Beam-energy and system-size dependence of the high p_T azimuthal anisotropy with the STAR experiment

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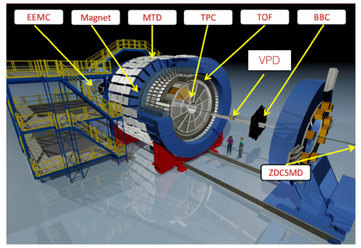
The Solenoidal Tracker At RHIC

➢ Time-Of-Flight
✓PID for high momenta

➢ Time Projection Chamber
Tracking of charged particles with:
✓Full azimuthal coverage
✓$|\eta| < 1$ coverage



Analysis Methods

➢ The two-particle flow harmonics contains short- and long-range non-flow correlations:
✓Short-range non-flow effect gets reduced using $|\Delta\eta| > 0.7$ cut
✓Long-range non-flow effect gets reduced using:
✓Peripheral Subtraction (PS)
✓Global Momentum Conservation (GMC)

➢ Peripheral Subtraction

$$v_{nn}^{PS}(p_T) = v_{nn}^{cent\%}(p_T) - \chi^{cent\%}(p_T)\, v_{nn}^{90\%}(p_T)$$

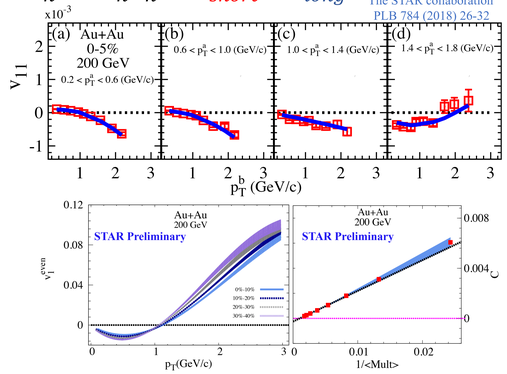
$$\chi^{cent\%}(p_T) = v_{11}^{cent\%}(p_T)/v_{11}^{90\%}(p_T)$$

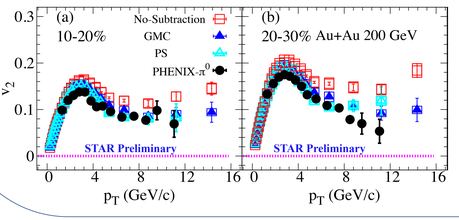
➢ Global Momentum Conservation

$$v_{nn} = v_{nn}^{flow} - C\,(\bar{v}_{n+1\,n+1} + \bar{v}_{n-1\,n-1})$$

$$v_n^{ab} = v_n^a v_n^b + \delta_{short} + \delta_{long}$$

The STAR collaboration PLB 784 (2018) 26-32





➢ Good agreement observed between;
✓ GMC and the peripheral subtraction methods
✓ STAR after subtraction and PENIX π^0 measurments

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Results
RHIC vs. LHC

➢ $v_2(p_T)$ for high and low p_T show similar trend to the LHC data

➢ The $v_2(p_T)$ measurement will add an additional constrain on energy dependence of the $\hat{q}/T^3$

➢ ε_2 is calculated using the Quark-Glauber model

The ALICE collaboration
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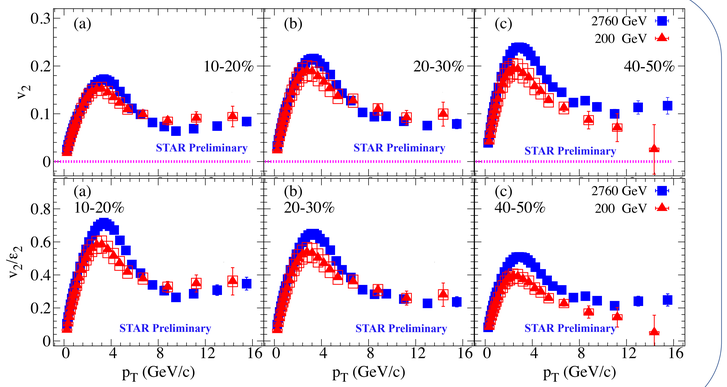


Results
System size

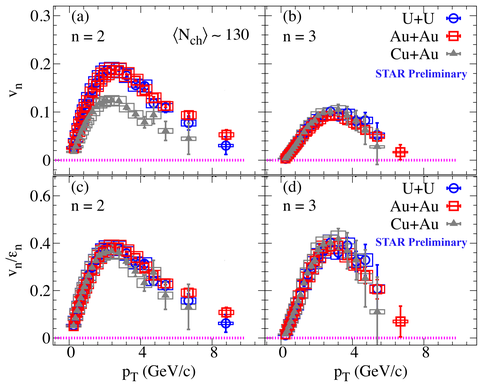
➢ $v_2(p_T)$ for high and low p_T show a collision-system size dependence

➢ $v_3(p_T)$ for high and low p_T are collision-system size independent

➢ ε_n are calculated using the Quark-Glauber model

➢ $v_2(p_T)/\varepsilon_2$ scales into one curve

➢ The $v_n(p_T)$ measurement will add an additional constrain on the path length dependence of the energy loss



Conclusion

➢ We observe: a good agreement between;
✓ GMC and the peripheral subtraction methods
✓ STAR results after non-flow subtraction and PENIX π^0 measurments

➢ We observe that $v_2(p_T)$ for high and low p_T show similar trend to the LHC data

➢ $v_n(p_T)/\varepsilon_n$ scales into one curve for different collision systems

➢ The $v_n(p_T)$ measurement will add an additional constrain on the beam-energy dependence of the $\hat{q}/T^3$