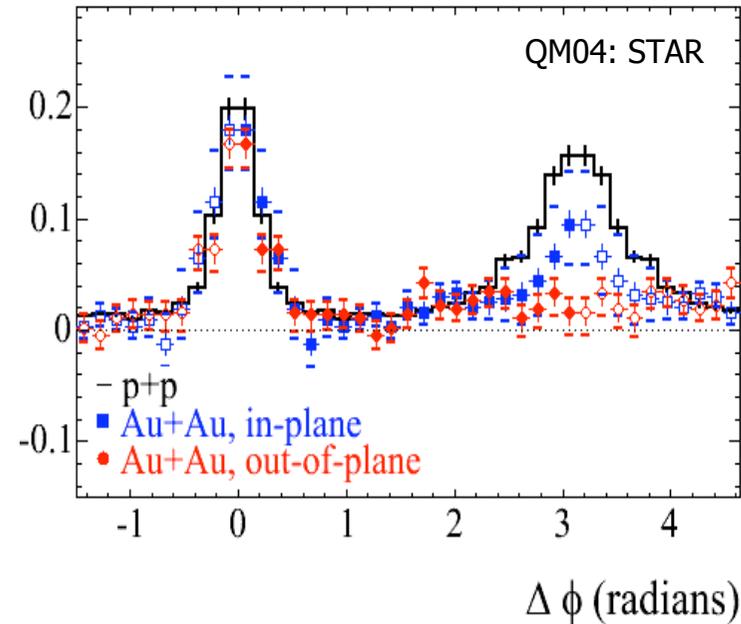


Need more studies and statistics for Au+Au case.

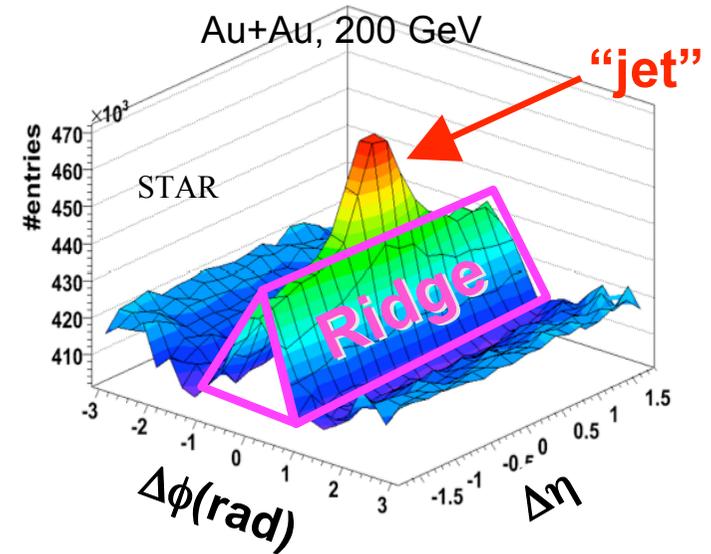
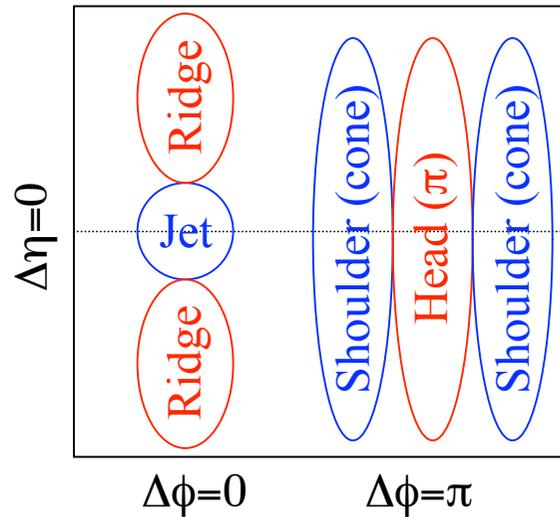
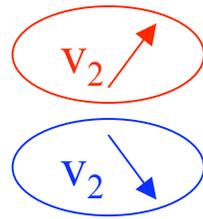
Jet modification and geometry (and v_2)



QM08: STAR, PHENIX



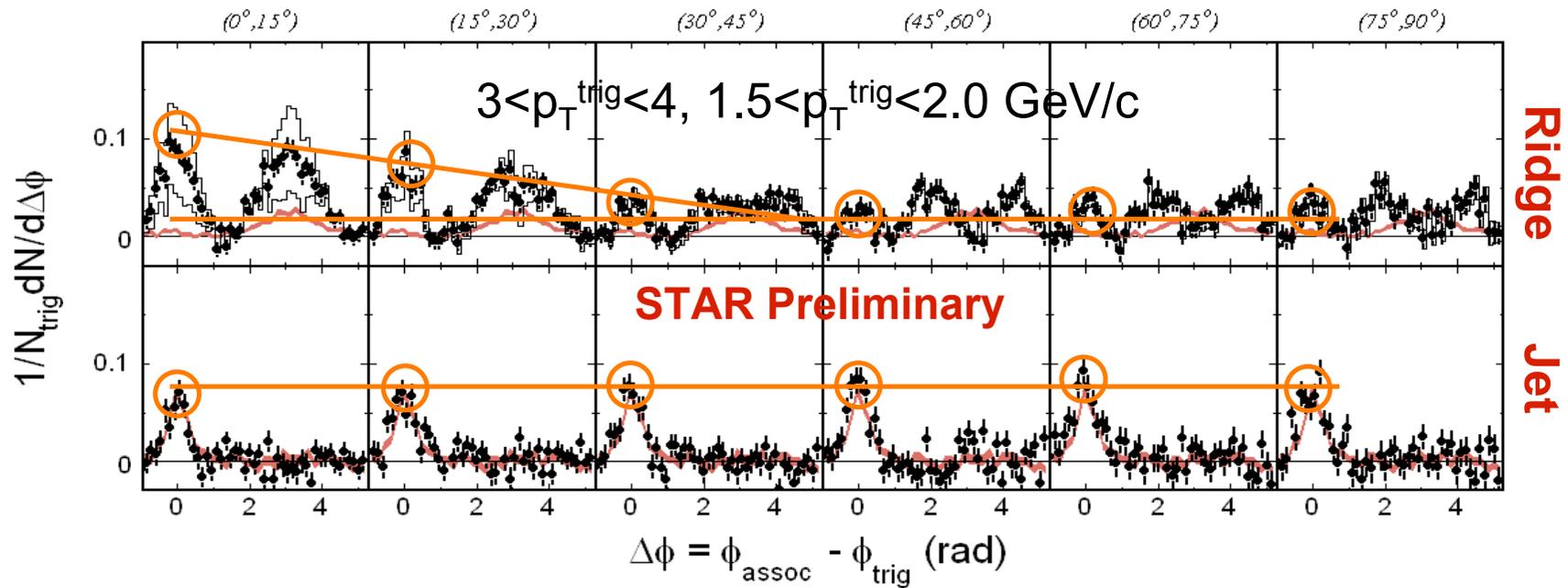
Ridge/Cone and geometry (v_2)



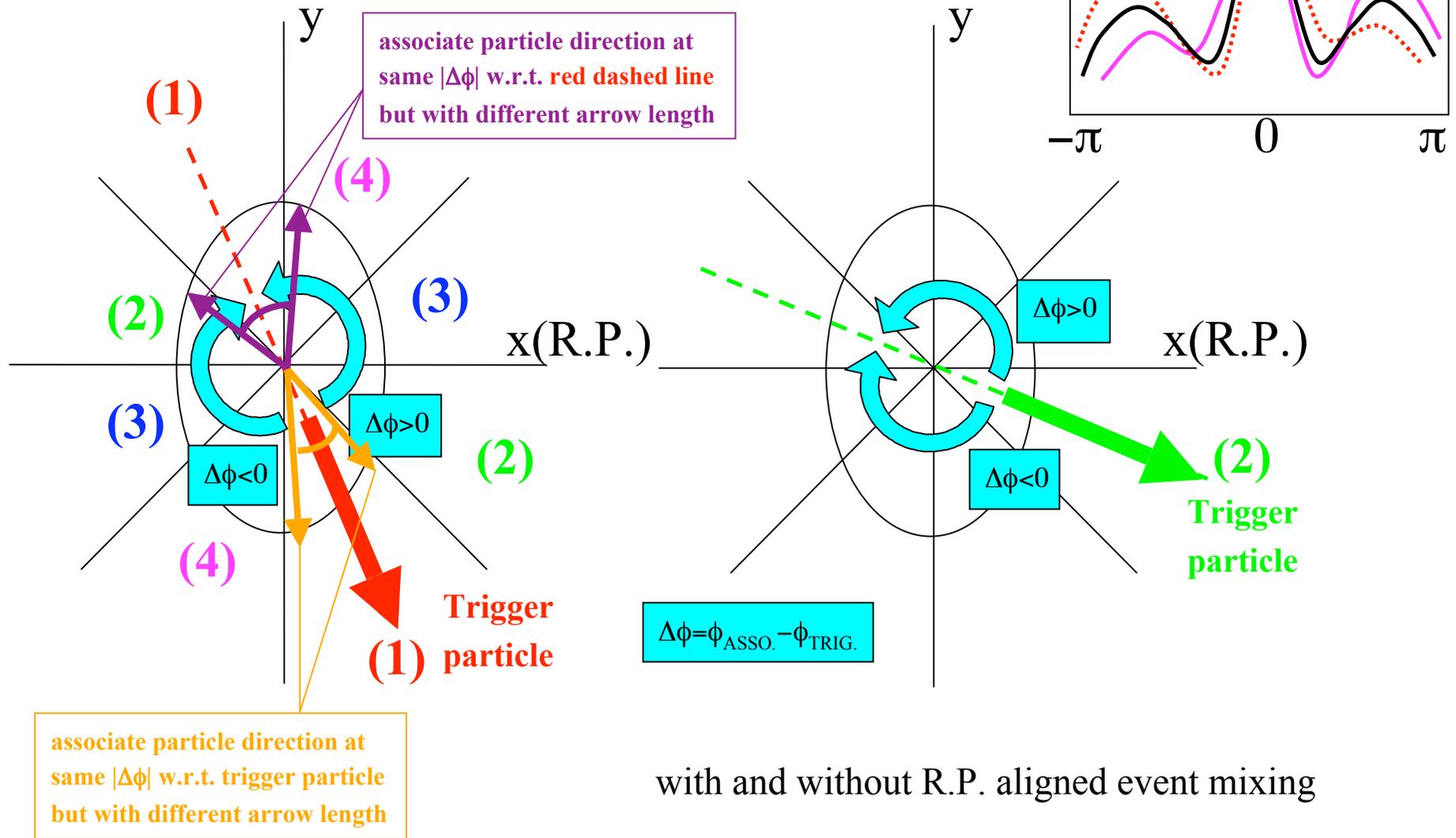
Ridge shape depends on R.P. angle.
Ridge is a source of v_2

Jet does not depend on it
Jet reduces v_2

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In order to study the jet modification (mach-cone, ridge) and it's relation with almond geometry in more detail...





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Summary and Conclusion

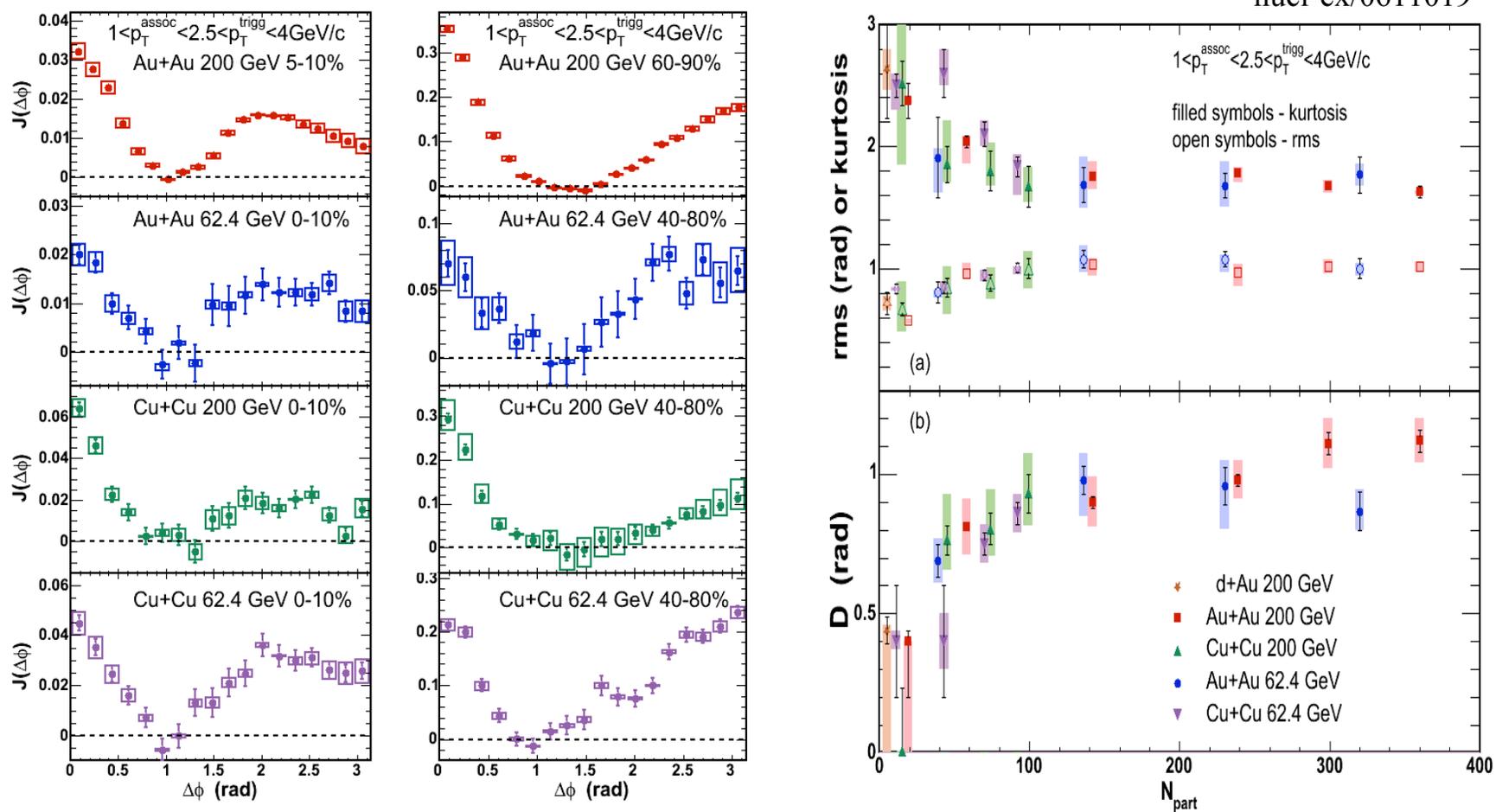
- 2- and 3- particle correlation and transverse momentum dependence of jet-modification tells us that it is likely a mach-cone.
- Mach-cone and ridge are almost as soft as inclusive particles.
- Identified particle (baryon, meson, π^0 , γ) correlation measurements in PHENIX
- Mach-cone and ridge w.r.t. reaction plane angle tells us that this is a part of v_2

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Extra and Back-up Slides

System Size and Beam Energy Dependence of Jet Shape

nucl-ex/0611019

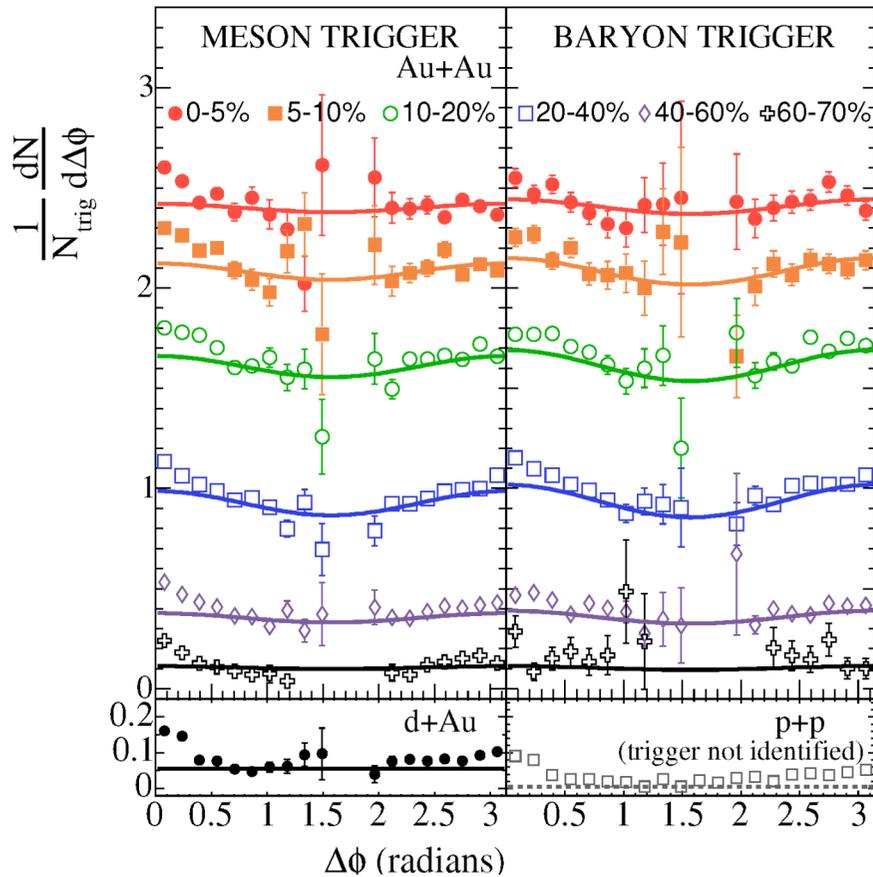


No energy dependence (62 ~ 200GeV)
 Rapid change between $N_{part} = 0 \sim 100$
 Almost no change above $N_{part} > 100$

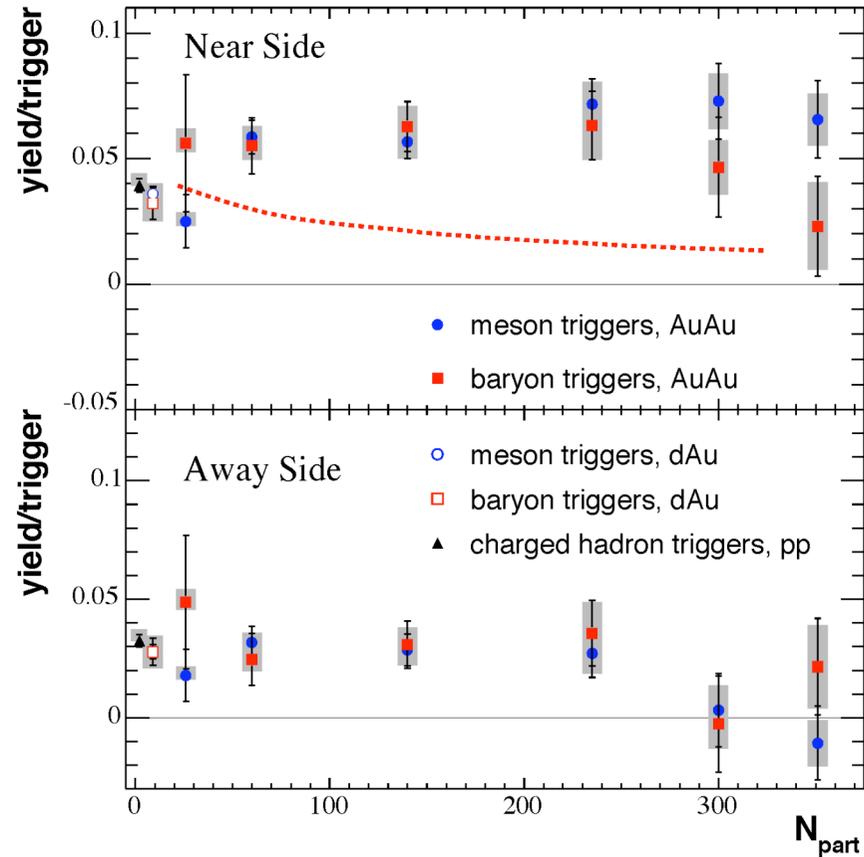
Identified Baryon/Meson trigger with associate hadron

PRC 71 051902

$2.4 < p_T^{\text{Trig}} < 4 \text{ GeV}/c$ $1.7 < p_T^{\text{Asso}} < 2.5 \text{ GeV}/c$

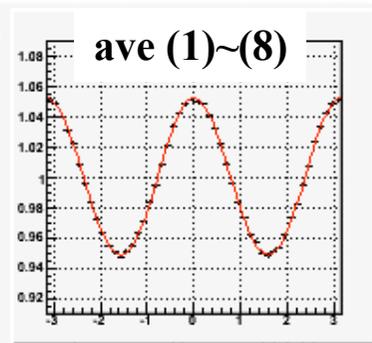


Enhanced near-side yield can not be explained by soft process like thermal recombination alone.



without R.P. aligned event mixing

with R.P. aligned event mixing



Pure Flow Simulation
with trigger angle selection w.r.t. R.P.
with/without R.P. aligned event mixing

