

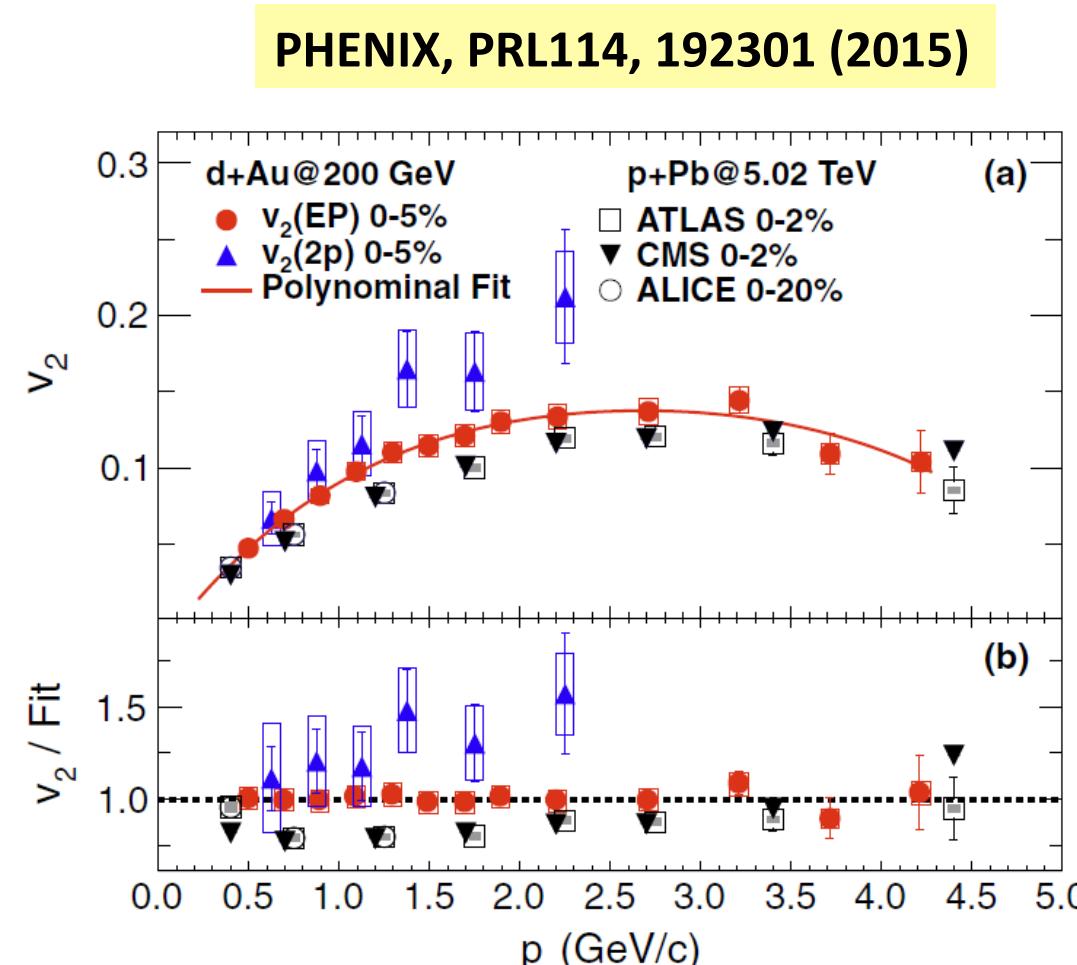
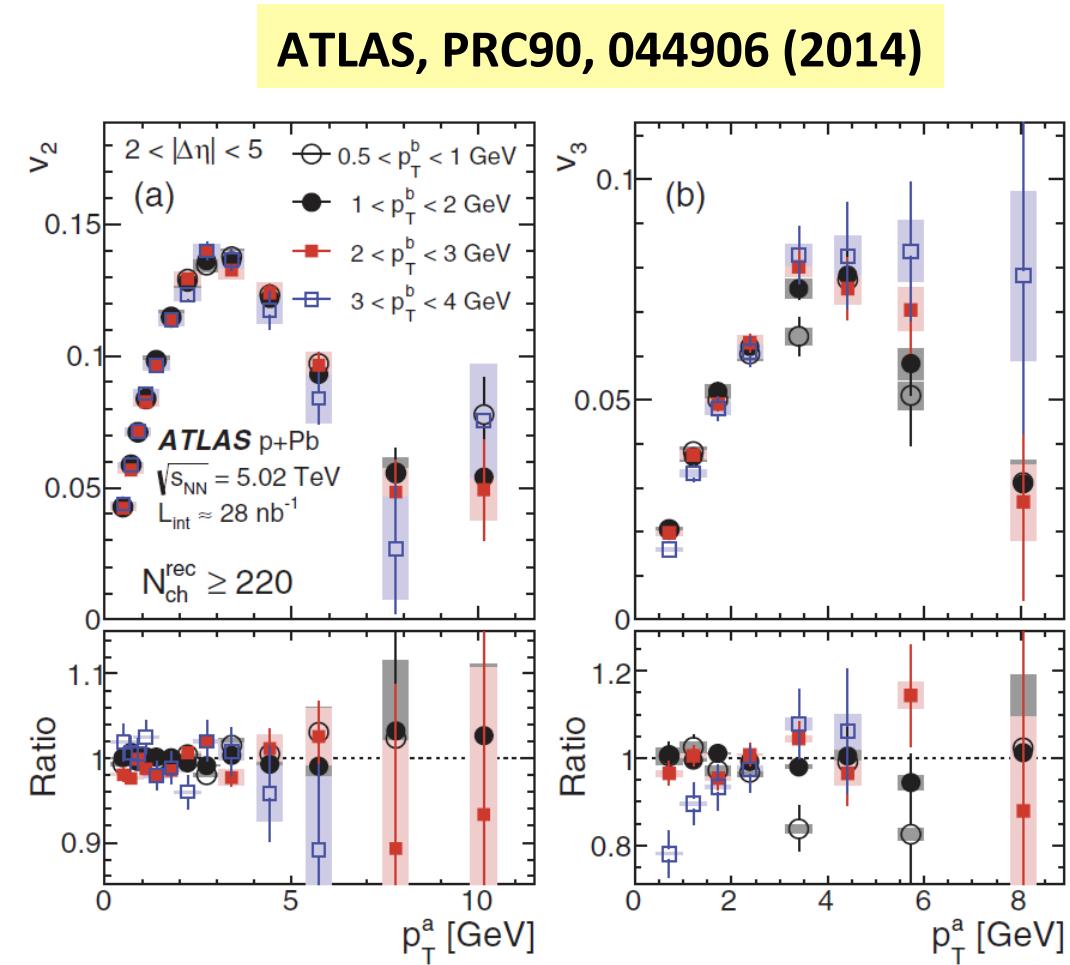
Systematic study of the parton energy loss from $p(d, {}^3\text{He})+A$ to $A+A$ collisions using high p_T hadrons measured by the PHENIX experiment at RHIC



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Flow like anisotropy observed at low and high p_T in $p(d)+A$



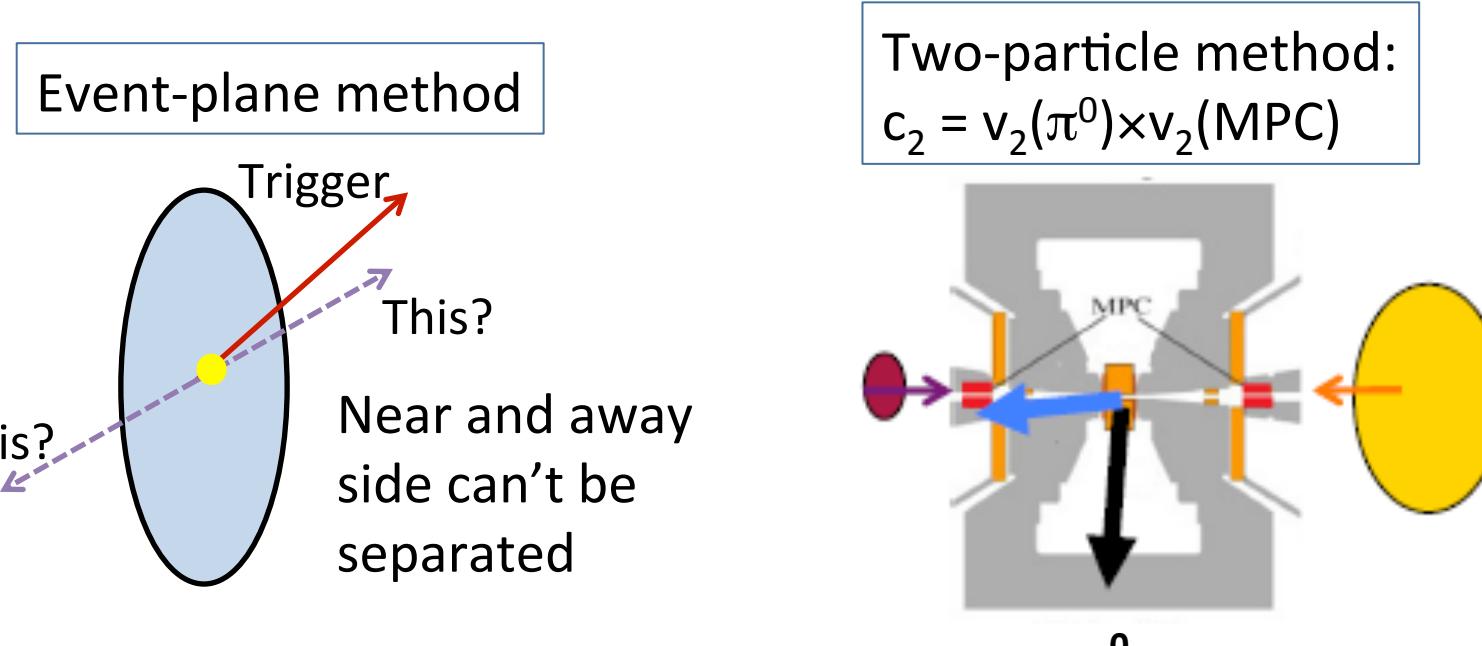
- Questions: 1) How high in p_T the flow like structure persists?
2) If there is a matter similar to $A+A$, is there jet-quenching like phenomenon also at RHIC ($s=200\text{GeV}$)?

In this study, we first focus on $d+\text{Au}$ and $\text{Au}+\text{Au}$ collisions.

Measurement strategy

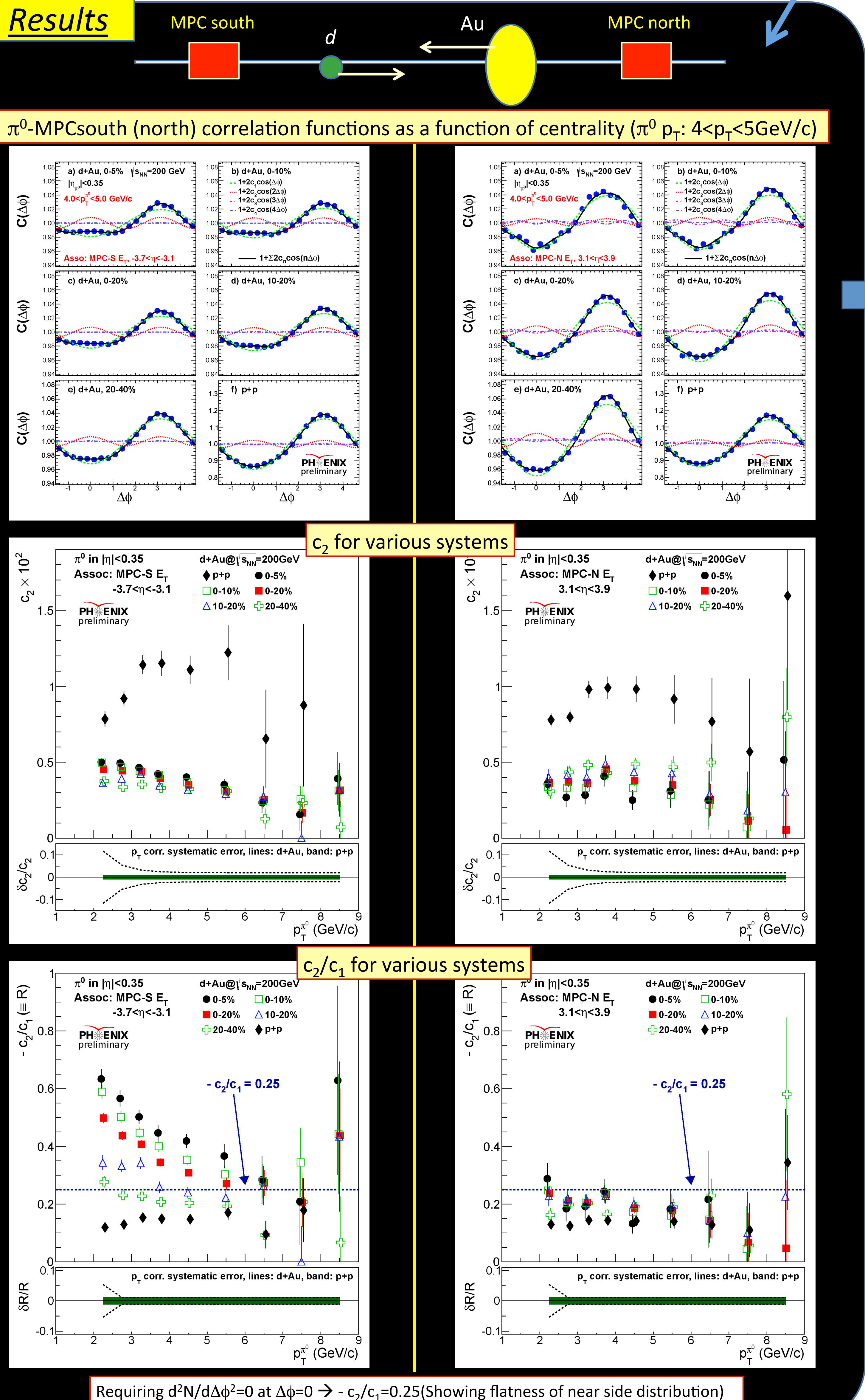
- Event-plane method can't separate near and away-side contributions, but two-particle correlation method can separate them (away-side is biased by dijet contribution)
- We associate π^0 's reconstructed in the central arm EM calorimeter ($|\eta|<0.35$) with hits in the MPC-S towers (tower energy $>0.3\text{GeV}$, $-3.7<\eta<3.1$)
- We fit correlation functions with Fourier series

$$\frac{dN}{d\Delta\phi} = N_0 [1 + 2c_1 \cos(\Delta\phi) + 2c_2 \cos(2\Delta\phi) + 2c_3 \cos(3\Delta\phi) + 2c_4 \cos(4\Delta\phi)]$$



In this analysis, we focus on c_2 .

Results



ATLAS's $p+\text{Pb}$ results

- Using ATLAS measurement of c_1 and c_2 , we were able to produce c_2/c_1 in $p+\text{Pb}$ comparable to our measurement.
 $N_{\text{ch}}^{\text{rec}} \geq 220$ (0.0027% of total events), jet component unsubtracted
so-defined high multiplicity events
- Magnitude is a factor of ~3 different from that of RHIC $d+\text{Au}$ 0-5%.
- LHC sees larger c_2 with respect to the jet yield, compared to RHIC

Used data from PRC90, 044906 (2014)

Discussion and summary

- Centrality and p_T dependence of flow-like feature was observed in $d+\text{Au}$ collisions.
- Feature is especially prominent for π^0 -MPC south correlation
- Flow-like feature becomes weaker as going to higher p_T ; similar to ATLAS measurement, but at lower p_T .
- The ratio of c_2 to c_1 shows the relative increase of flow-like component, assuming c_1 is mostly dominated by jet contribution.
- From c_2/c_1 , assuming c_1 as a proxy of jet contribution
- Difference of c_2/c_1 between most central $d+\text{Au}$ and $p+p$ collisions at a higher p_T (~5-6 GeV/c) may give a hint on possible differential energy loss in the small system?
- The same analysis will be performed in $p+\text{Au}$ and ${}^3\text{He}+\text{Au}$ soon.

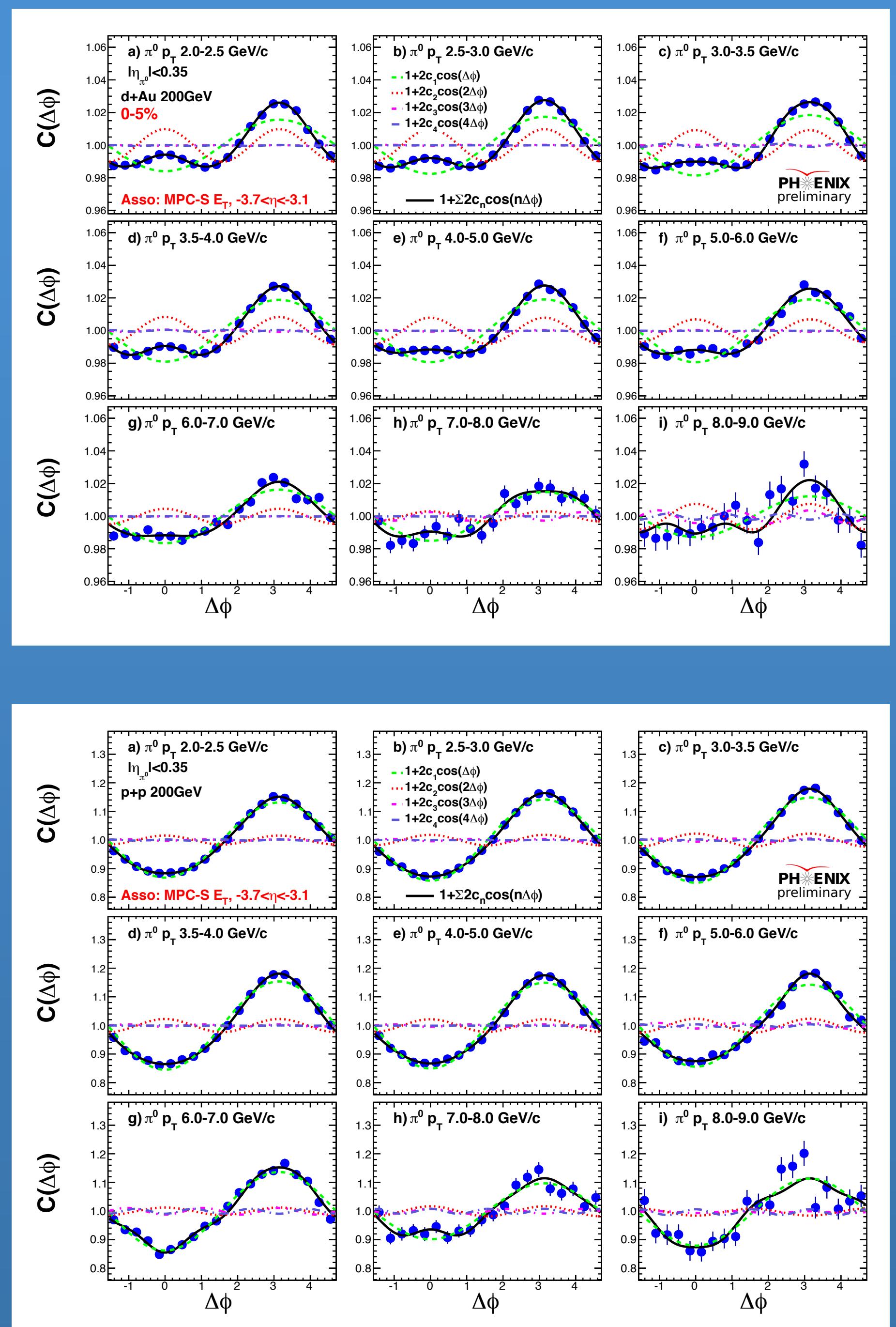
$\rightarrow c_n$ will eventually be converted to v_n using three-subevent method:

$$v_n(\pi^0) = \sqrt{\frac{c_n(\pi^0, \text{MPCN}) \cdot c_n(\pi^0, \text{MPCS})}{c_n(\text{MPCN}, \text{MPCS})}}$$

Similarity with $\text{Au}+\text{Au}$ collisions will be studied as well.

For raw data lovers

π^0 -MPCS correlation functions as a function of $\pi^0 p_T$



Poster presented on Sep 29, 2015, for