

Update on CME & CMW analyses

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Factorization or not?

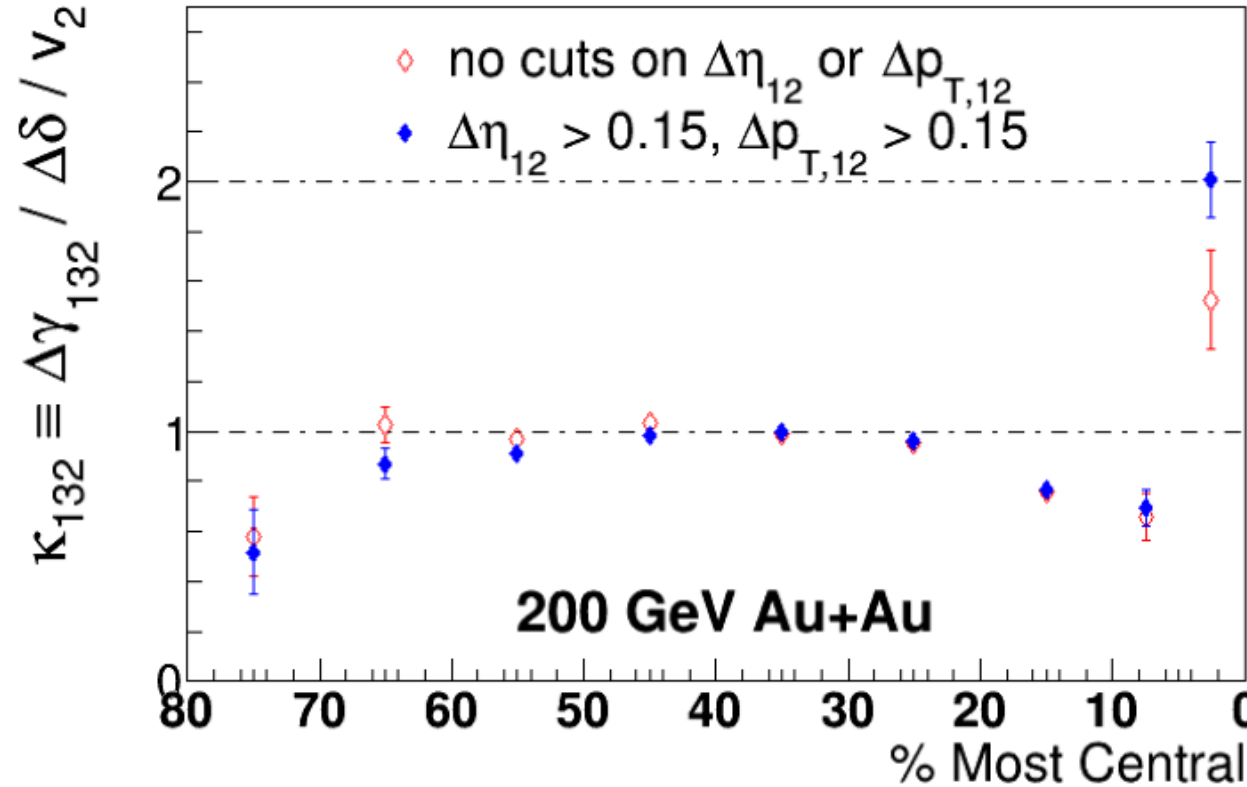
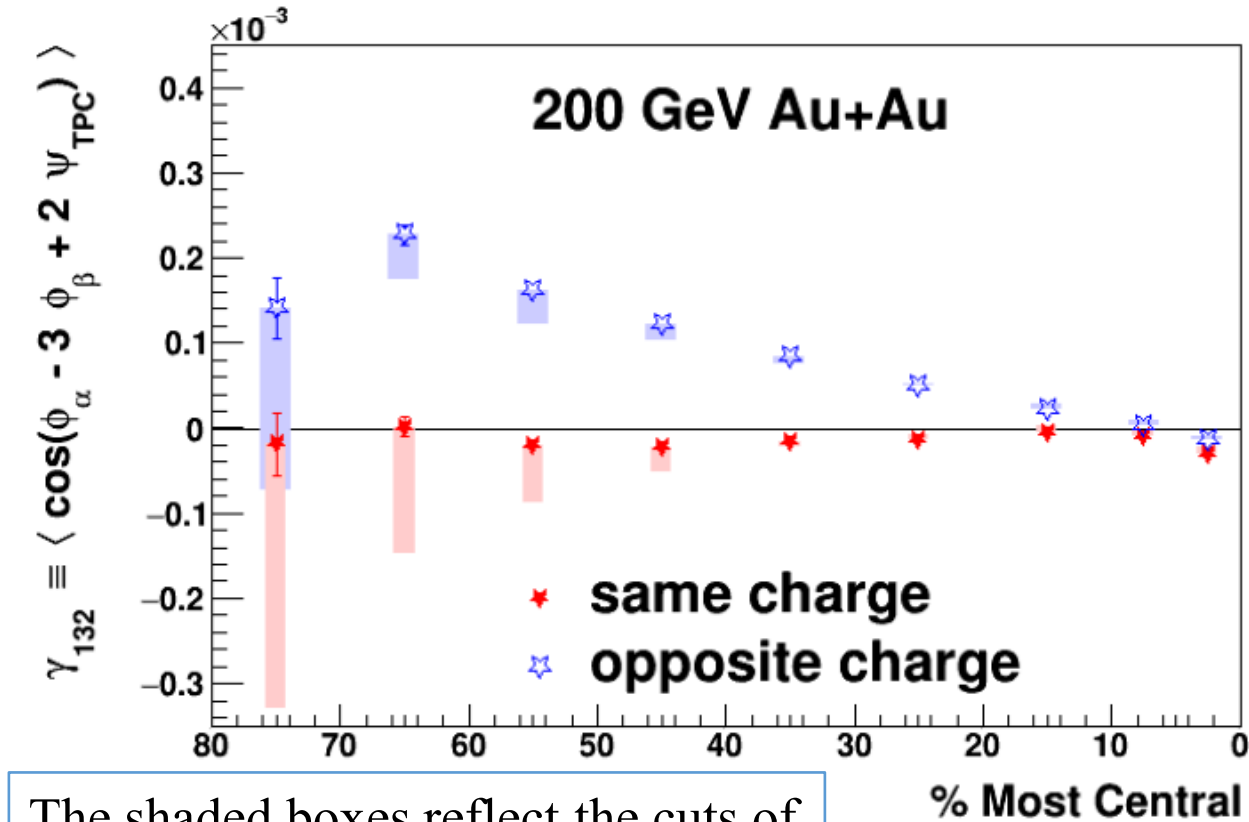
$$\begin{aligned}\gamma_{112} &= \langle \cos(\varphi_\alpha + \varphi_\beta - 2\Psi) \rangle \\ &= \langle \cos(\varphi_\alpha - \varphi_\beta + 2\varphi_\beta - 2\Psi) \rangle \\ &= \langle \cos(\varphi_\alpha - \varphi_\beta) \cos(2\varphi_\beta - 2\Psi) \rangle - \langle \sin(\varphi_\alpha - \varphi_\beta) \sin(2\varphi_\beta - 2\Psi) \rangle \\ &\approx \delta^* v_2 \quad \text{if factorization works}\end{aligned}$$

$$\begin{aligned}\gamma_{132} &= \langle \cos(\varphi_\alpha - 3\varphi_\beta + 2\Psi) \rangle \\ &= \langle \cos(\varphi_\alpha - \varphi_\beta + 2\Psi - 2\varphi_\beta) \rangle \\ &= \langle \cos(\varphi_\alpha - \varphi_\beta) \cos(2\varphi_\beta - 2\Psi) \rangle + \langle \sin(\varphi_\alpha - \varphi_\beta) \sin(2\varphi_\beta - 2\Psi) \rangle \\ &\approx \delta^* v_2 \quad \text{if factorization works}\end{aligned}$$

Does factorization ever work?

Not for γ_{112} or γ_{123} , what about γ_{132} ?

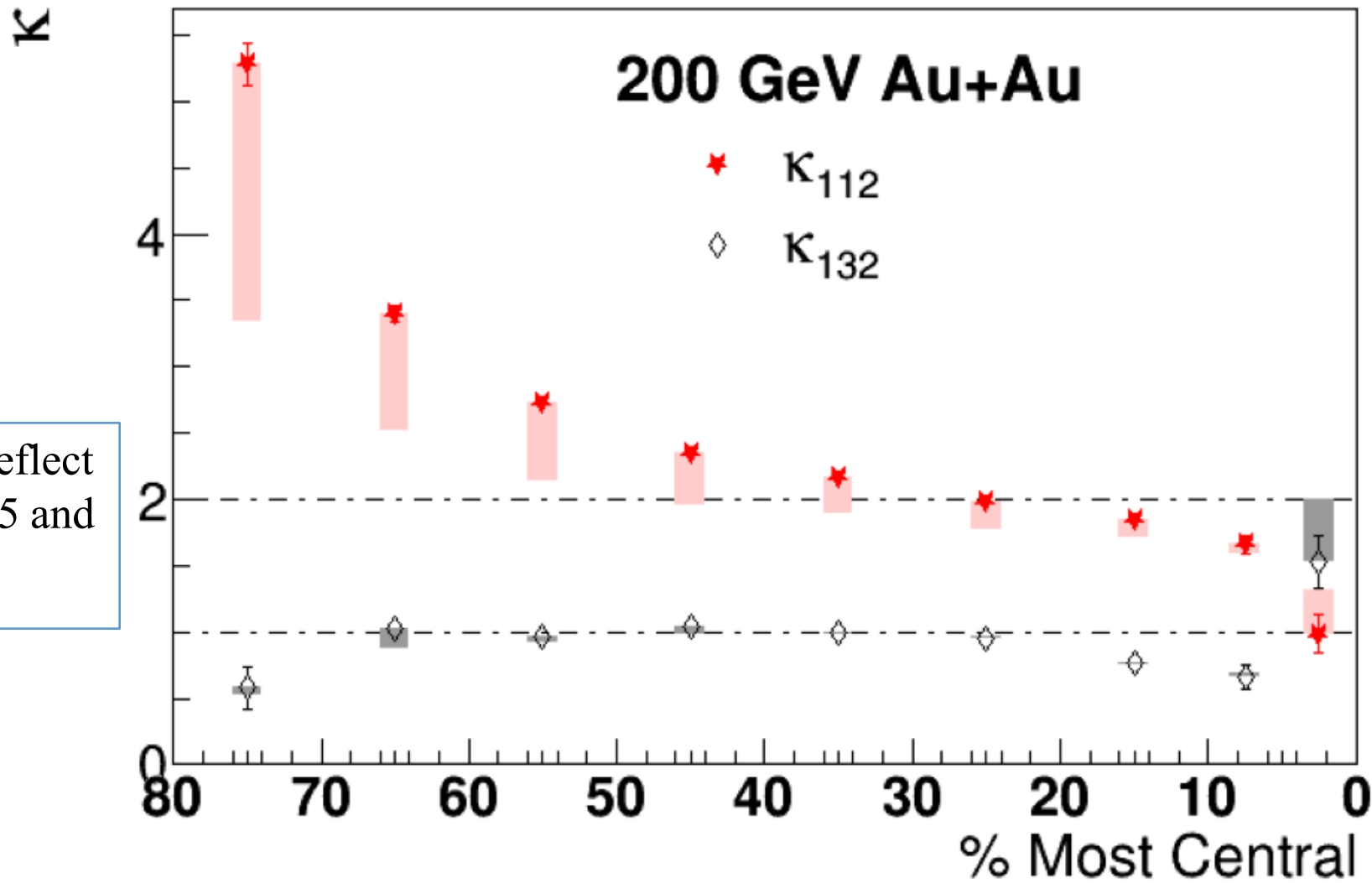
γ_{132} in 200 GeV Au+Au



The shaded boxes reflect the cuts of $|\Delta\eta| > 0.15$ and $|\Delta p_T| > 0.15$ GeV/c.

- γ_{132} displays OS > SS: v_2 driven background.
- $\kappa_{132} \approx 1$ for 20 - 70% events: factorization works here!

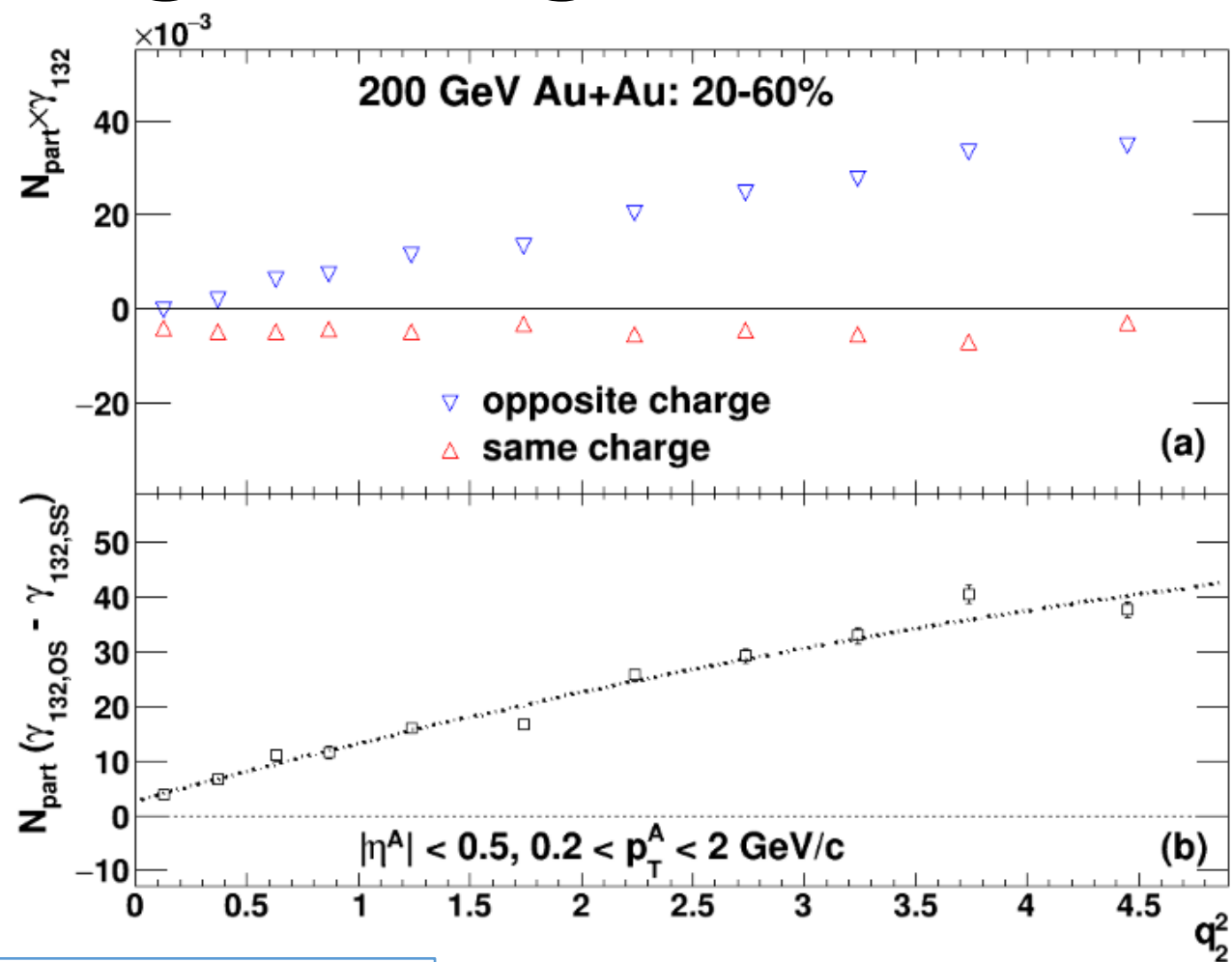
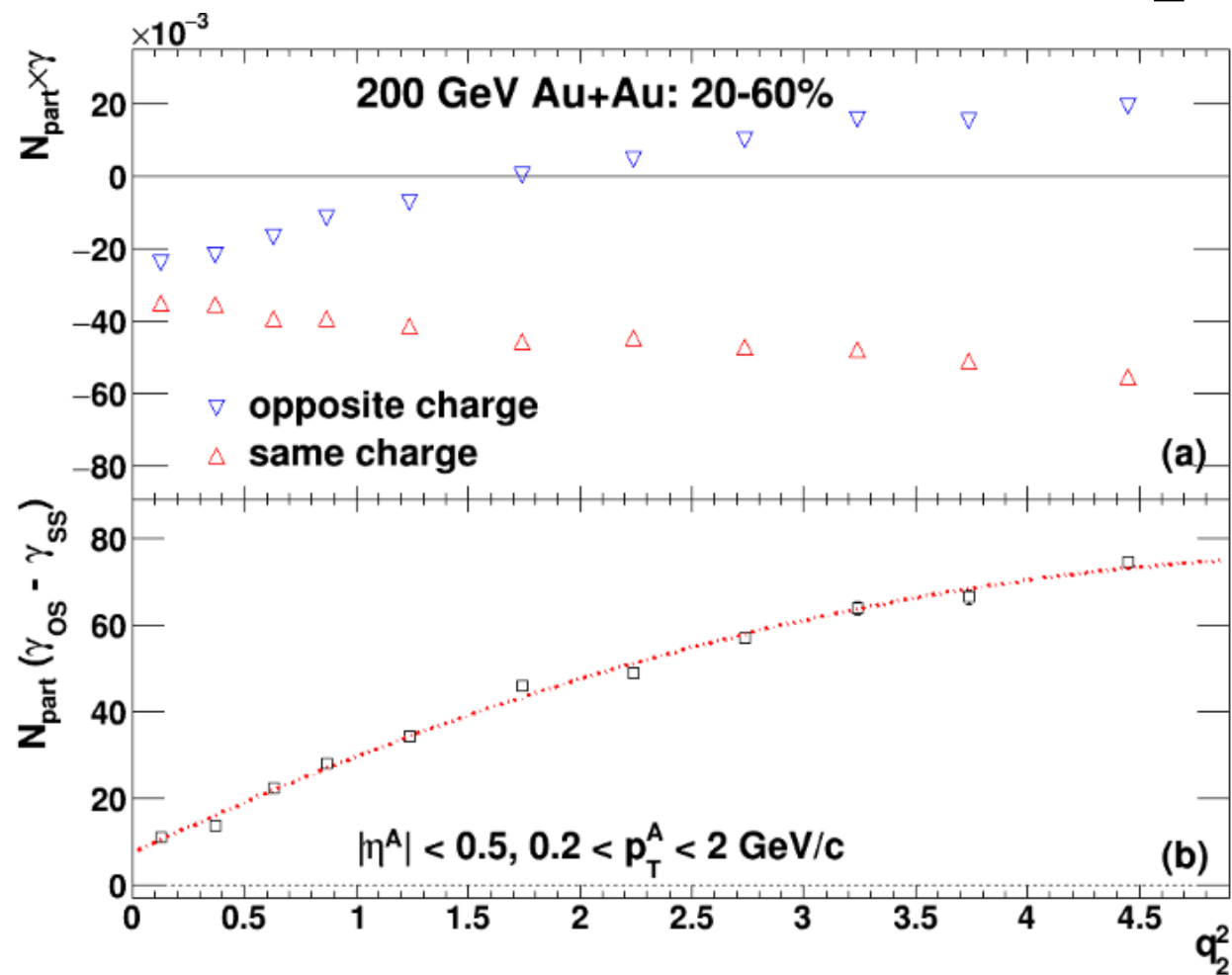
γ_{112} VS γ_{132}



The shaded boxes reflect the cuts of $|\Delta\eta|>0.15$ and $|\Delta p_T|>0.15$ GeV/c.

Compared with γ_{132} , γ_{112} does show some extra correlations.

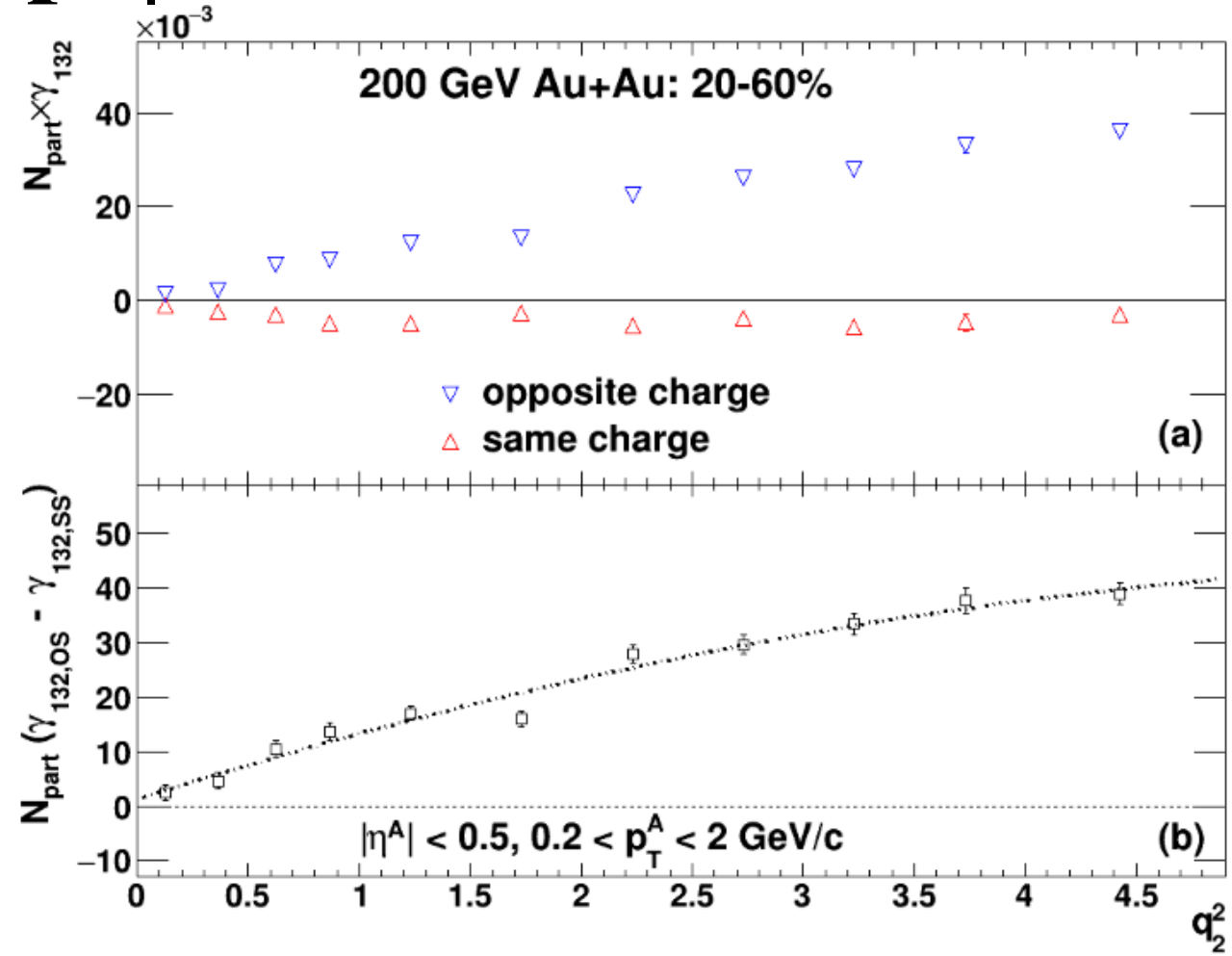
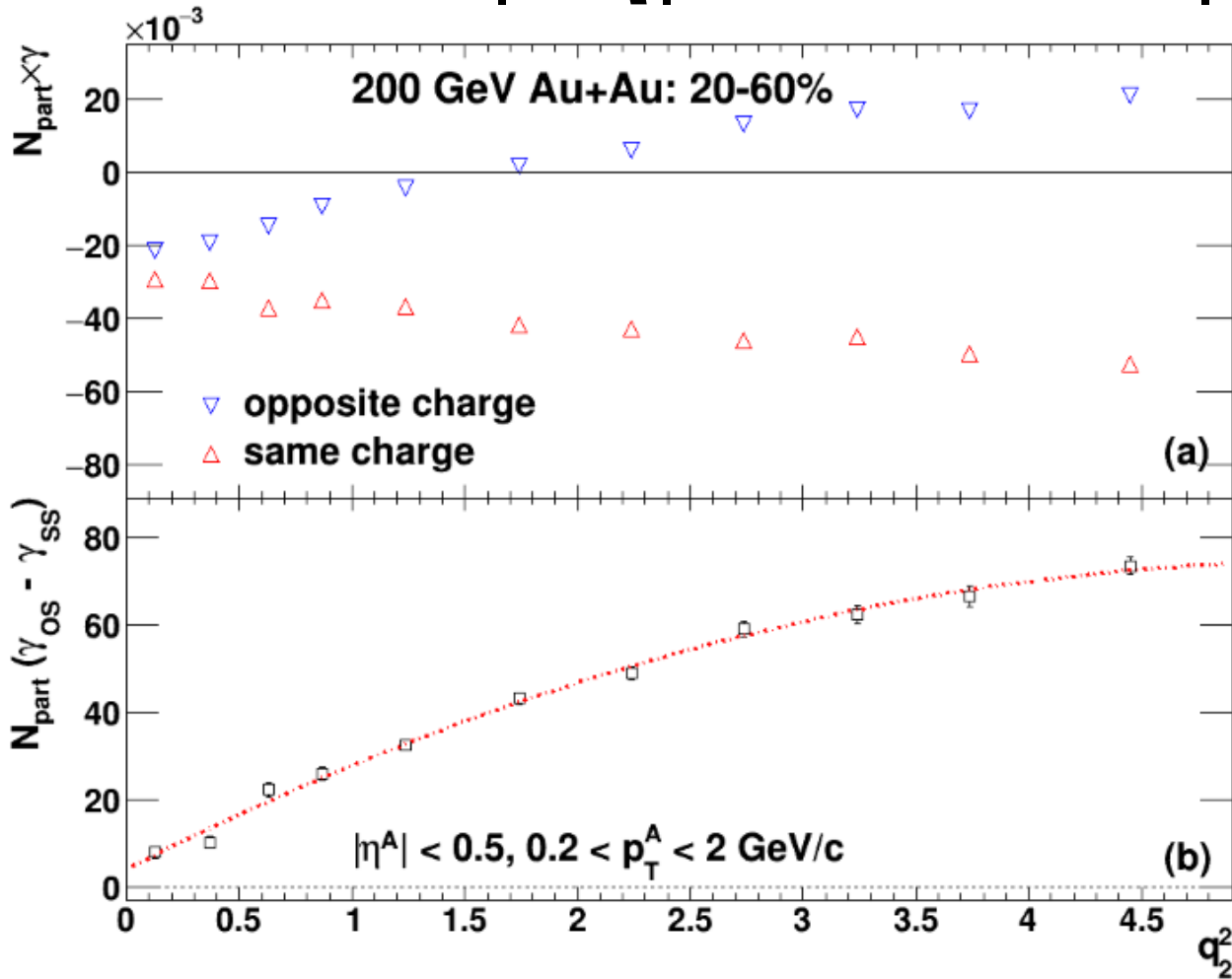
Event-shape engineering



At $q=0$,

- $\gamma_{112} = 7.51 \cdot 10^{-3} \pm 7.5 \cdot 10^{-4}$
- $\gamma_{132} = 2.65 \cdot 10^{-3} \pm 7.7 \cdot 10^{-4}$

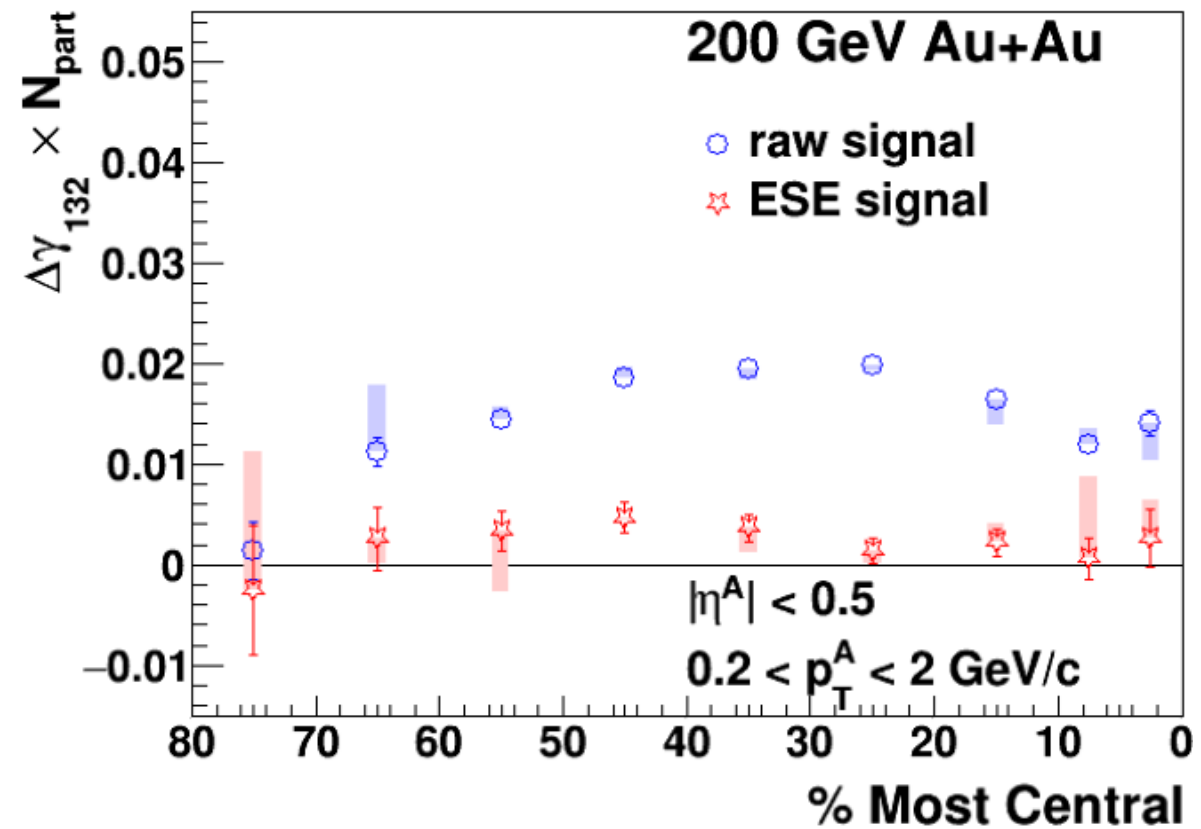
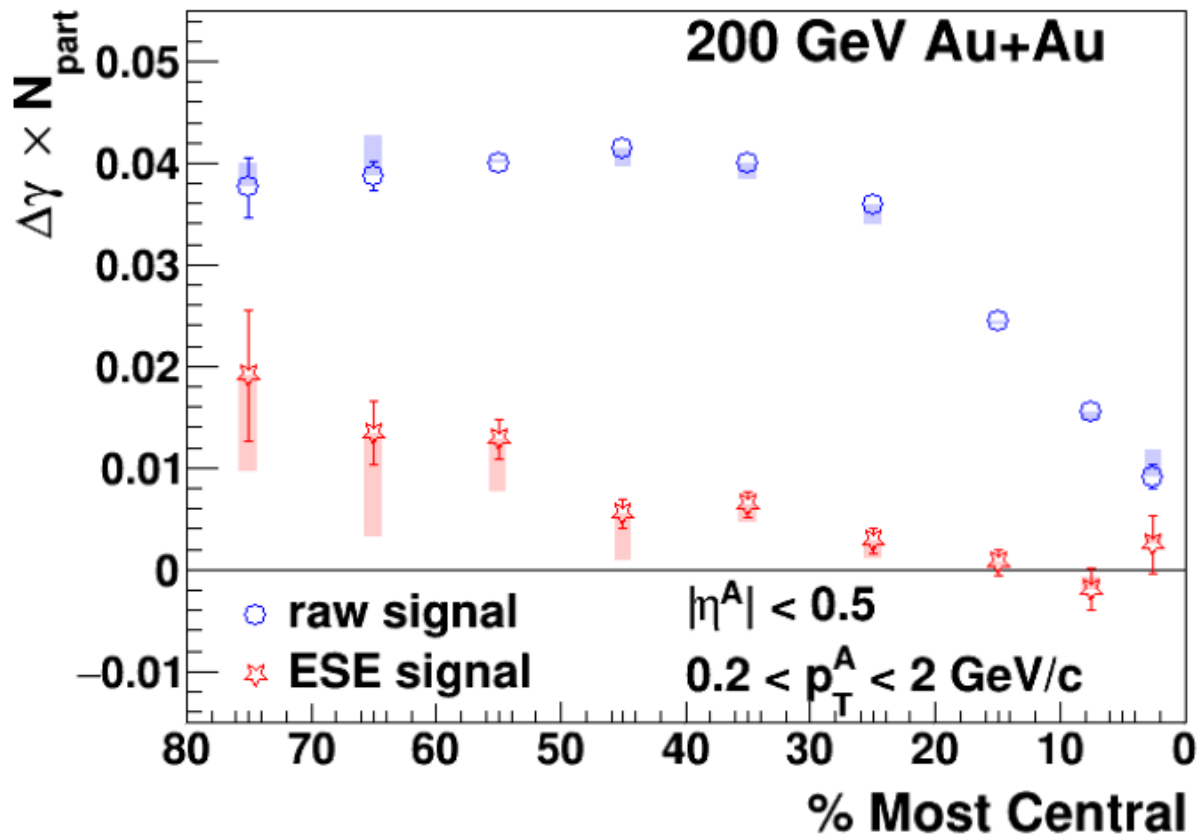
$|\Delta\eta|>0.15$ and $|\Delta p_T|>0.15$ GeV/c



At $q=0$,

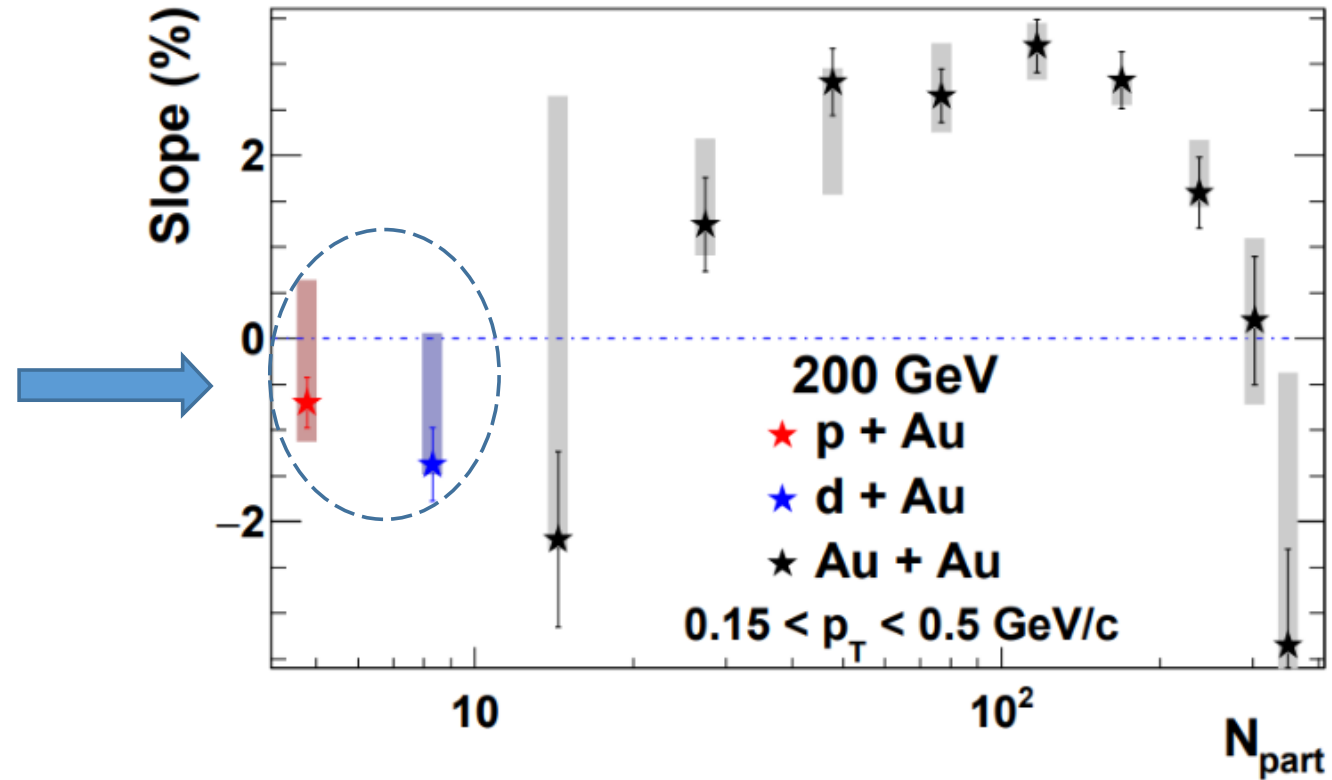
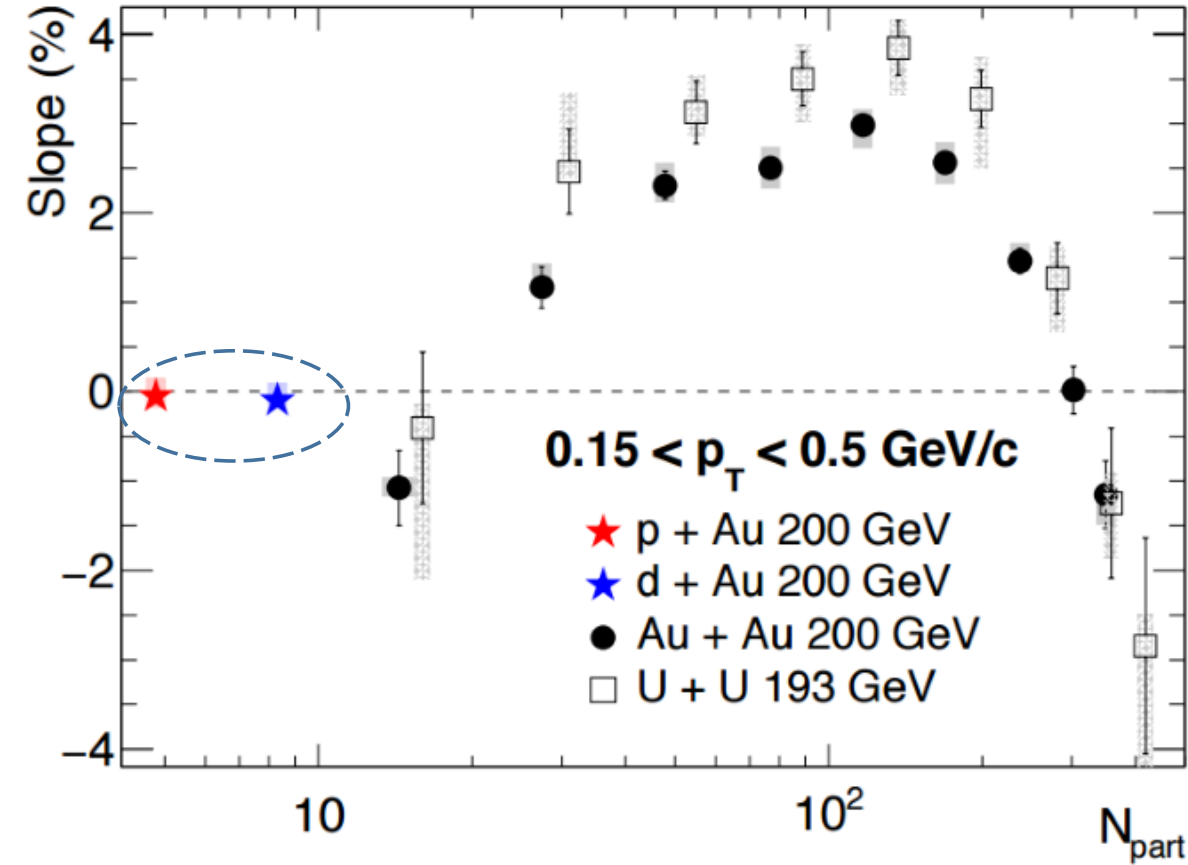
- $\gamma_{112} = 4.15 \cdot 10^{-3} \pm 1.08 \cdot 10^{-3}$
- $\gamma_{132} = 1.24 \cdot 10^{-3} \pm 1.10 \cdot 10^{-3}$

Centrality dependence



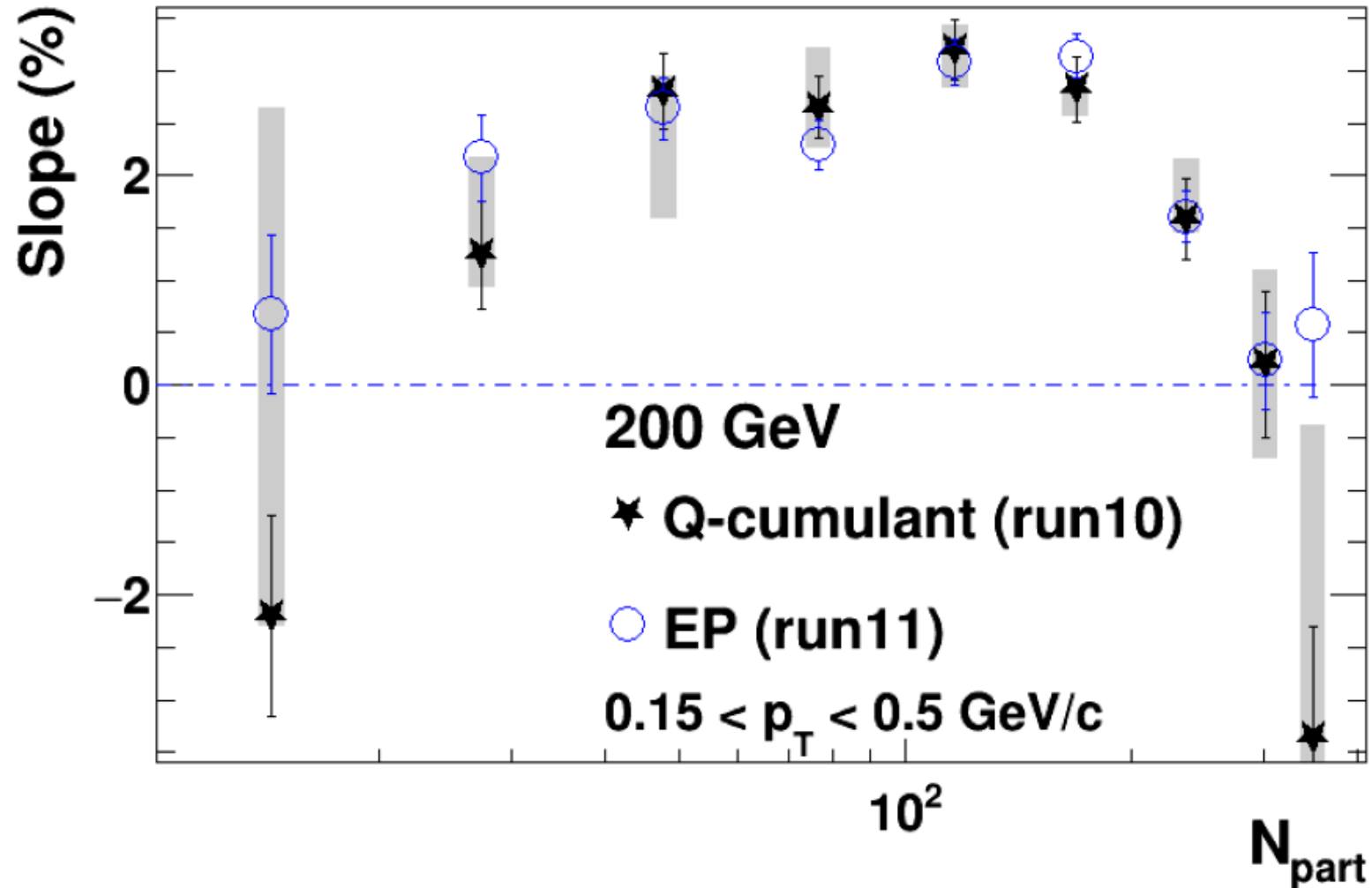
- The raw signals are different between γ_{112} and γ_{132} .
- The ESE signals are more consistent with zero for γ_{132} than γ_{112} .

Update CMW analyses



Previously the EP resolution was mis-calculated for pAu and dAu: wrongly used $\cos(\Psi_{east} - \Psi_{west})$ instead of $\cos(2\Psi_{east} - 2\Psi_{west})$.

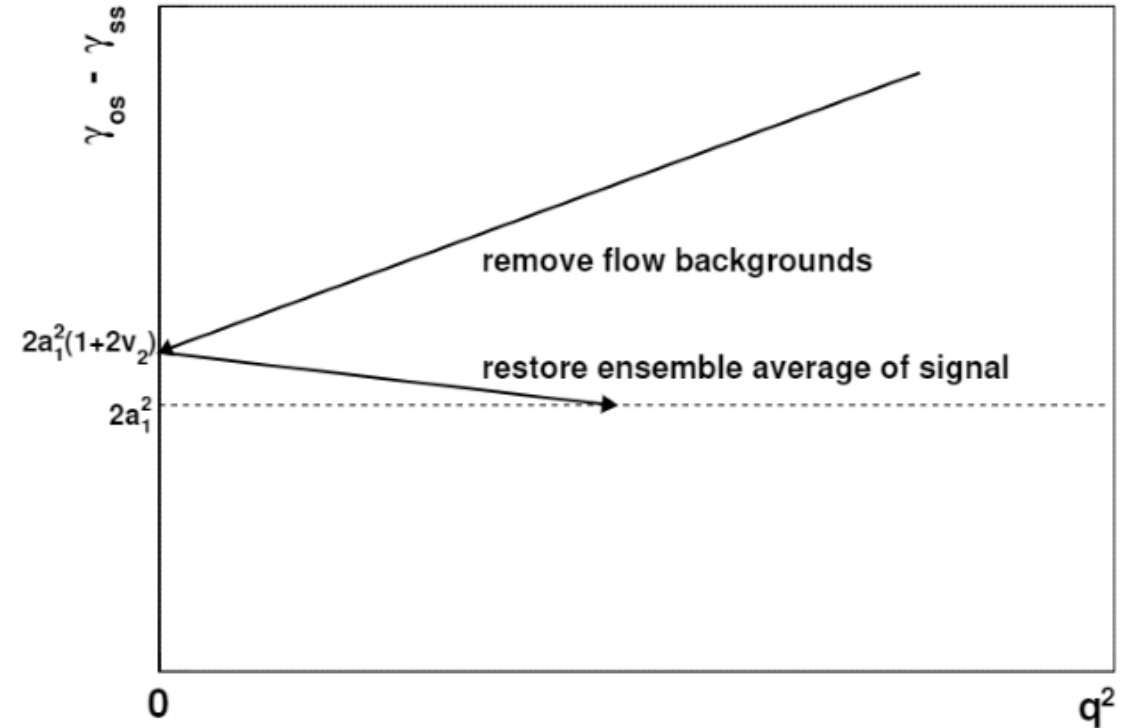
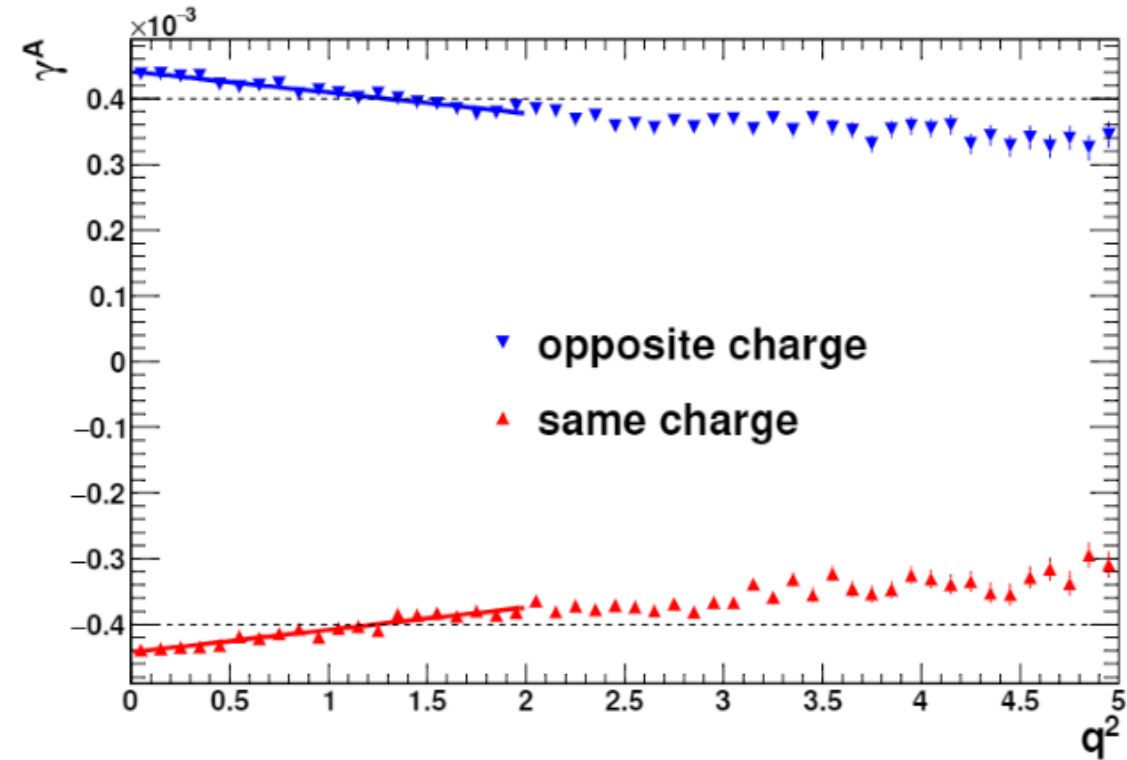
$v_2\{\text{EP}\}$ vs $v_2\{\text{q-cumulant}\}$



Results with EP and q-cumulant are consistent with each other.
Note that the data sets are from different years.

Backup slides

Event-shape engineering: artificial effect



Fufang Wen, Jacob Bryon, Liwen Wen, Gang Wang, arXiv:1608.03205v3

$\Delta\gamma|_{q=0}$ is exaggerating the ensemble-average signal by a factor of $2v_2$, a roughly 10% effect.