

$v_2(p_T)$ at Forward Rapidity in PHENIX 200 GeV Au+Au Collisions

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for the PHENIX Collaboration
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Outline

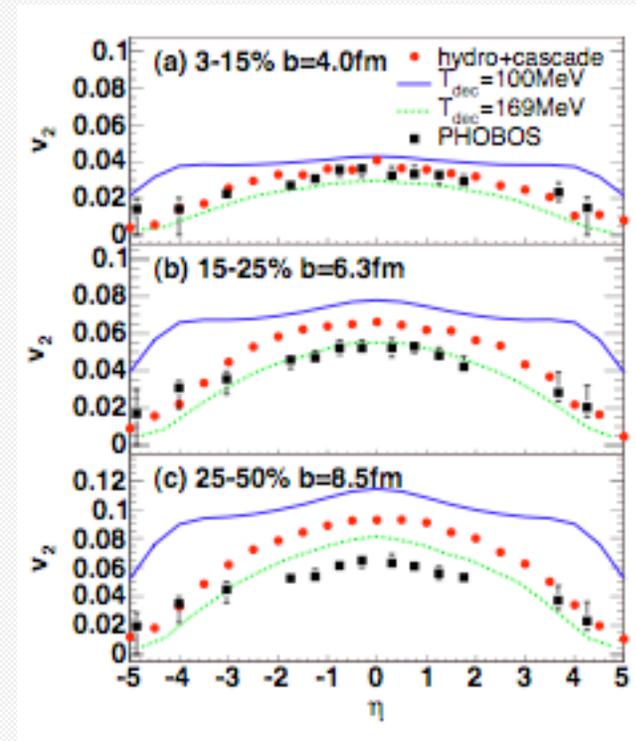
1. Motivation
2. Methodology
3. Result and comparisons

Elliptic Flow at RHIC

$v_2(p_T, \eta \approx 0)$ at RHIC has been recreated well by hydrodynamic models at low p_T .

The rapidity shape of data has been approached by models using either hadronic dissipative effects or a higher freeze-out temperature.

$v_2(p_T)$ measurements at forward rapidities provide an additional way to test models that are successful at mid-rapidity.



T. Hirano, *et al.*
Phys.Lett. B636 (2006) 299–304

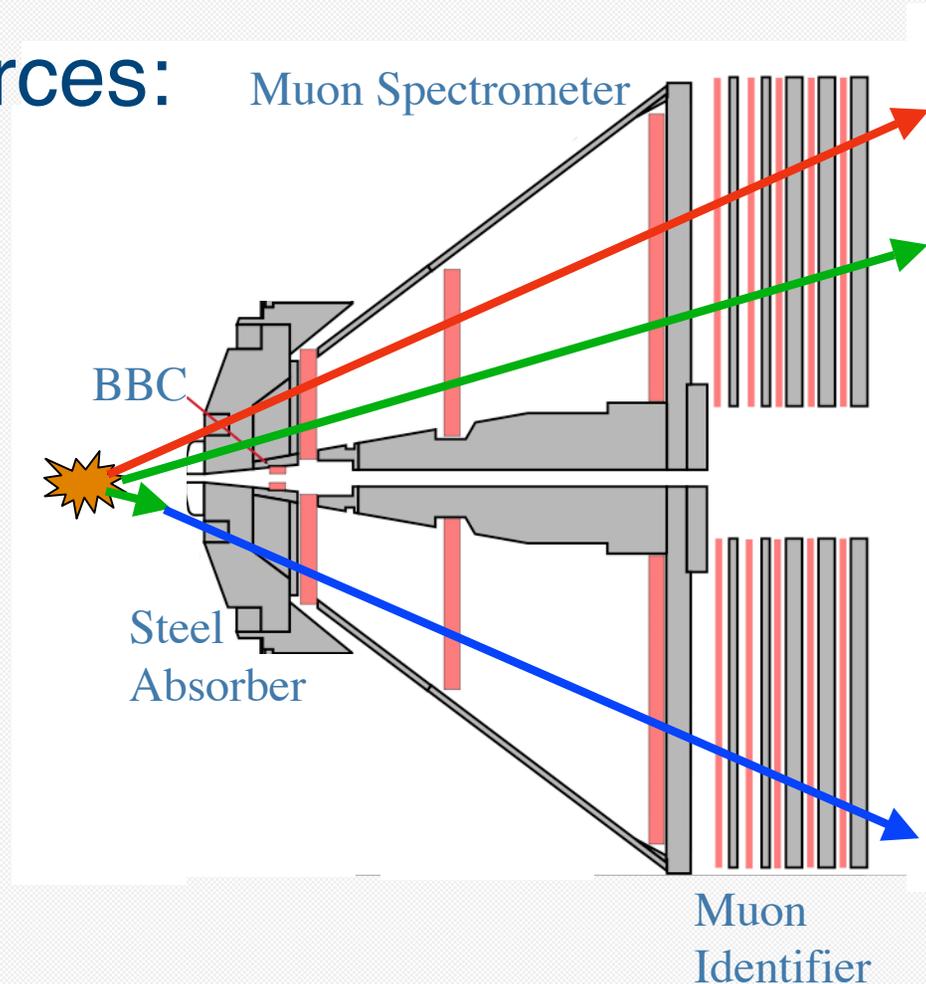
The PHENIX Muon Arms

Major Track Sources:

Pions and kaons

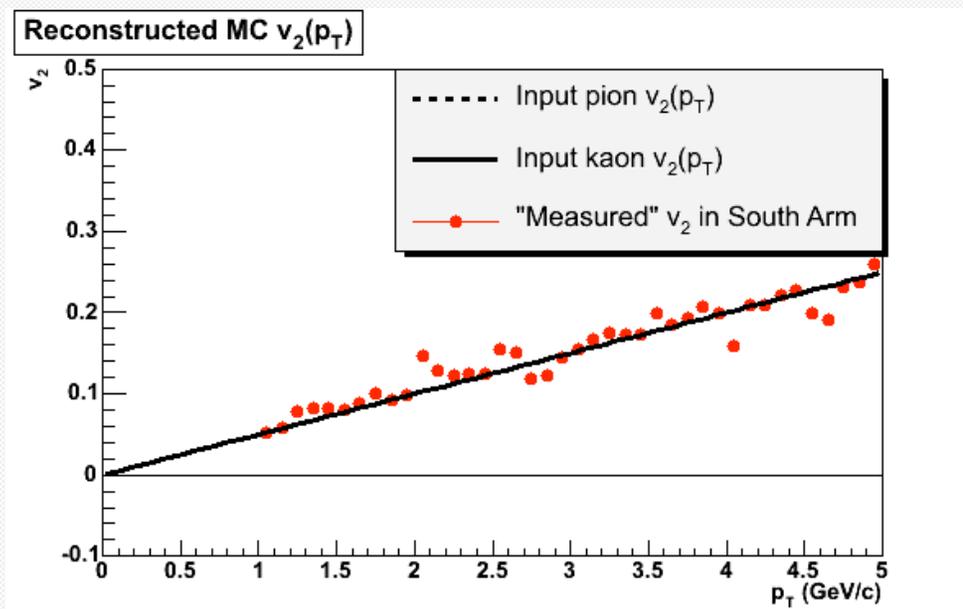
- Punchthroughs
- Showers
- Decays

Open charm decay ($D \rightarrow \mu \nu$)



Simulation Checks

- Can we reconstruct $v_2(p_T)$ for pions & kaons from a mixture of tracks from punchthroughs and decay products?
- Simulation of pions & kaons in Muon Arms with input $v_2(p_T)$ says yes!
- The parent particles' ϕ -distribution is still represented by the decay products.

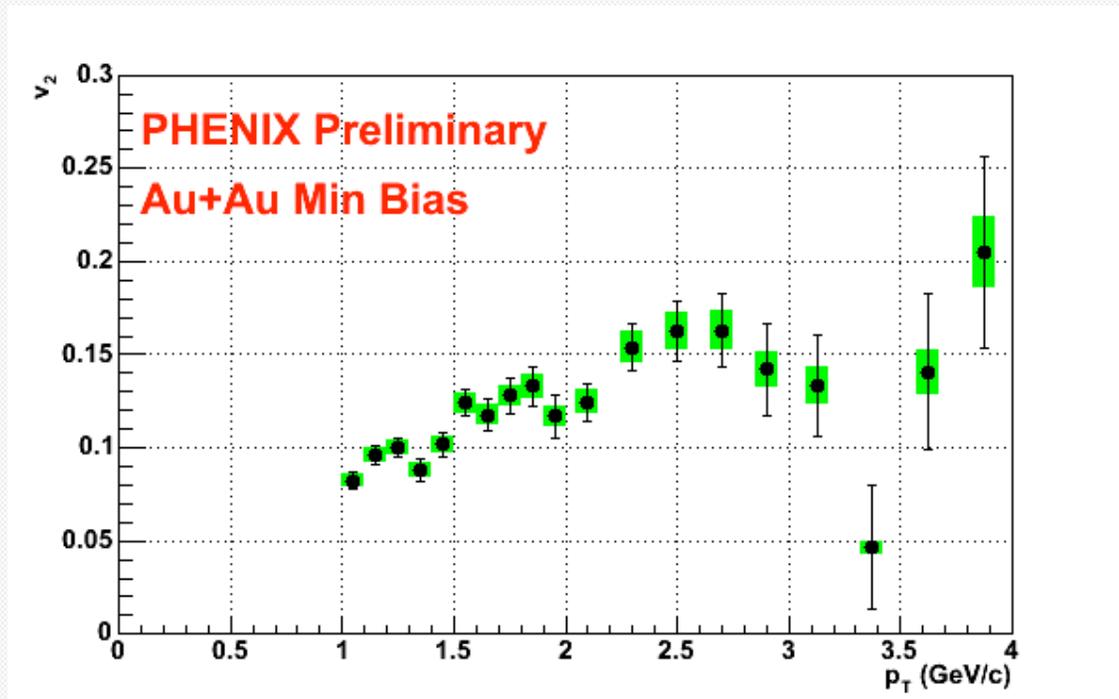


Result

$v_2(p_T)$ for a currently unquantified mixture of pions and kaons, with an open charm contribution.

Dataset is $\sim 10\%$ of recorded Run4 events (~ 1.4 billion)

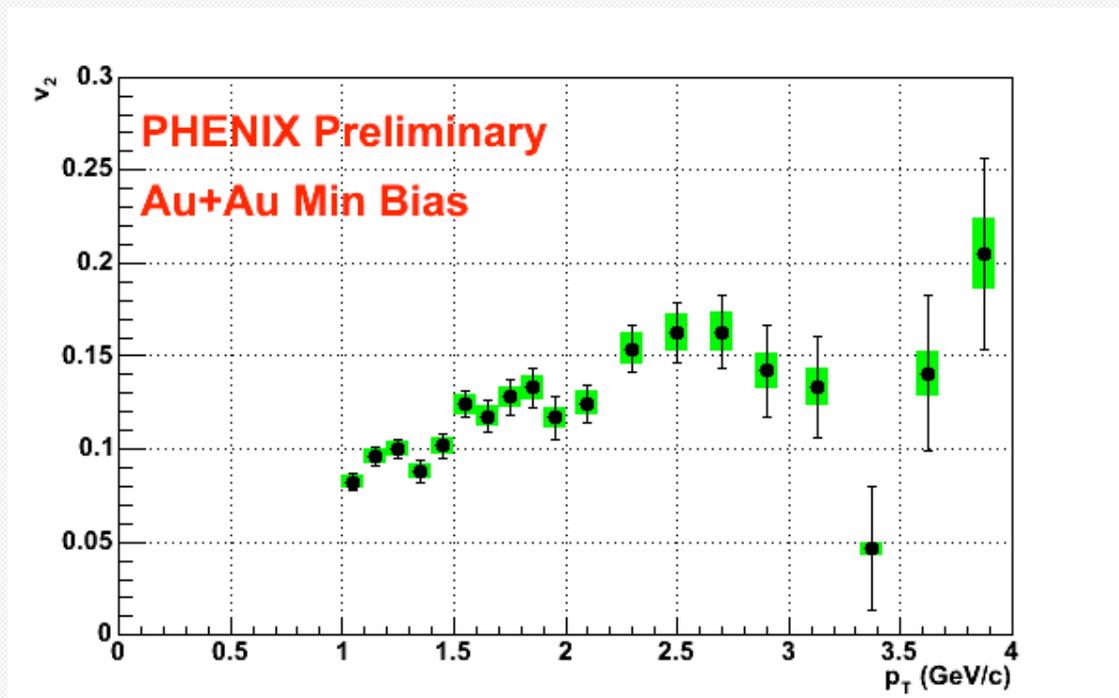
Minimum bias centrality
 $1.2 < |\eta| < 2.0$



Sources of Errors

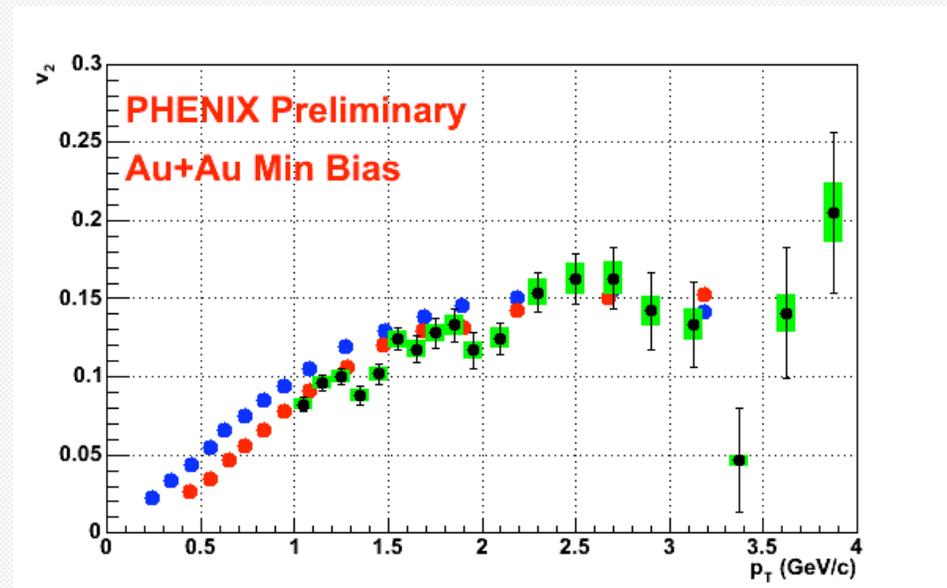
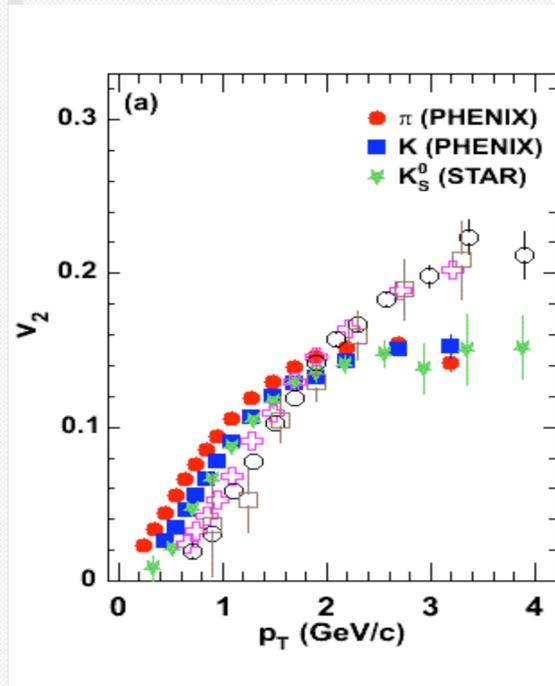
Systematic errors (green bands) are from determining the reaction plane resolution using the Beam-Beam Counter, and the bias due to remaining background tracks after cuts, mostly real low- p_T tracks that have been mis-reconstructed to a higher p_T .

Black bars are statistical errors.



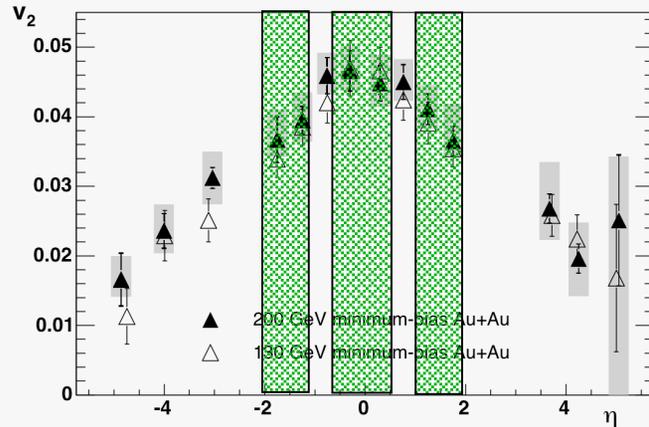
Comparison to Central Arm v_2

If we take the central arm $v_2(p_T)$ for pions and kaons from nucl-ex/0608033, figure 2a and overlay it:



Central Arm Pion v_2
Central Arm Kaon v_2

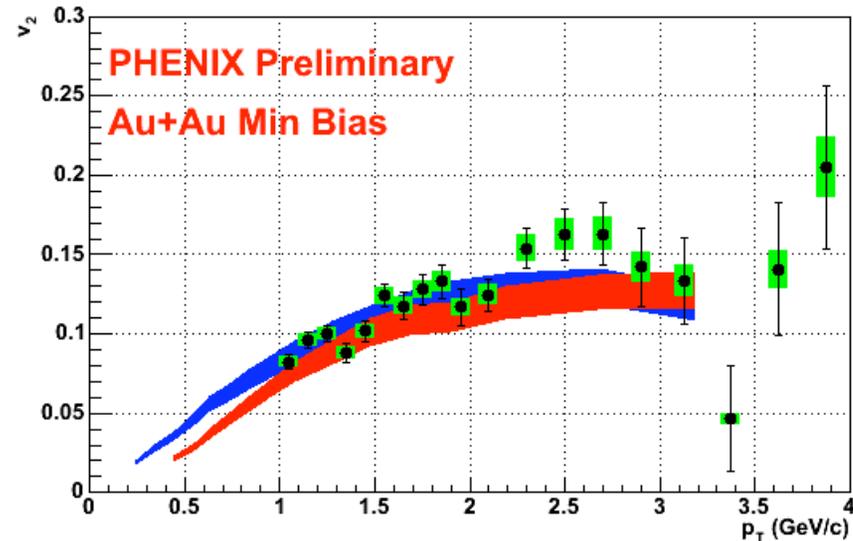
Combine w/ PHOBOS $v_2(\eta)$



Phys. Rev. C72, 051901(R) (2005)

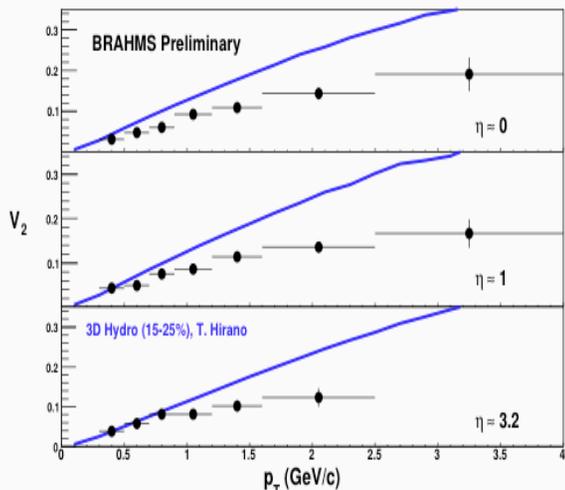
Scale the PHENIX pion/kaon $v_2(p_T)$ by this amount (with errors):

Ratio of PHOBOS integrated $v_2(\eta \sim 1.5)$ to $v_2(\eta \sim 0)$ is
 $\approx 0.84^{+0.087}_{-0.091}$

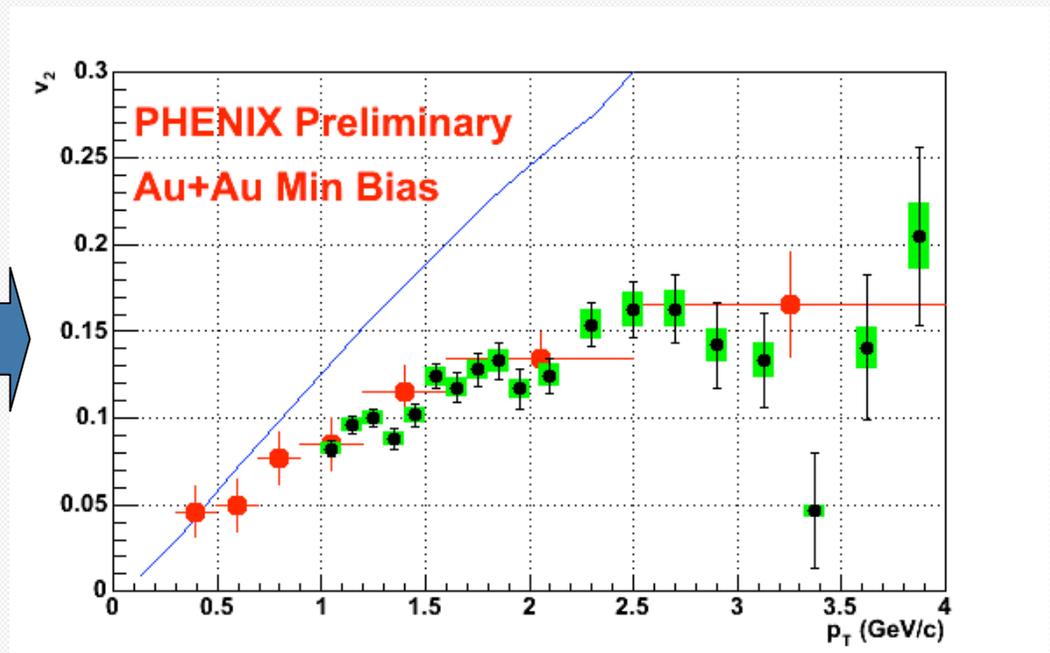


Compare w/ BRAHMS $v_2(p_T)$

- BRAHMS measured for charged hadrons and protons at several rapidities. Unfortunately it is 10-30% centrality, not min bias, but the average eccentricity is not so different.



PANIC '05 Proceedings
Erik Johnson for BRAHMS Coll.



BRAHMS points at $\eta \approx 1$

Summary

- We have measured $v_2(p_T)$ at forward rapidity for a currently unquantified mixture of pions and kaons, with an open charm contribution.
- We are very interested in comparing to any models that make predictions at forward rapidities.

Backup

10/28/06

M. Wysocki - DNP2006

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Octant-Swapping Study

Estimate the level of combinatoric background after cuts.

- Swap data for station 2 half-octants in the MuTr, then reconstruct.
- Background is higher in North Arm because of higher occupancy.
- Because of this, South Arm is used for the result in this talk.

