$\Delta\gamma$\{ZDC-SMD\} in Au+Au at 200 GeV (run16)

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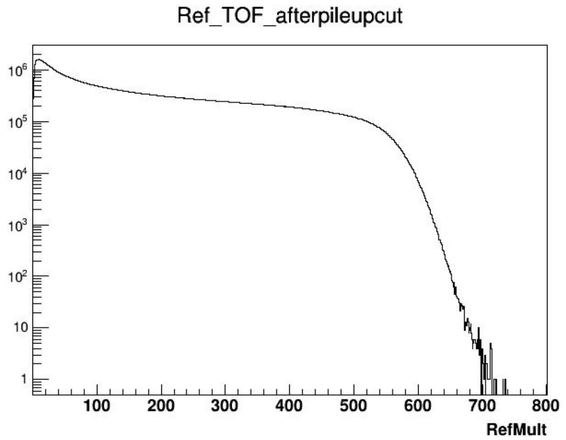
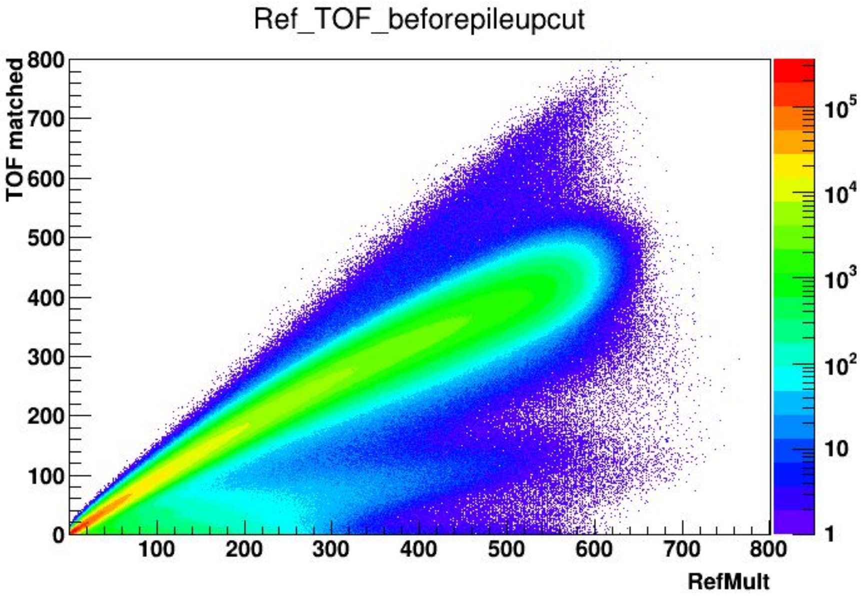
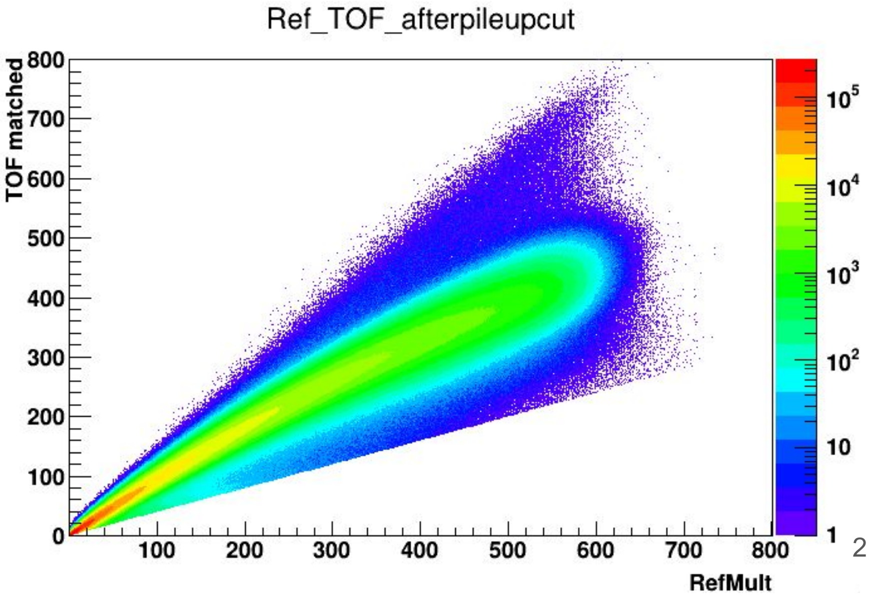
Data set: run16

After all cuts, ~1.88 billion minimum-bias-trigger events in the 0-80% centrality range.
Bad run list, pile-up rejection, and centrality definition follow the previous publication.

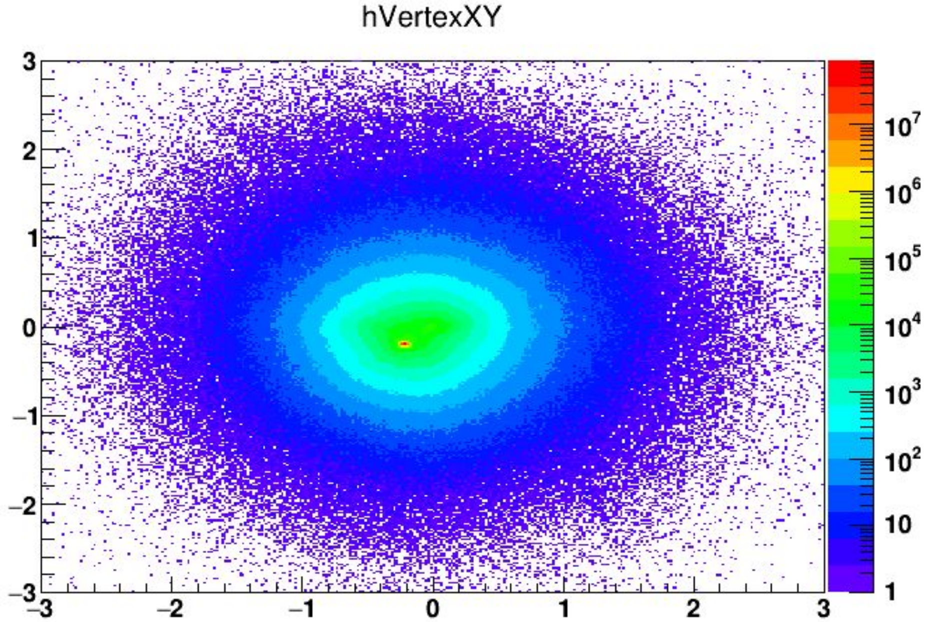


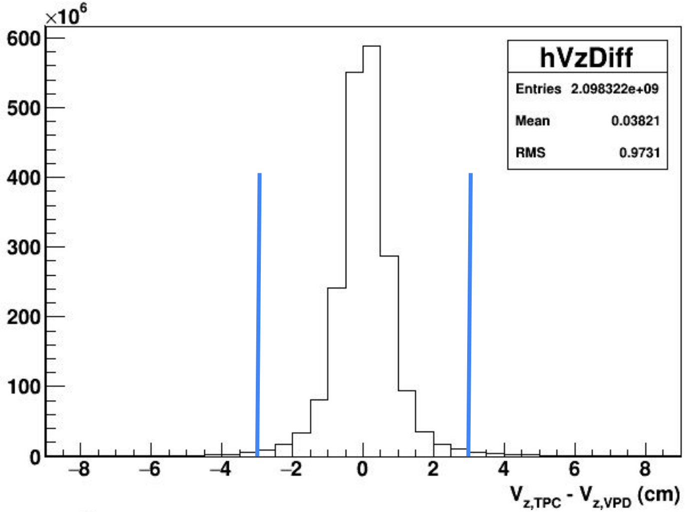


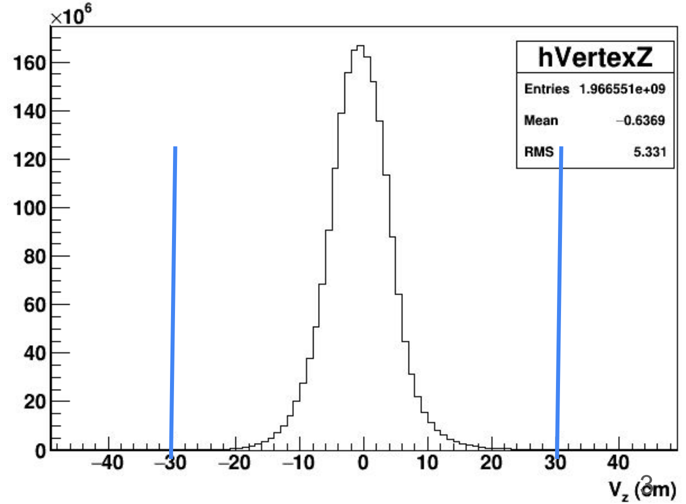


Event cuts

V_r < 2 cm
$|V_z|$ < 30 cm (no HFT used)
$|V_{z,TPC} - V_{z,VPD}|$ < 3 cm

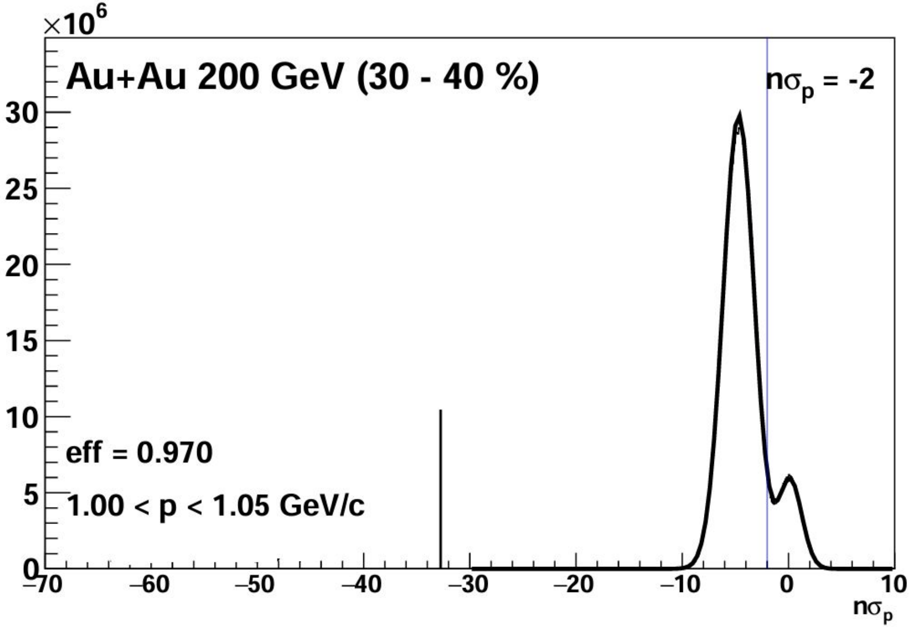


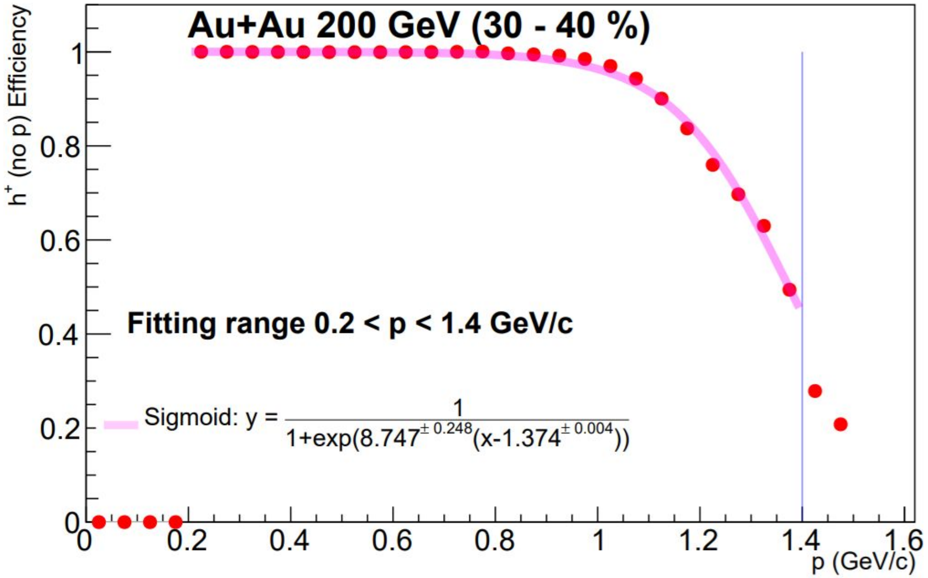




Particle cuts

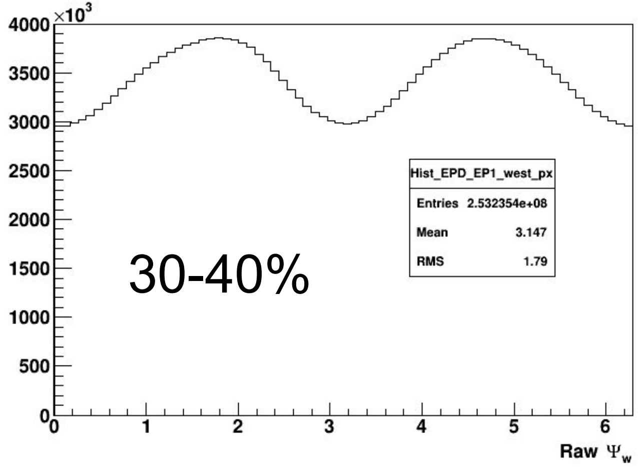
$|\eta| < 1$, $p_T > 0.2$ GeV/c, $p < 1.4$ GeV/c, $N_{hits} \geq 15$, DCA < 3 cm, $n\sigma_p < -2$
An extra inefficiency is introduced due to the $n\sigma_p$ cut, and is corrected for.

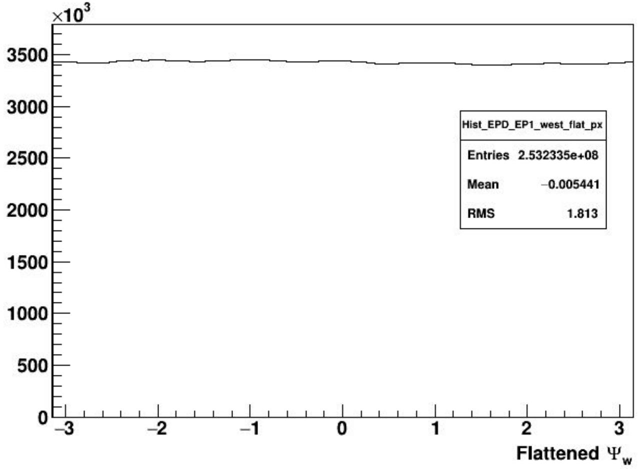


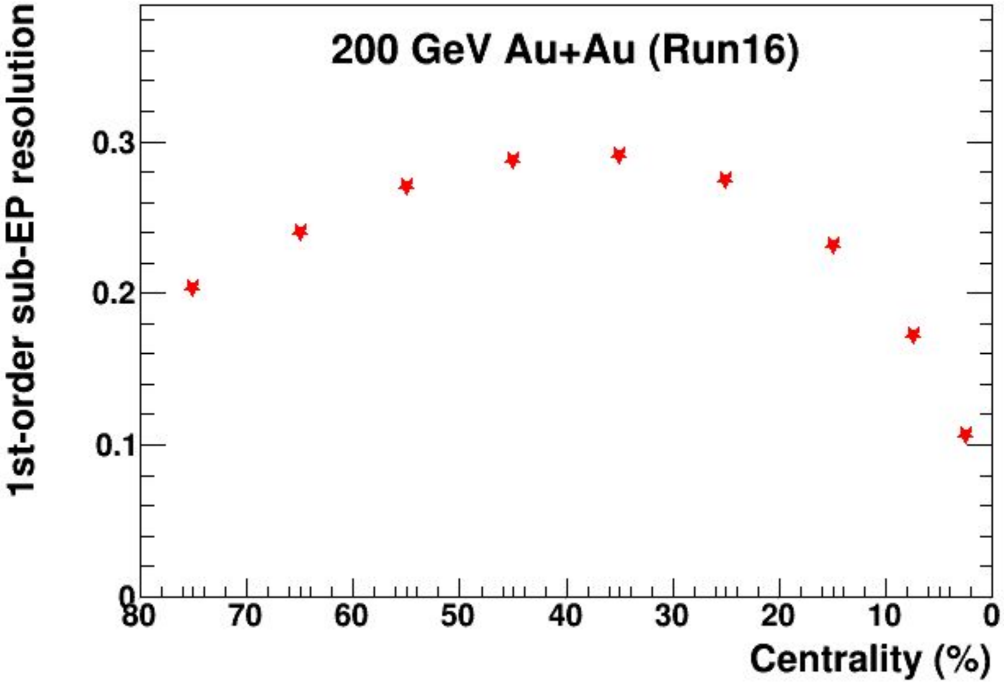


EP{ZDC-SMD}

The event planes from ZDC-SMDs are shifted to be flat.
The 1st-order EP resolution $\sqrt{\langle \cos(\Psi_E - \Psi_W) \rangle}$ looks reasonable.

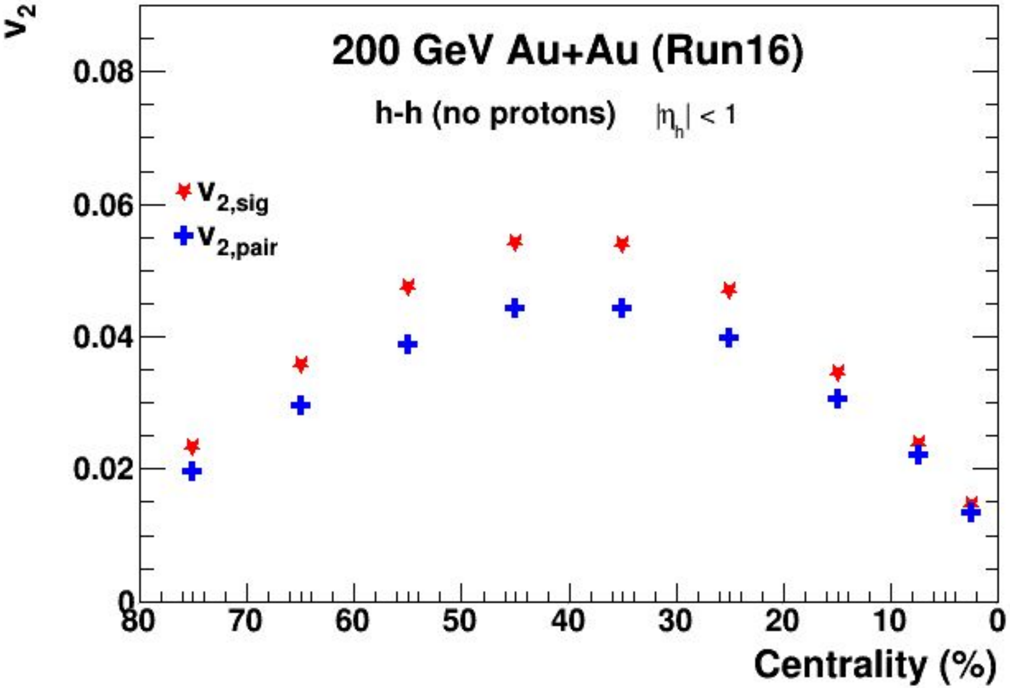


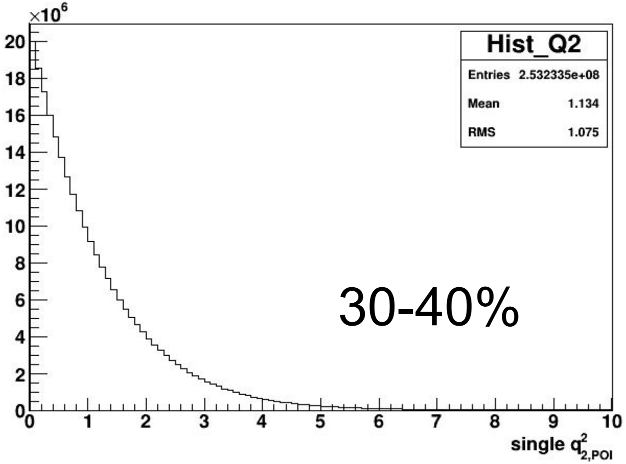




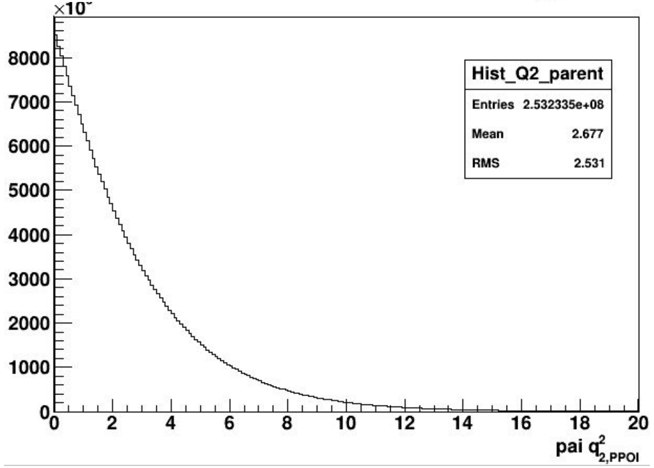
v_2\{ZDC-SMD\}, as well as the distributions of single and pair q_2^2, looks reasonable.

$$v_2 = \langle \cos(2\varphi - \Psi^f - \Psi^b) \rangle / \langle \cos(\Psi^f - \Psi^b) \rangle$$

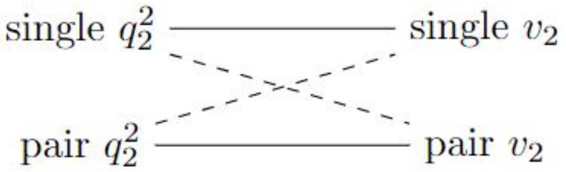


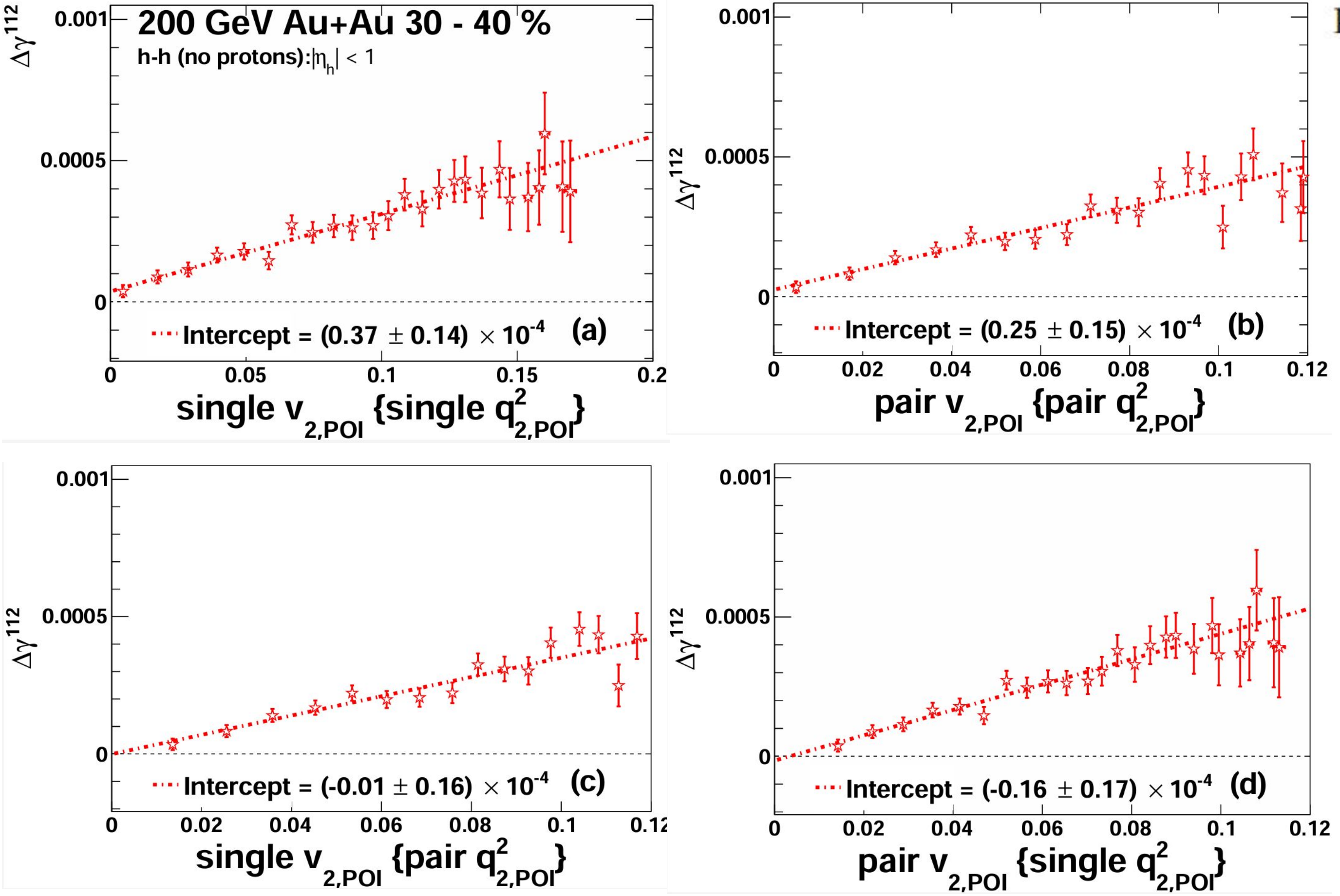


$$q^2_{2,\mathrm{PPOI}} = \frac{\left(\sum_{i=1}^{N_{\mathrm{pair}}} \sin 2\varphi_i^{\mathrm{p}}\right)^2 + \left(\sum_{i=1}^{N_{\mathrm{pair}}} \cos 2\varphi_i^{\mathrm{p}}\right)^2}{N_{\mathrm{pair}}(1 + N_{\mathrm{pair}} v^2_{2,\mathrm{pair}})}$$



Four ESS Recipes

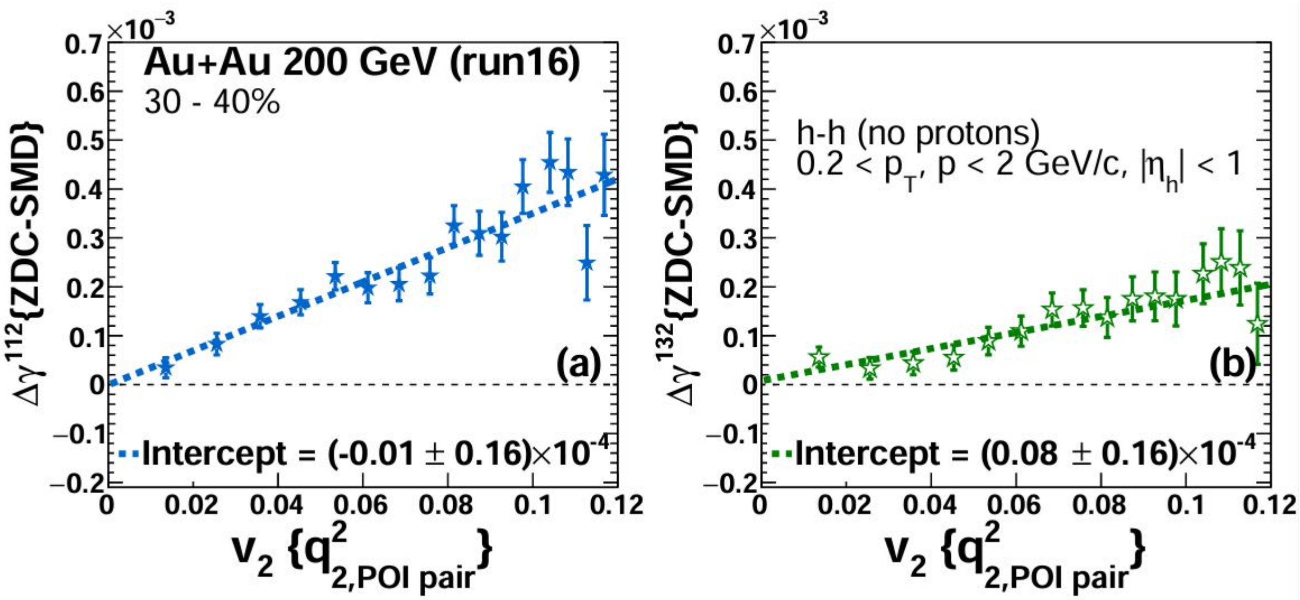




In the 30-40% centrality, the ordering of (a) > (b) > (c) > (d) is the same as at other beam energies, and the same as in model simulations.

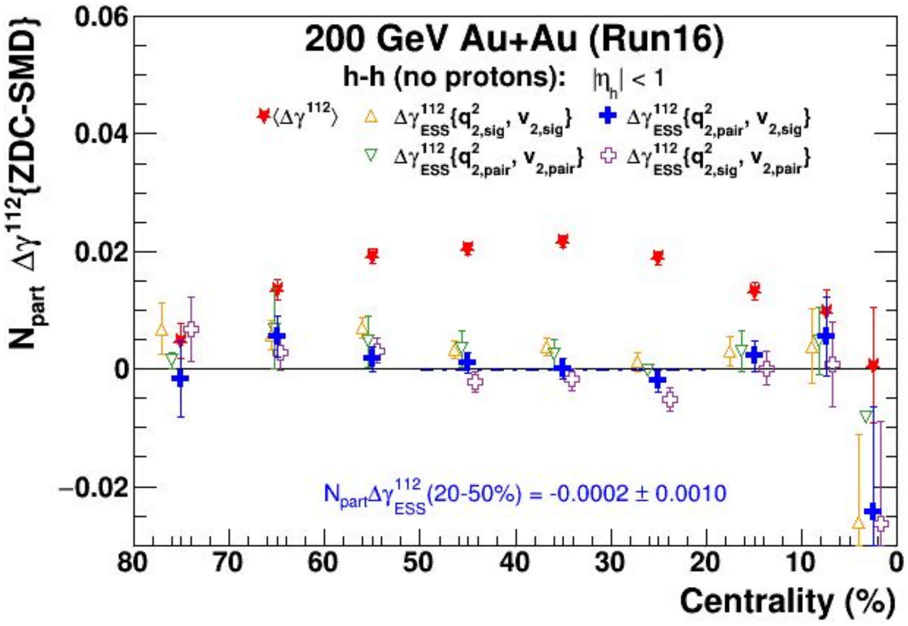
Optimal ESS (c): pair q_2^2 and single v_2

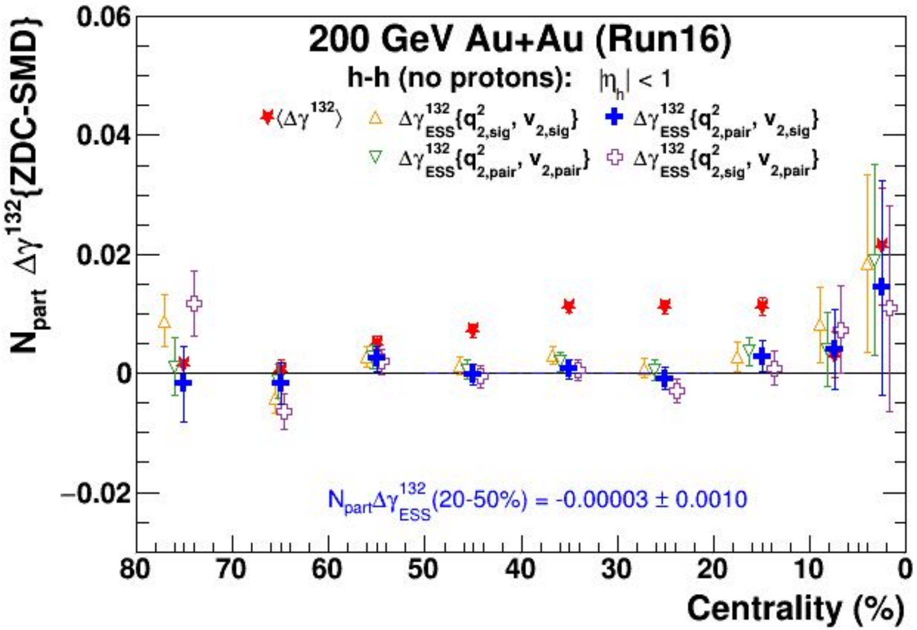
$$\gamma^{112} = \langle\cos(\varphi_\alpha + \varphi_\beta - \Psi^f - \Psi^b)\rangle / \langle\cos(\Psi^f - \Psi^b)\rangle,$$
$$\gamma^{132} = \langle\cos(\varphi_\alpha - 3\varphi_\beta - \Psi^f - \Psi^b)\rangle / \langle\cos(\Psi^f - \Psi^b)\rangle$$



In this example of 30-40% centrality, intercepts for both $\Delta\gamma^{112}$ and $\Delta\gamma^{132}$ are consistent with zero. Intercept*$(1-v_2)^2$ as the unbiased signal.

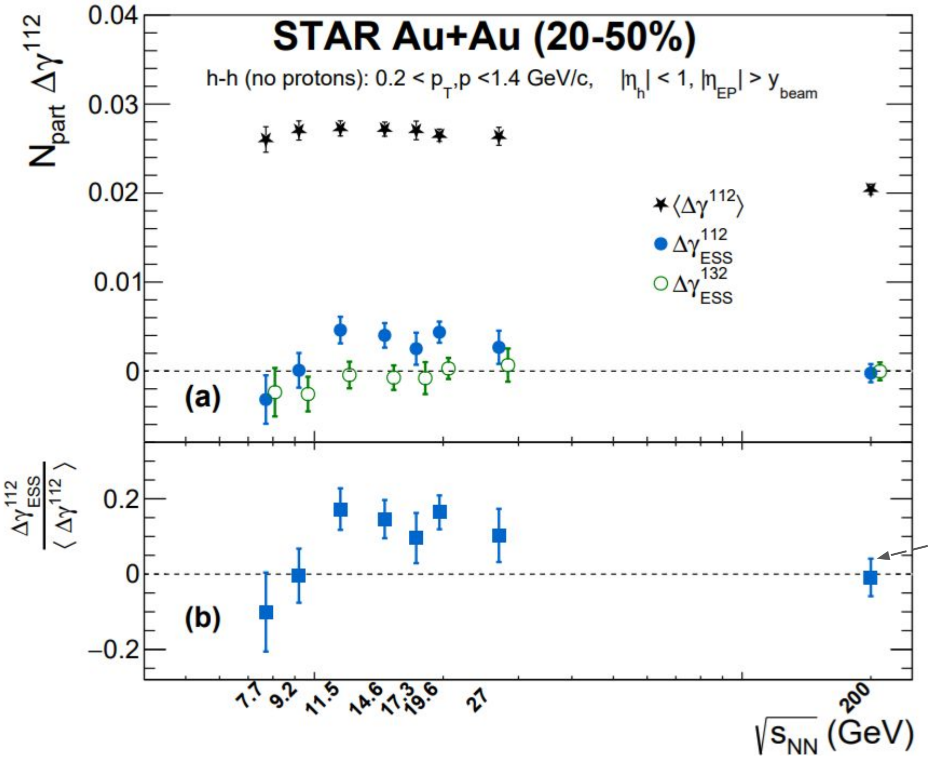
Centrality Dependence

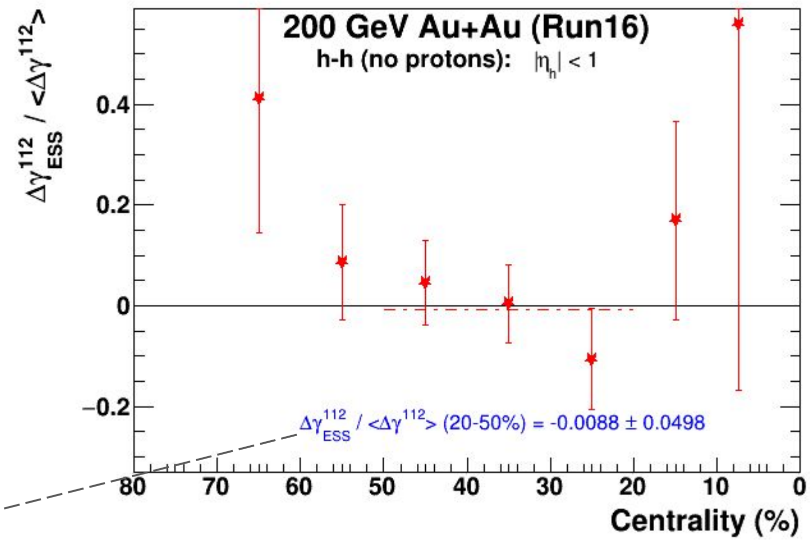




At each centrality, both $\Delta\gamma^{112}{}_{ESS}$ and $\Delta\gamma^{132}{}_{ESS}$ (blue cross) are consistent with 0.

Beam-Energy Dependence





Upper limit is 9% with 95% CL.
(only statistical uncertainty)

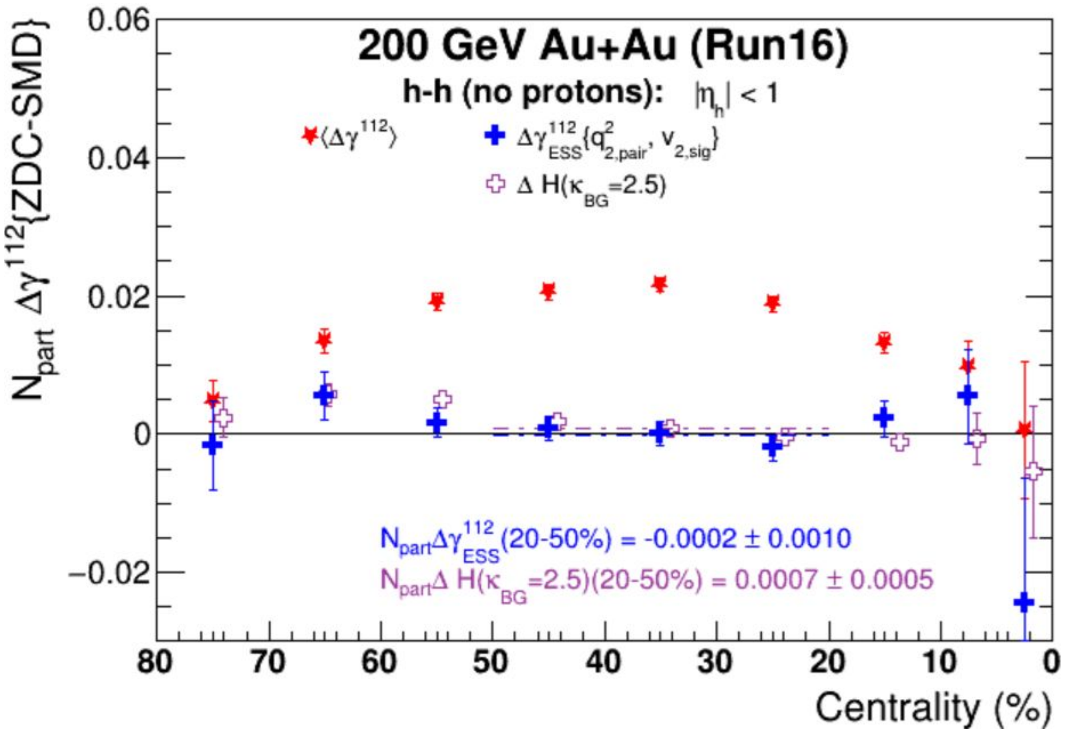
The point at 200 GeV indicates a null result with a good precision.

H correlator

We introduced the *H* correlator when dealing with the v_2-related background in BES-I data:

$$\Delta H(\kappa_{BG}) = (\Delta\gamma - \kappa_{BG} v_2 \Delta\delta)/(1+\kappa_{BG} v_2)$$

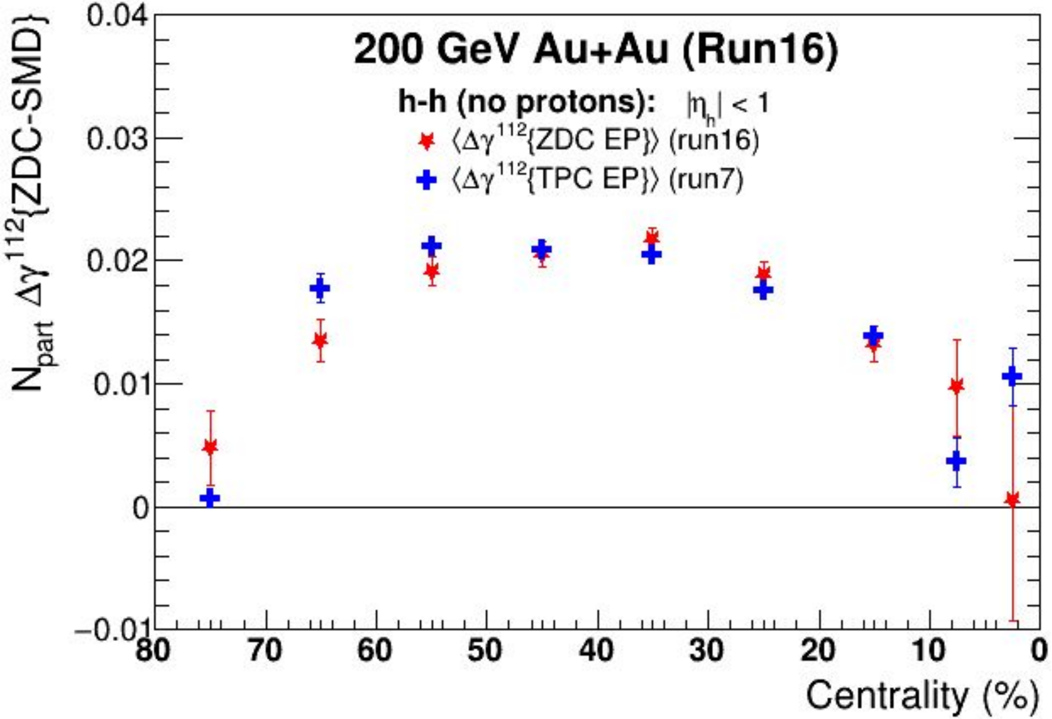
$$\Delta\delta = \langle \cos(\varphi_1 - \varphi_2) \rangle$$



Good consistency between Δ*H* and the optimal ESS result, implies a universal coupling constant (κ_{BG}=2.5) between elliptic flow and two-particle correlation.

Backup slides

Run16 vs Run7



Good consistency between run16 and run7 (both with efficiency correction), though slightly different PIDs, p_T and p cuts, and different EPs.

Ordering for $\Delta\gamma^{132}{}_{ESS}$

20 - 50% centrality

(a) 0.0018 ± 0.0009
(b) 0.0011 ± 0.0009
(c) -0.00003 ± 0.001
(d) -0.0008 ± 0.0011

$\Delta\gamma^{132}{}_{ESS}$ has the same ordering as $\Delta\gamma^{112}{}_{ESS}$.
The errors are large, but correlated.
Recipe (c) seems to be closest to zero.