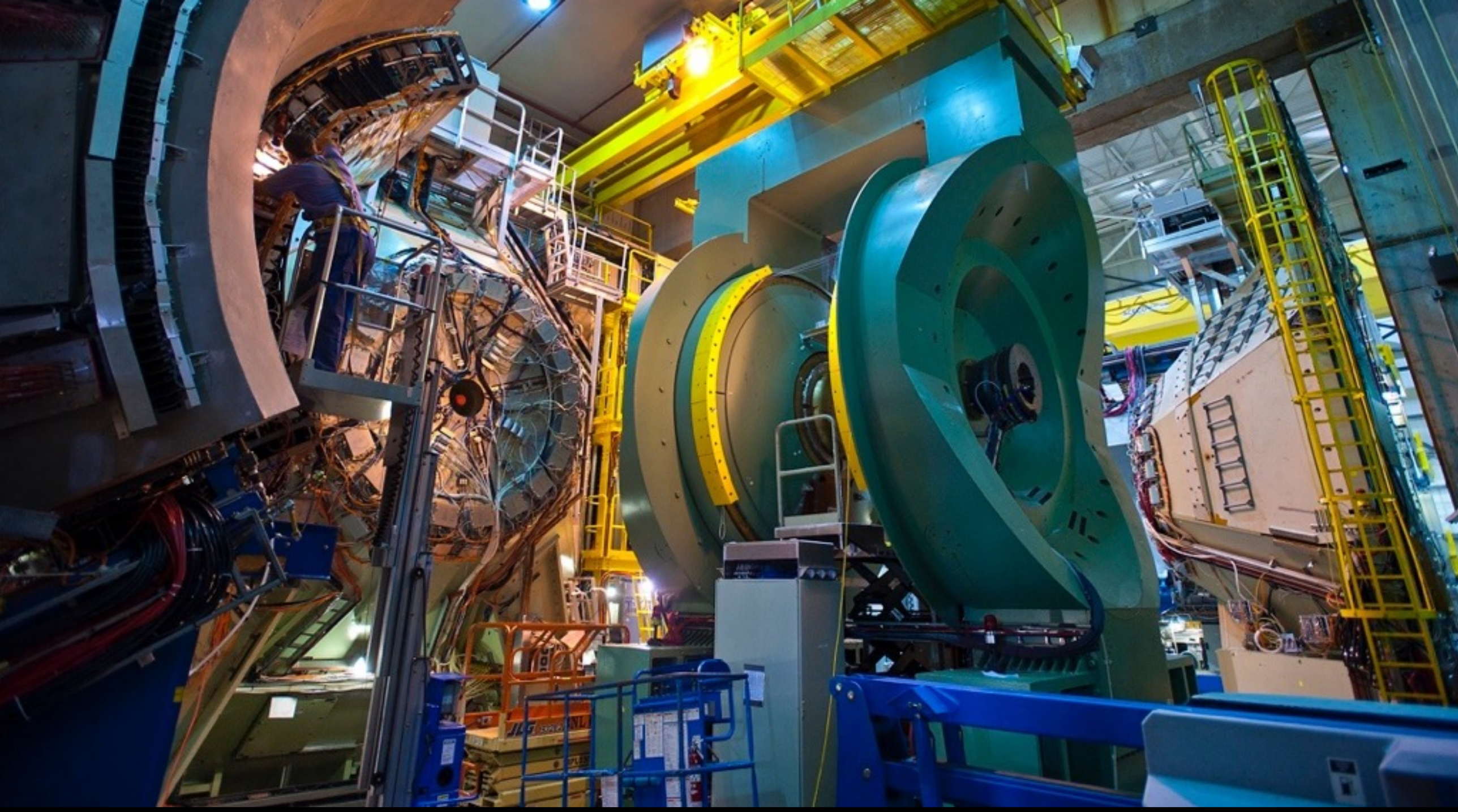


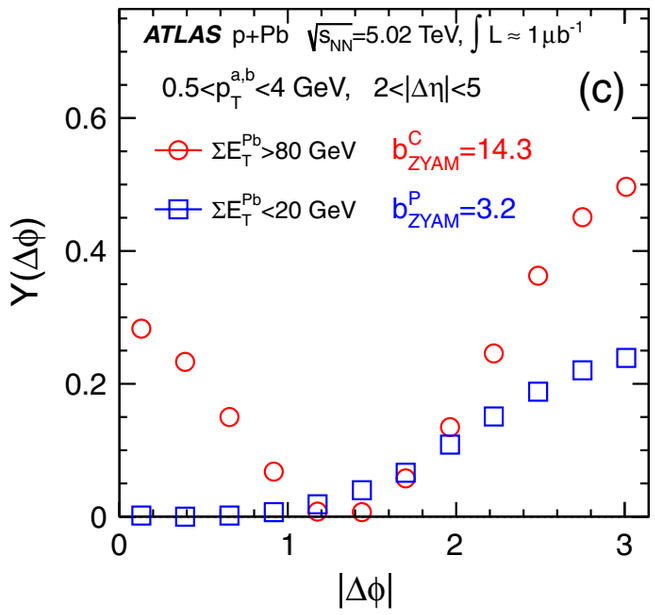
Hadron Correlations in 3He+Au and d+Au Collisions at PHENIX

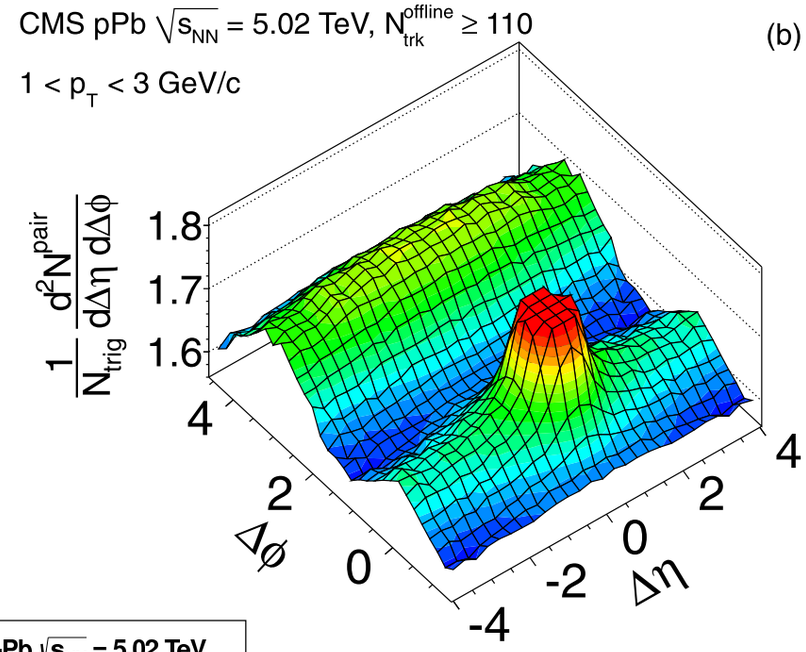
Anne M. Sickles
for the PHENIX Collaboration

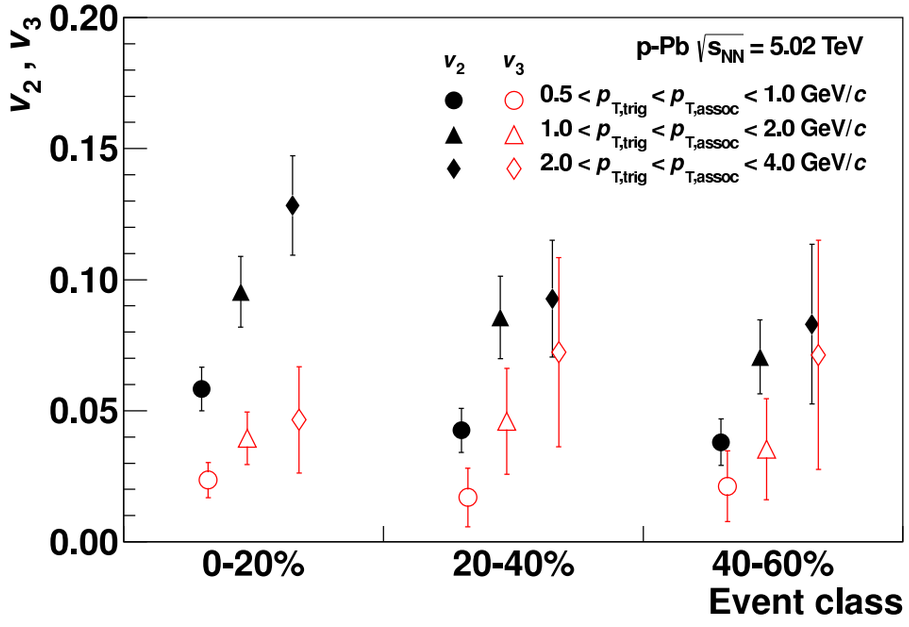
June 29, 2015

ILLINOIS

collectivity in small systems?





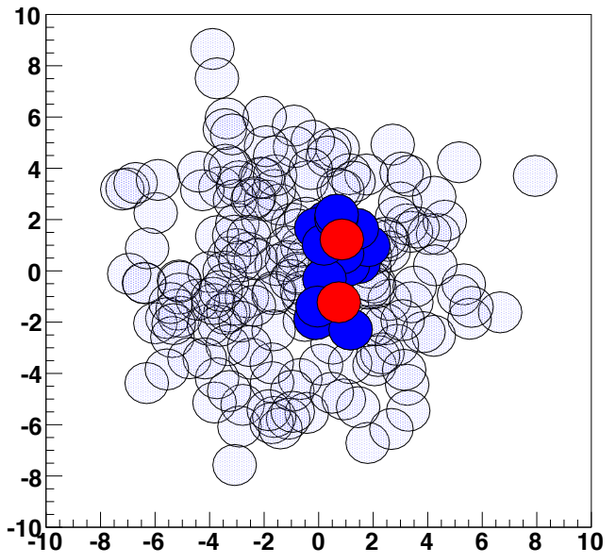


is the origin of these correlations similar to in AA?
what does that tell us about AA systems?

measurements at RHIC

- unique accessibility to variation in the initial state geometry

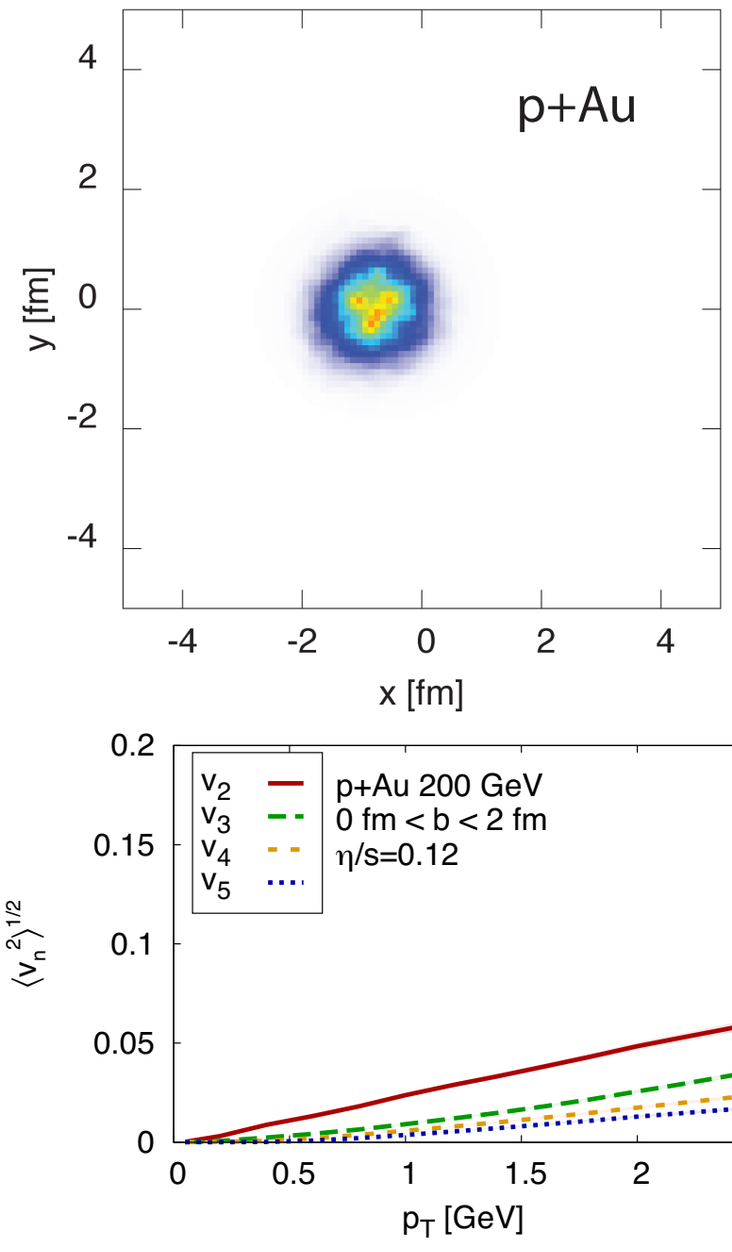
dA

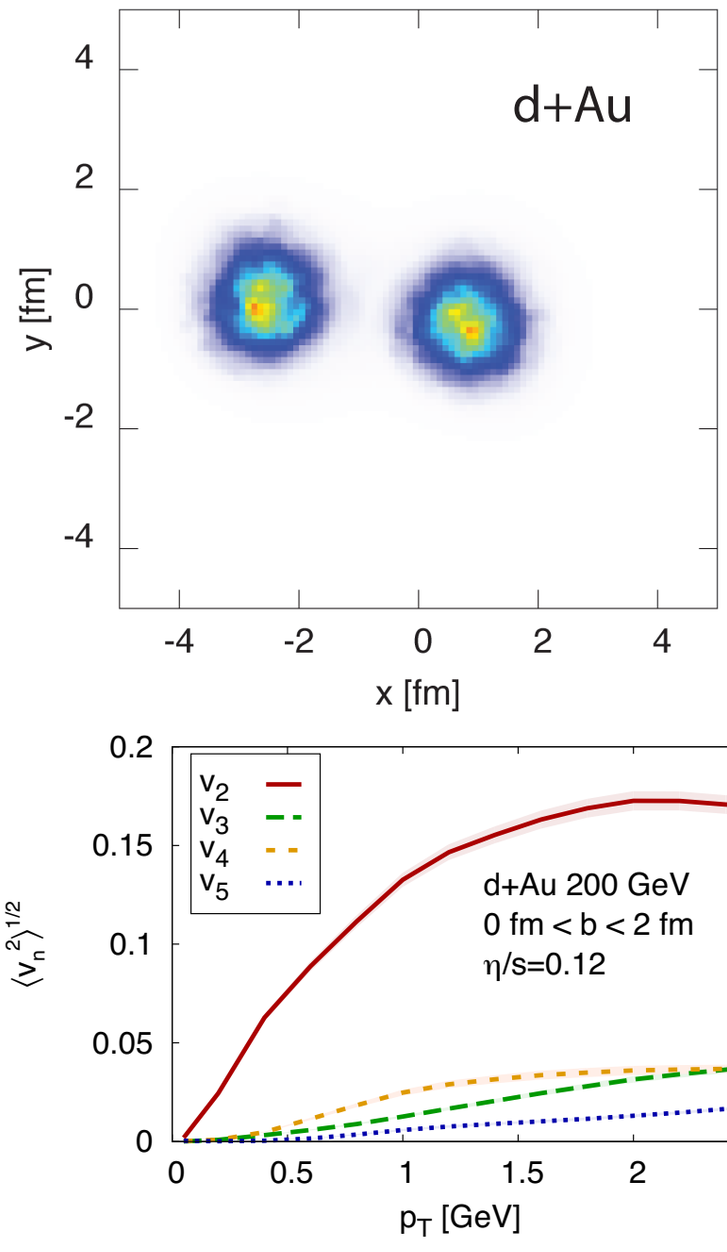


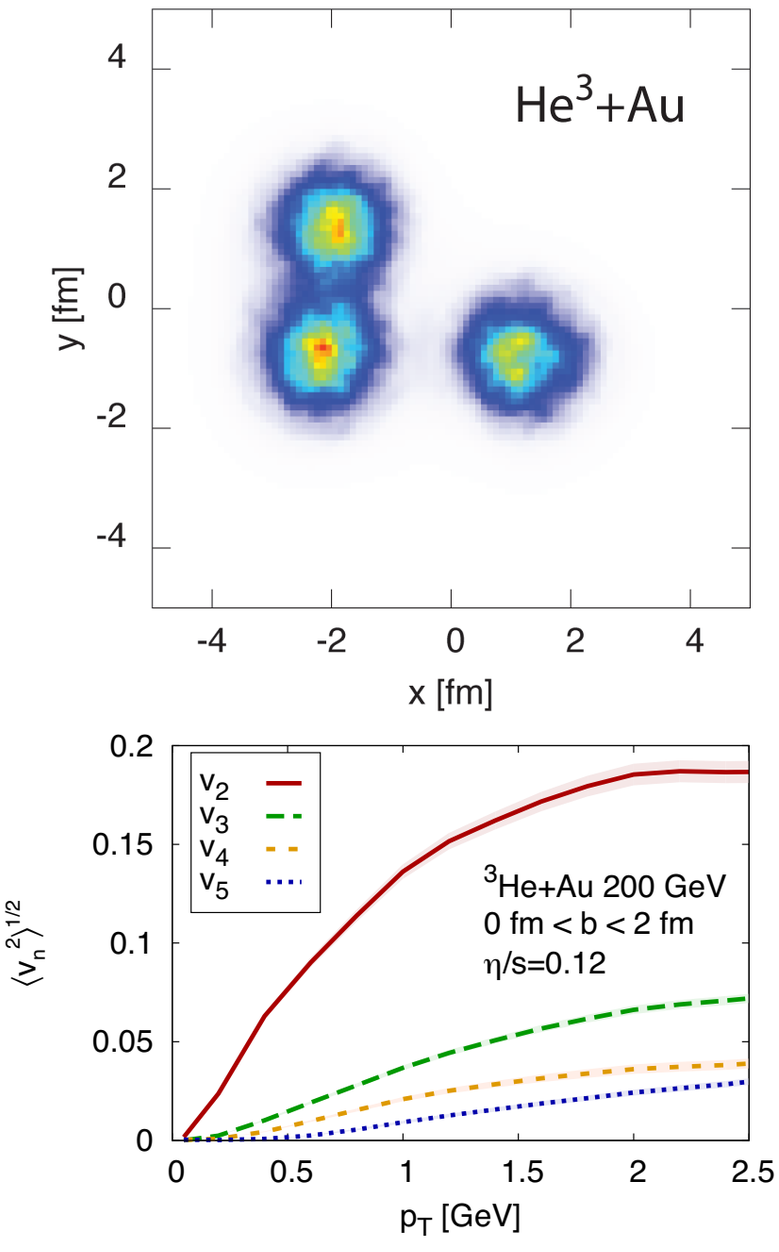
2008

this talk: d+Au and He3+Au results from PHENIX

geometry to v_N

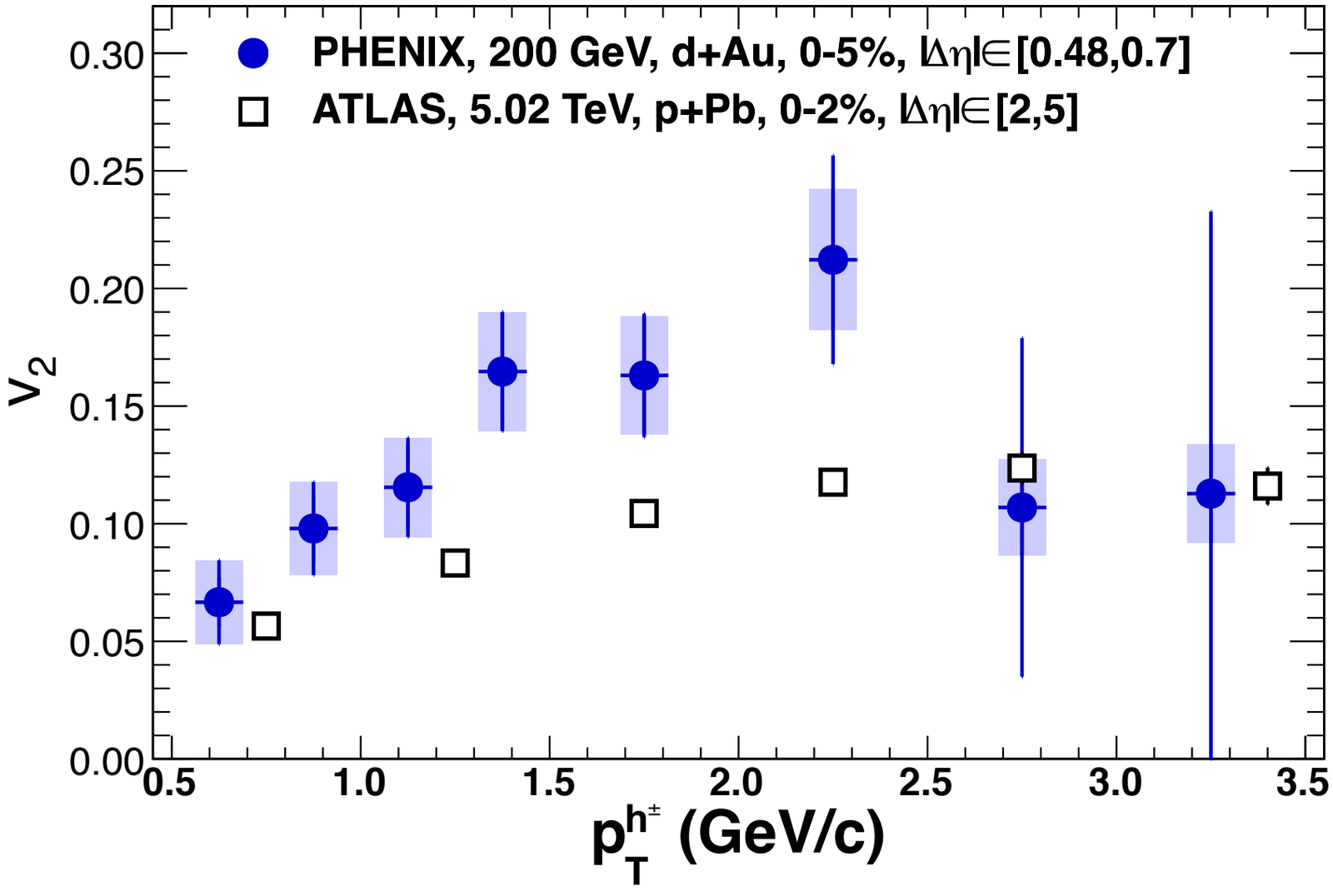


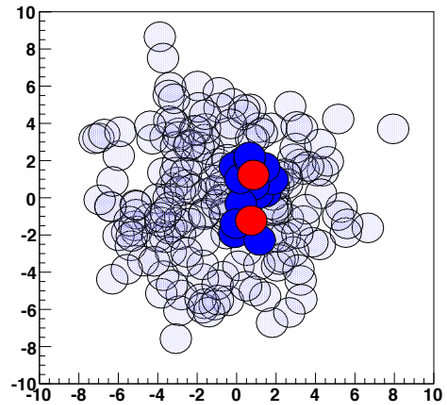


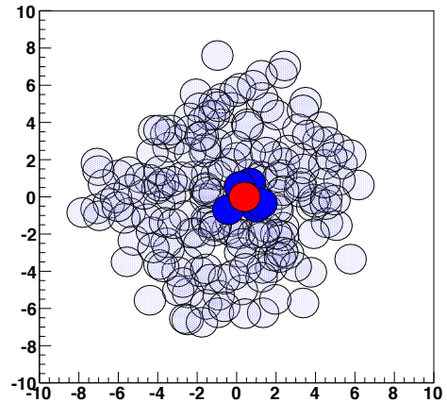


Schenke & Venugopalan: 1407.7557

v2: pPb & dAu







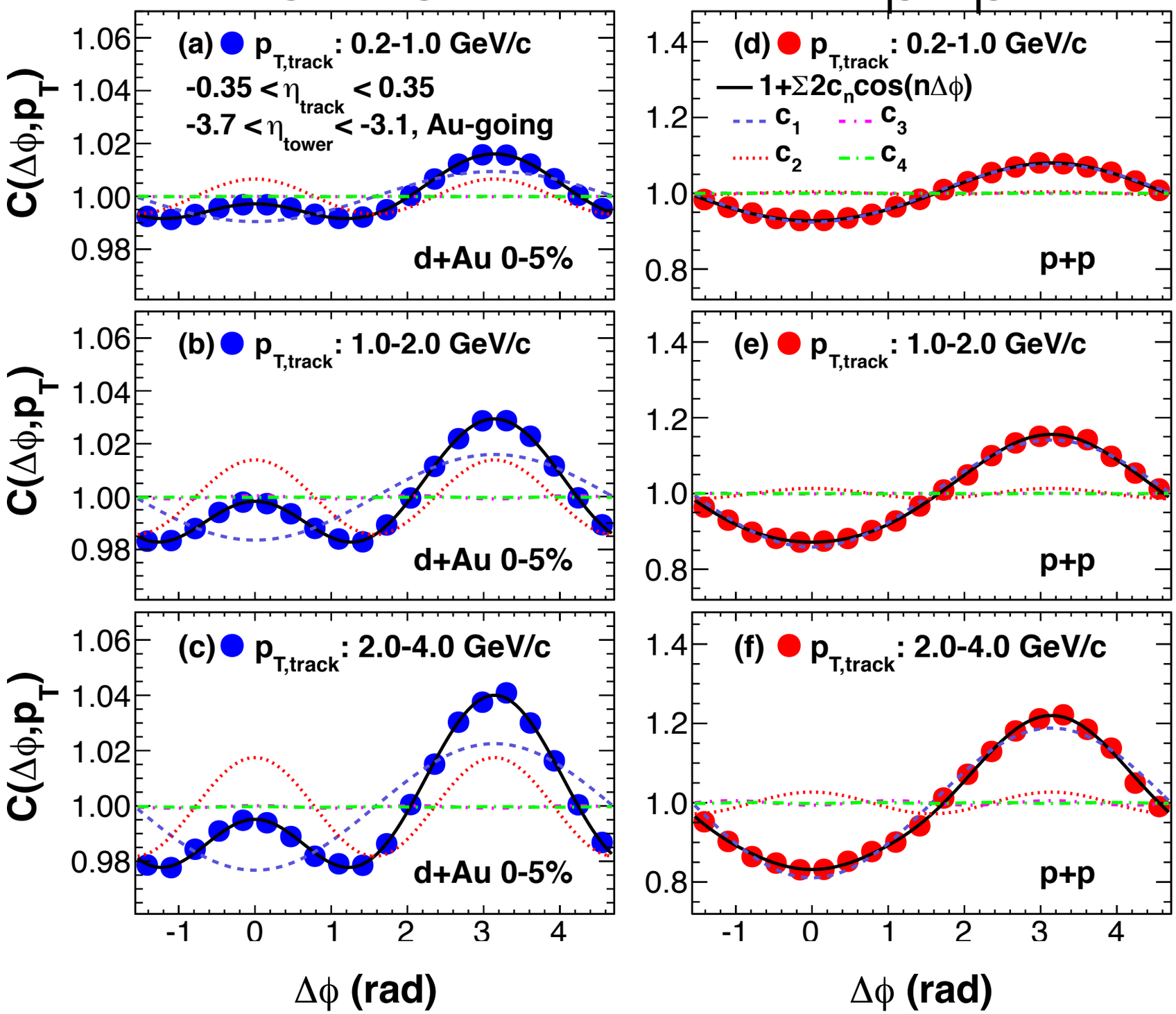
evidence for double ridges, but not a long range measurement

PHENIX PRL 111 212301 (2013)
ATLAS PRL 110 182302 (2013)

long range correlations in dAu

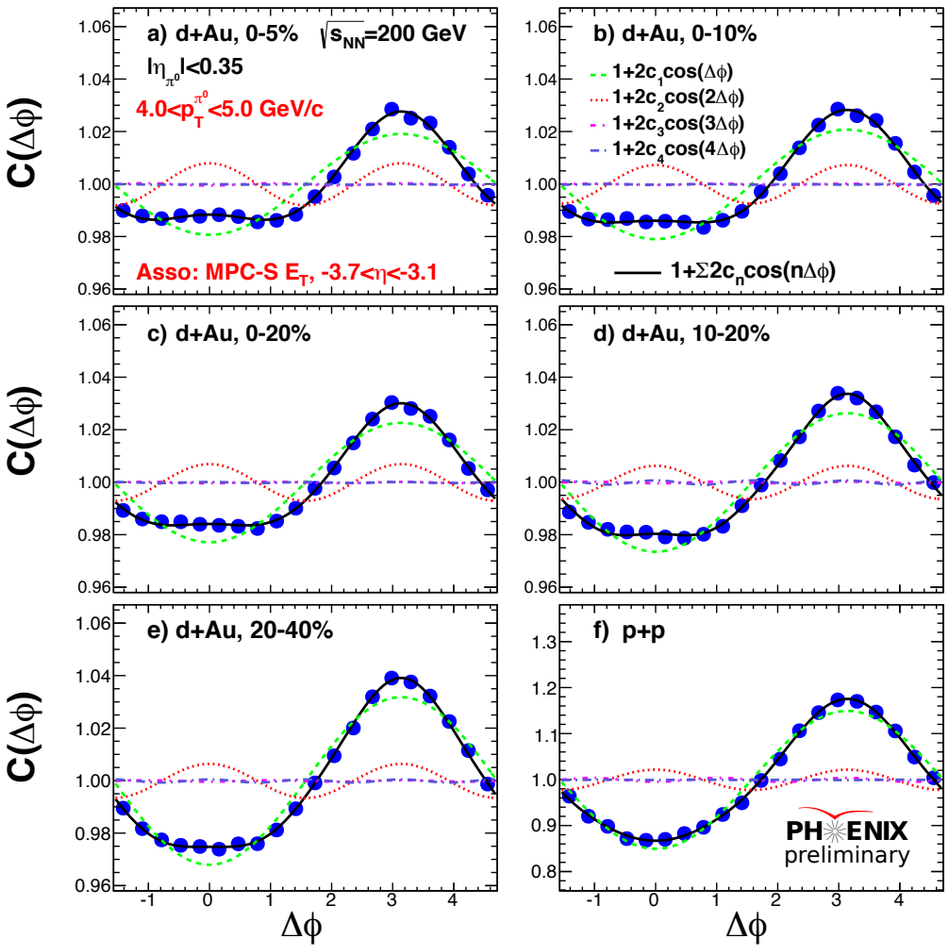
track-forward E_T correlation

$(3 < \eta < 4)$

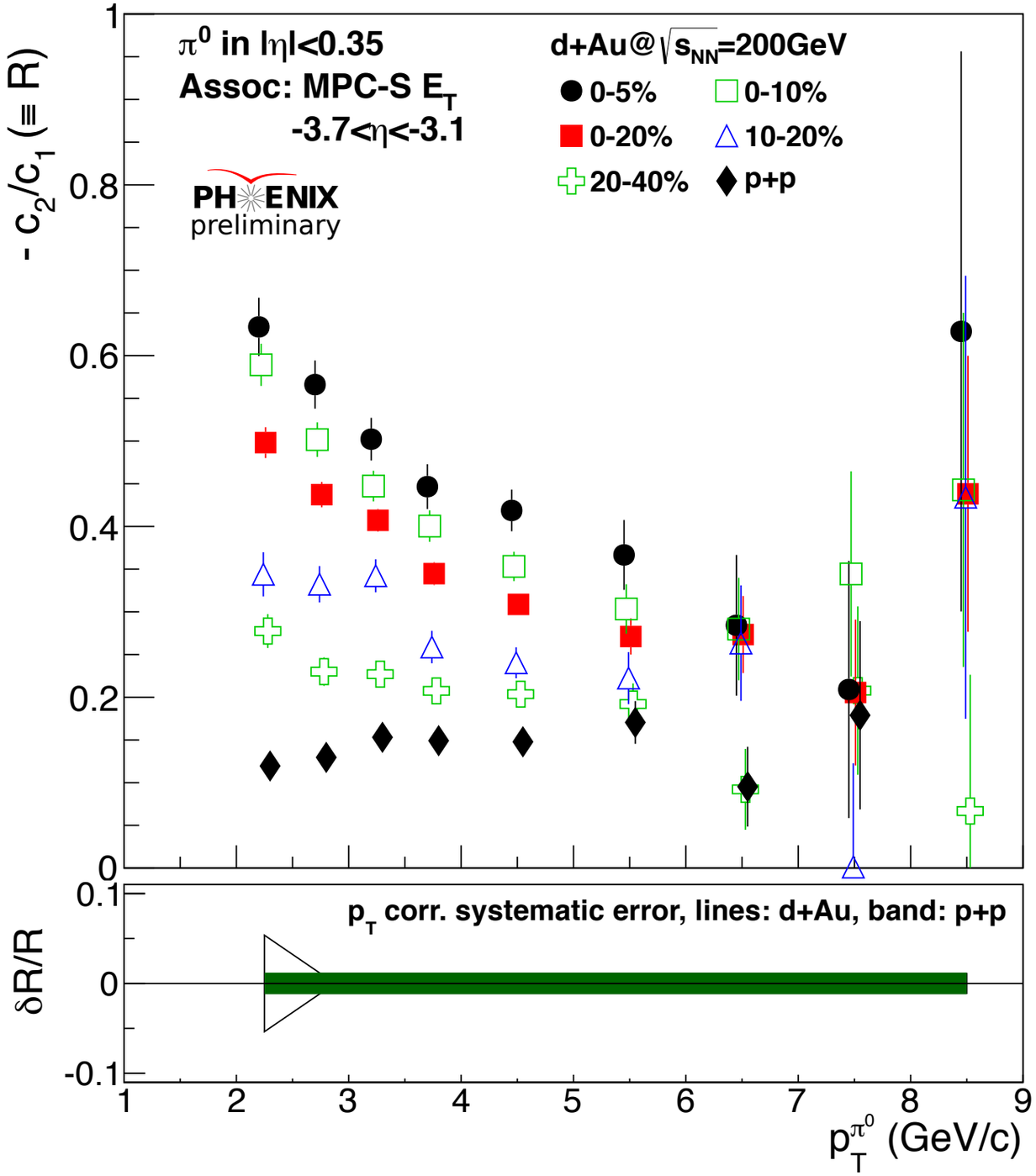


PRL 114 192301 (2015)

going to higher p_T with π^0s

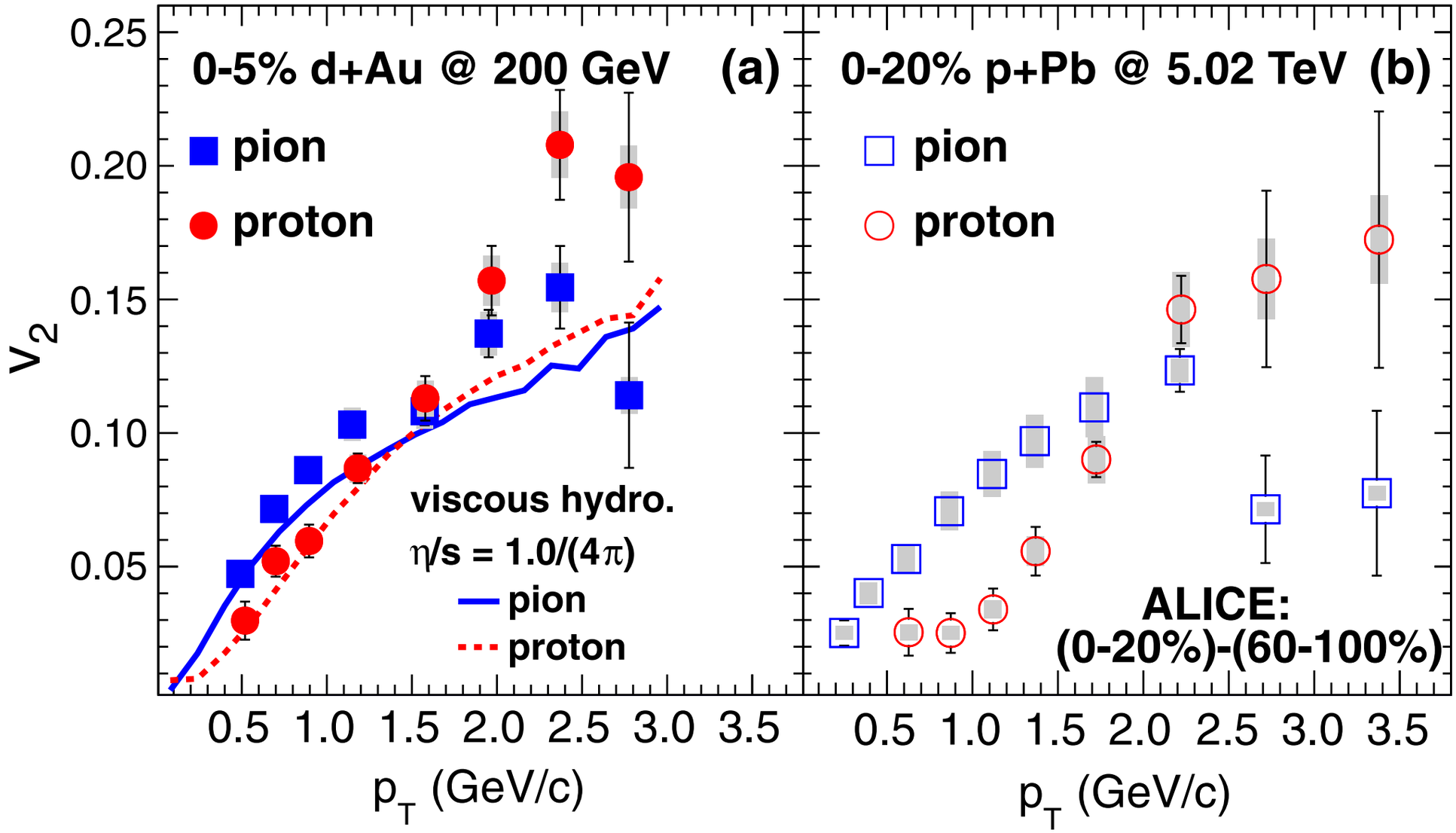


- c_2 structure enhanced in dAu to pp even at high p_T?



poster: T. Sakaguchi

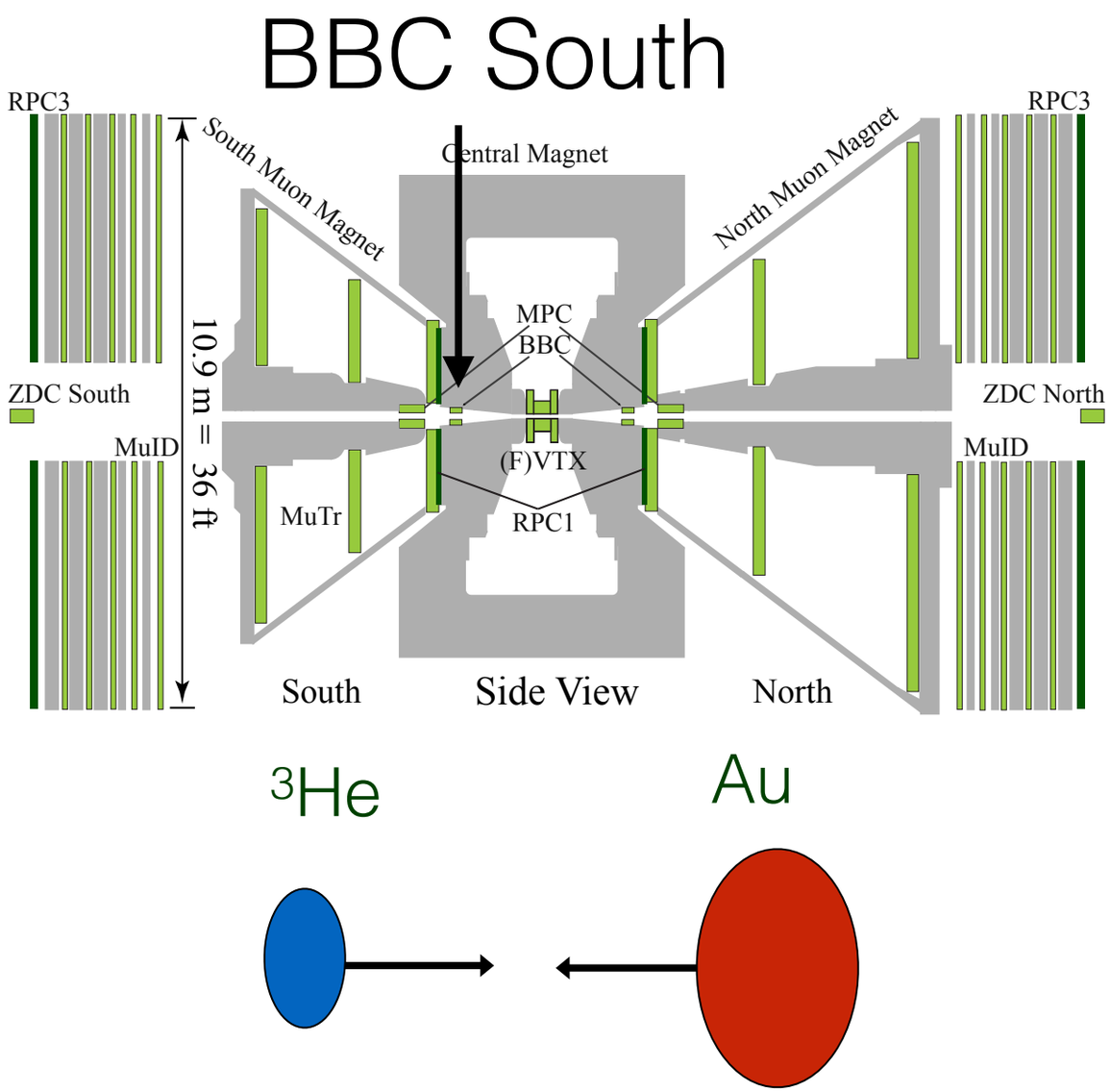
collectivity in small systems?

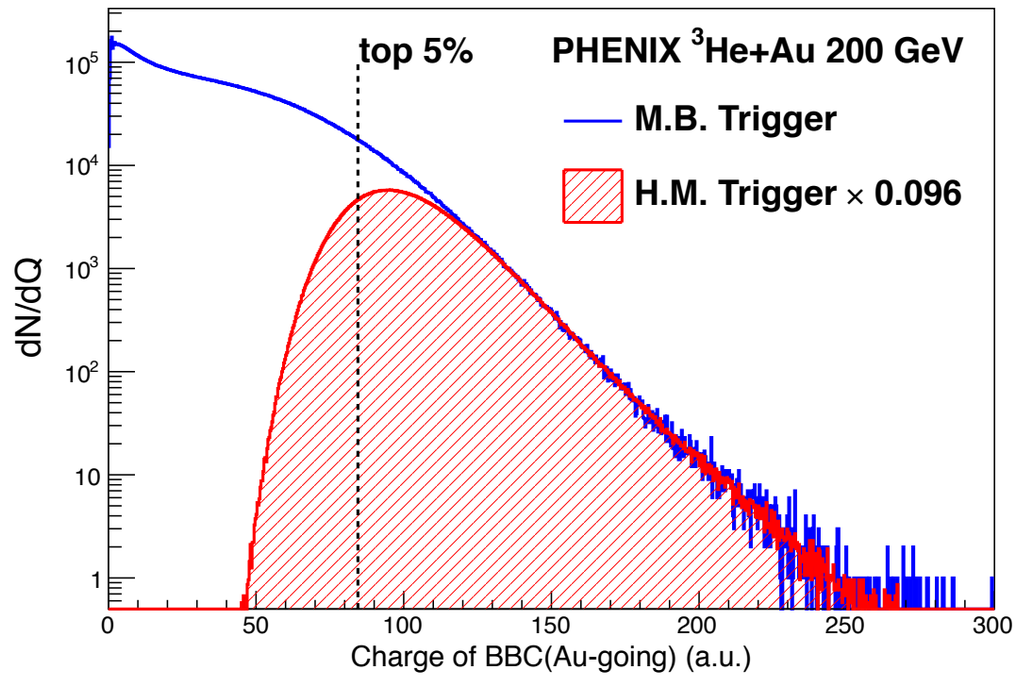


hadron mass dependent v2 observed in d+Au at RHIC and p+Pb at the LHC

PRL 114 192301 (2015)

He3+Au data in 2014

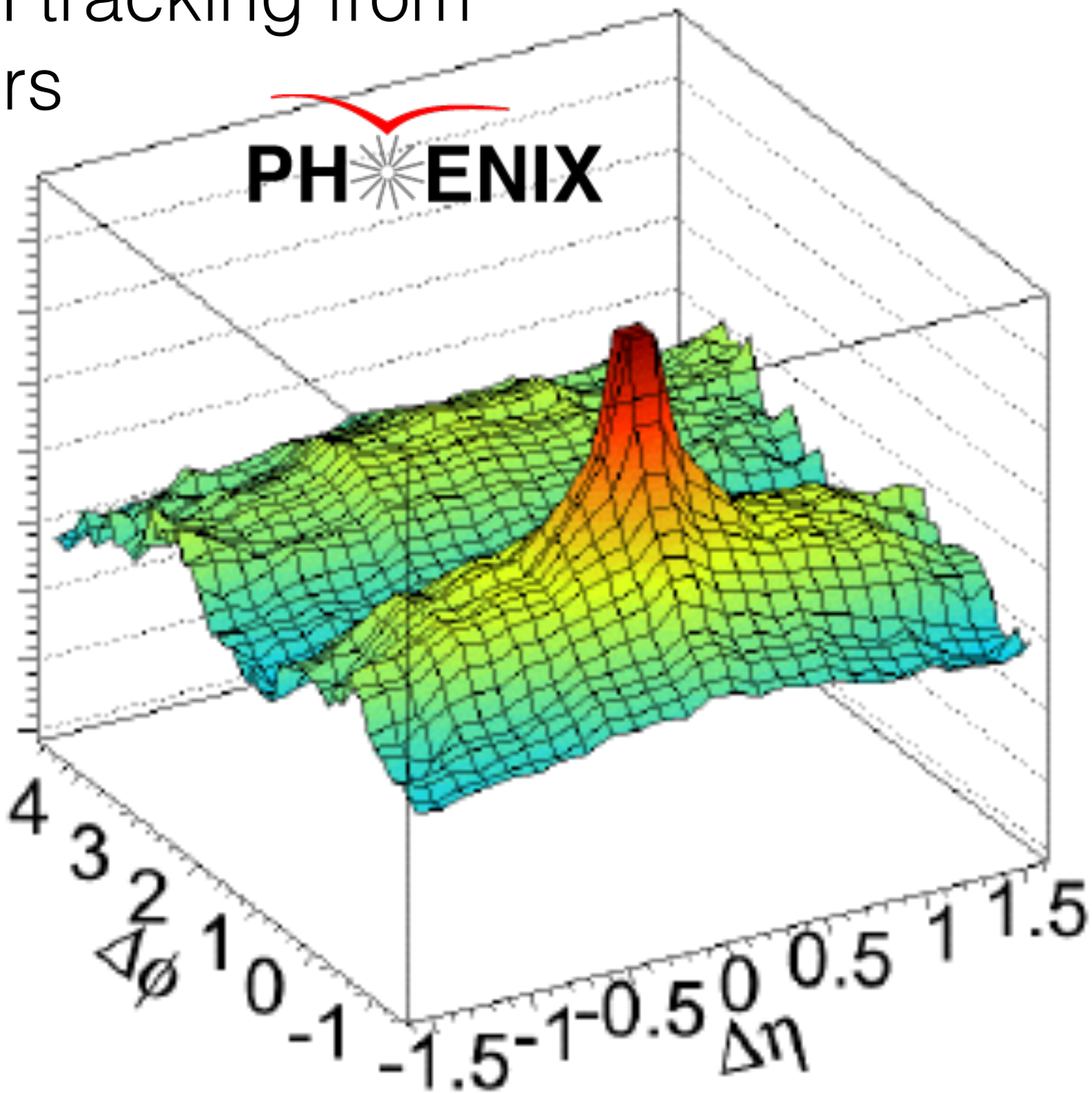




trigger provides a x10 enhancement of high multiplicity events!
essentially every central event recorded

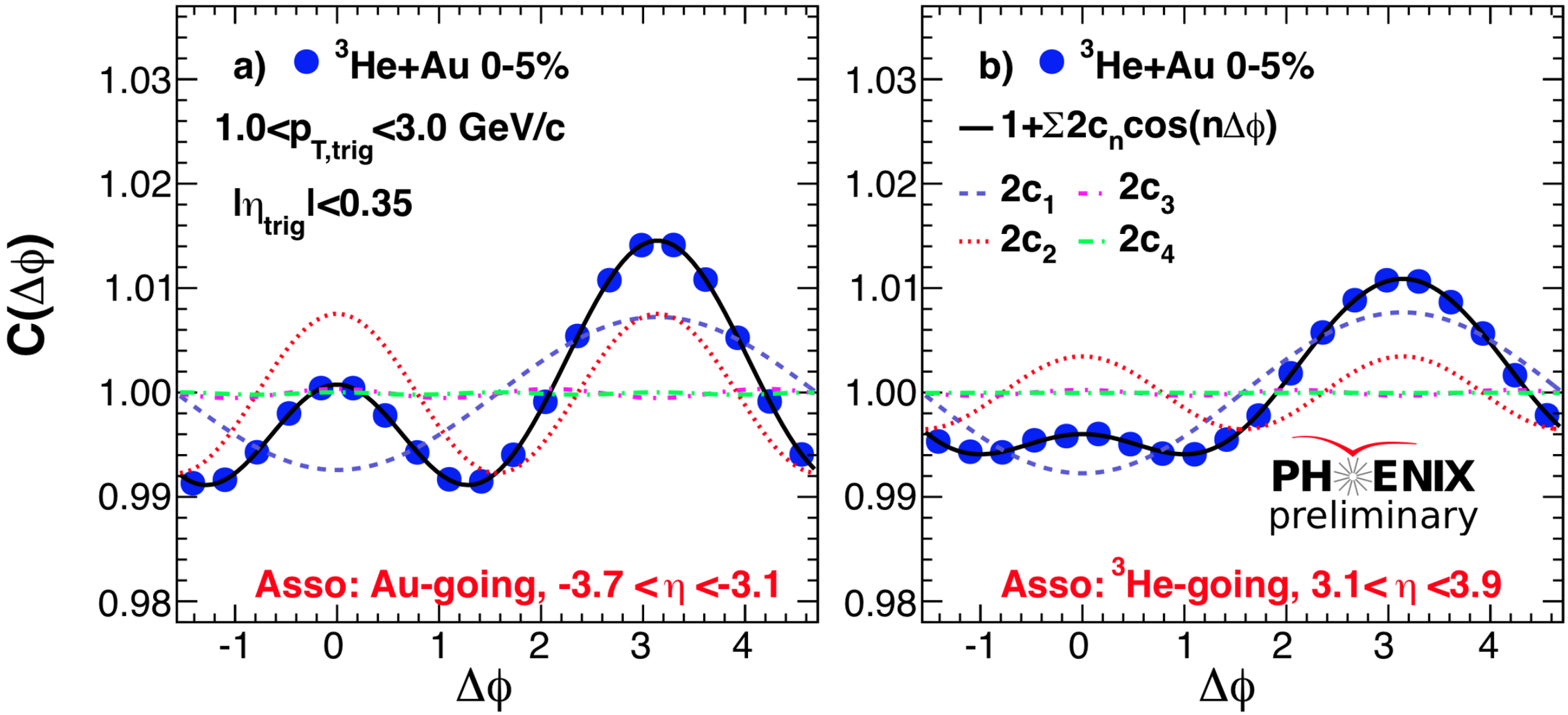
long range correlations He3+Au

inclusion of additional tracking from silicon vertex detectors



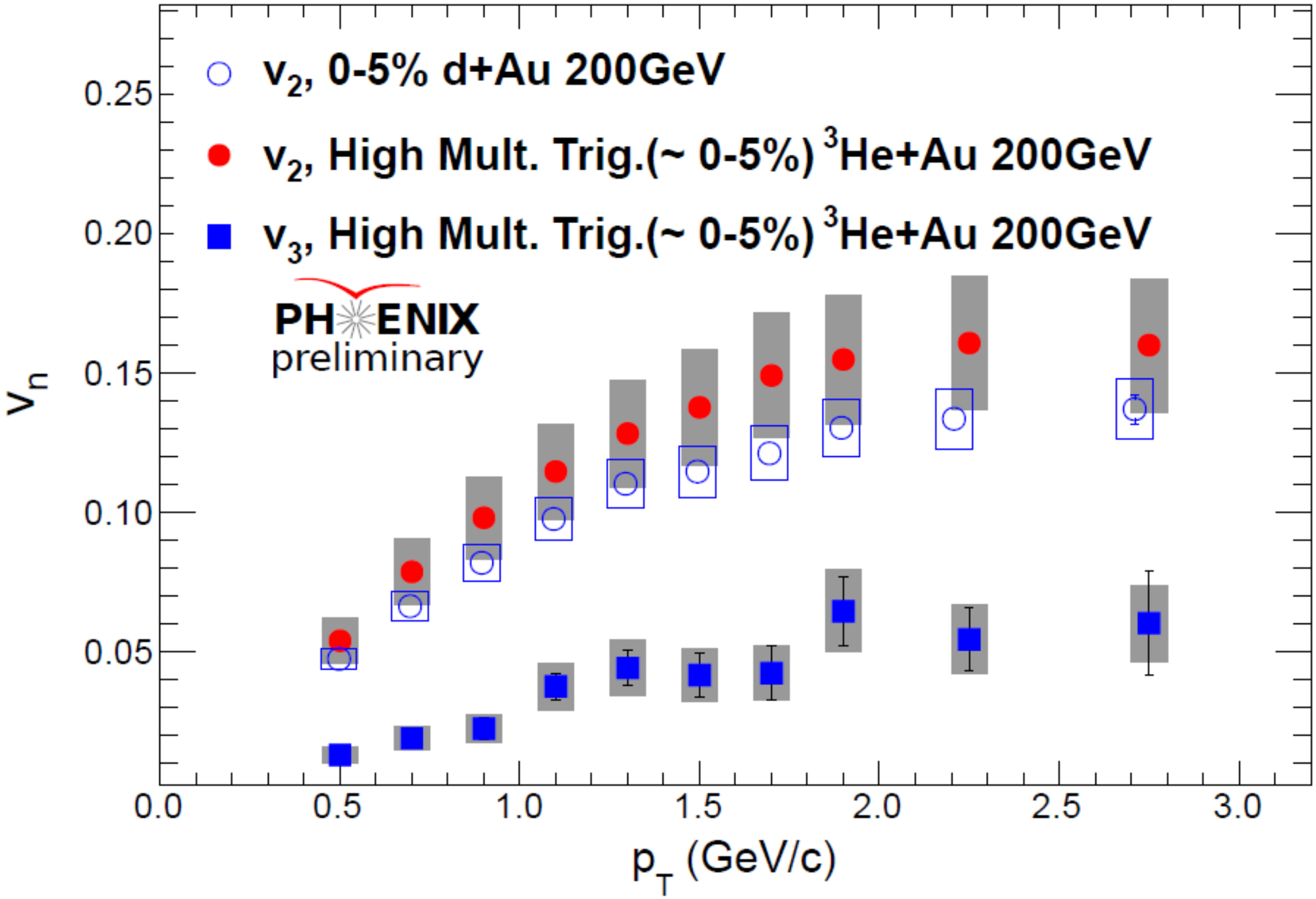
H.M. trigger events

long range correlations in He3+Au



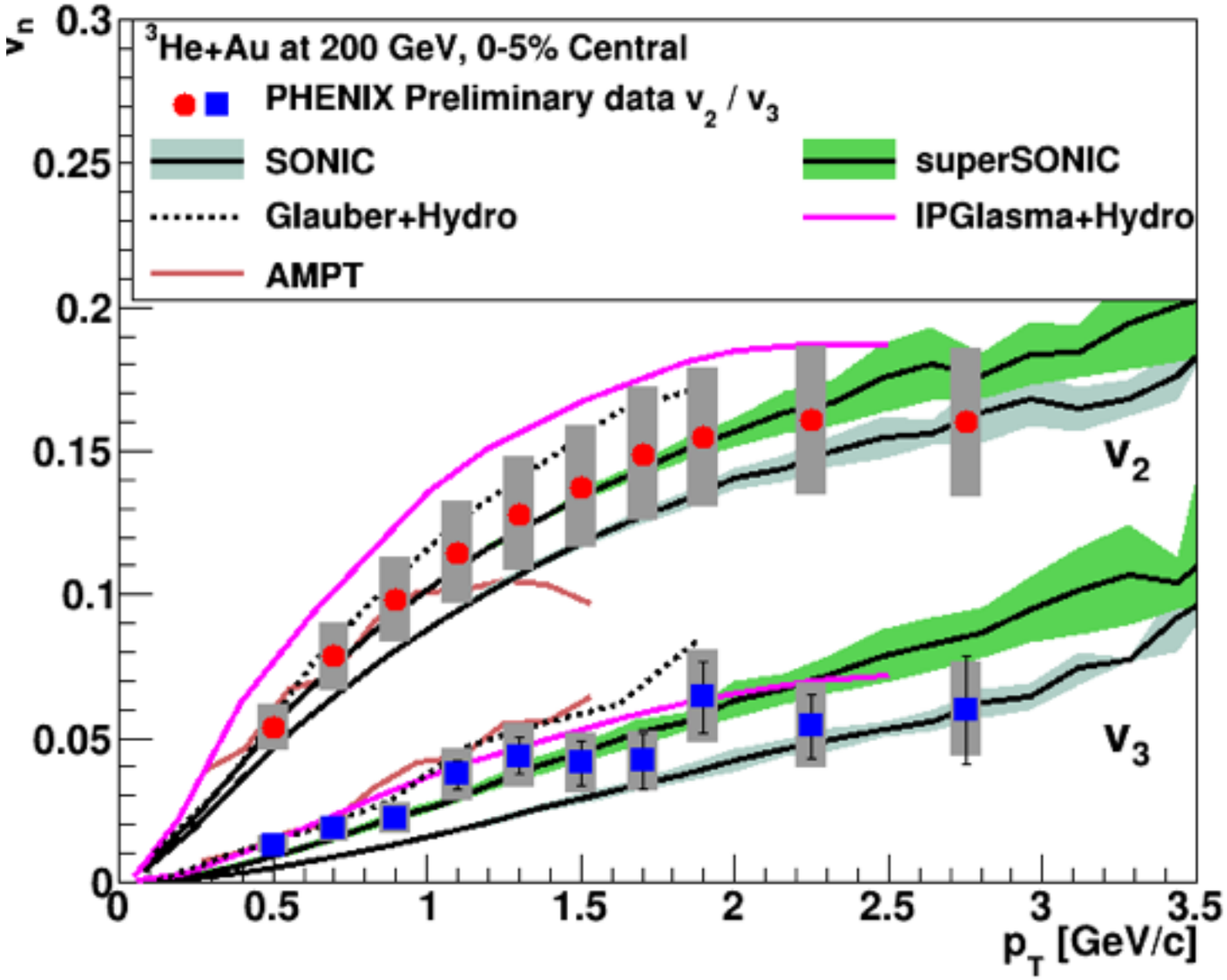
observation of near side structure on both Au going and He3 going directions

v_N in He^3+Au


v2, 0-5% d+Au 200GeV
v2, High Mult. Trig.(~ 0-5%) 3He+Au 200GeV
v3, High Mult. Trig.(~ 0-5%) 3He+Au 200GeV
PHENIX
preliminary
vn
pT (GeV/c)
0.25
0.20
0.15
0.10
0.05
0.0
0.5
1.0
1.5
2.0
2.5
3.0

comparison to theory

- SONIC: η/s = 1/4π, Glauber IC, cascade
- SuperSONIC: Sonic + pre-flow
- IP Glasma: IP Glasma IC, η/s = 1.5/4π
- Glauber+Hydro:η/s = 1/4π, ξ/s = 0.04
- AMPT: Glauber IC + string melting + coalescence & cascade

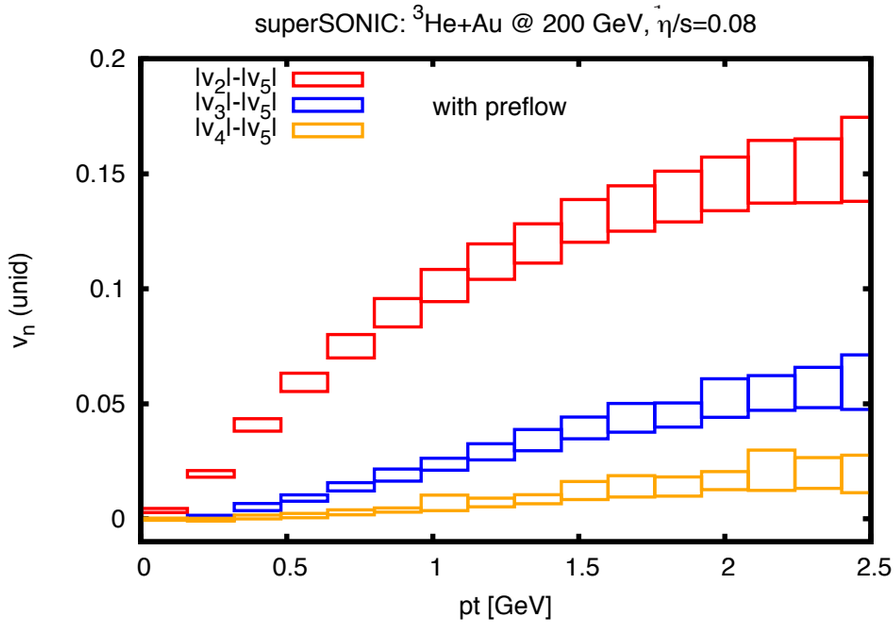


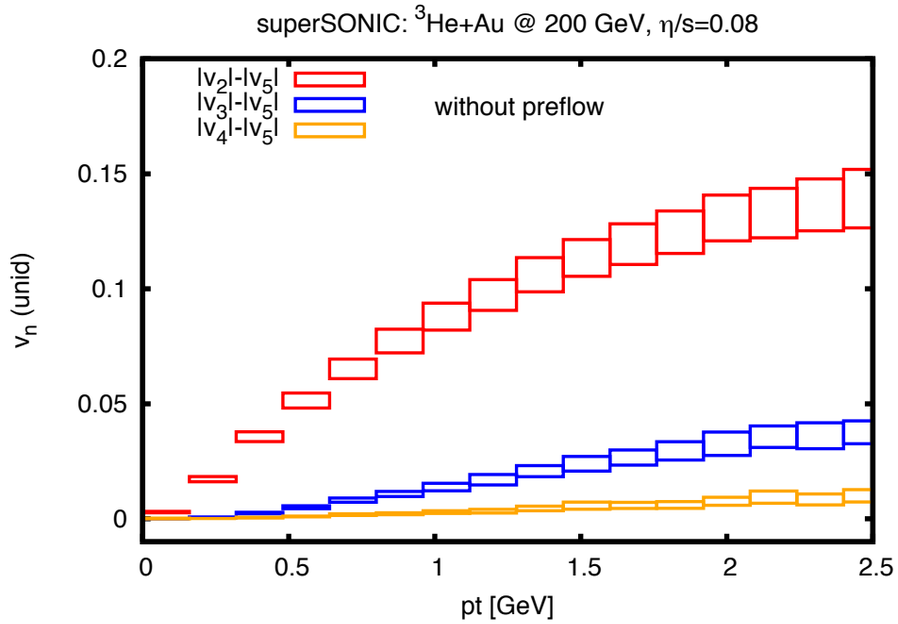
systematic approach

Light-Heavy Ion Collisions: A window into pre-equilibrium QCD dynamics?

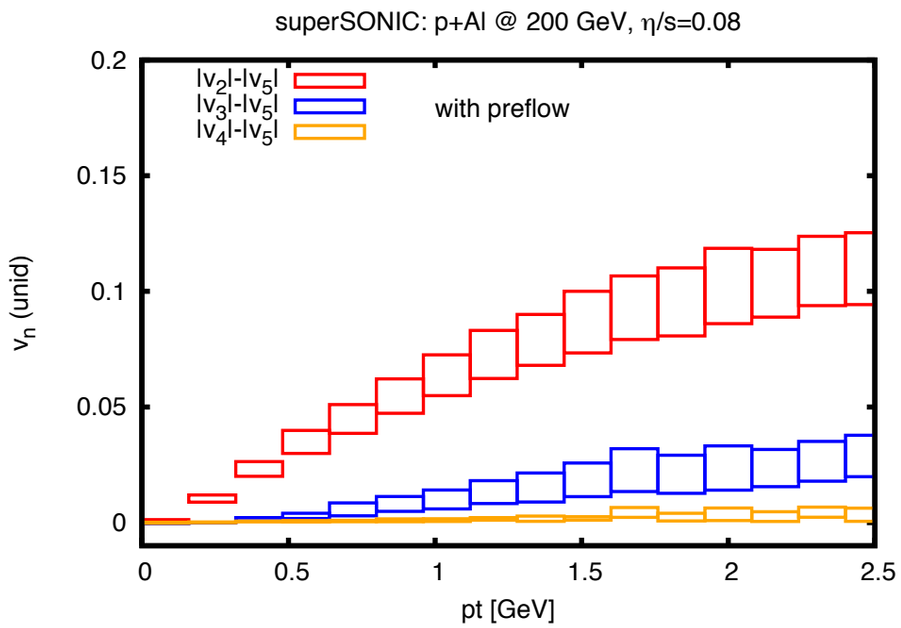
P. Romatschke[1]

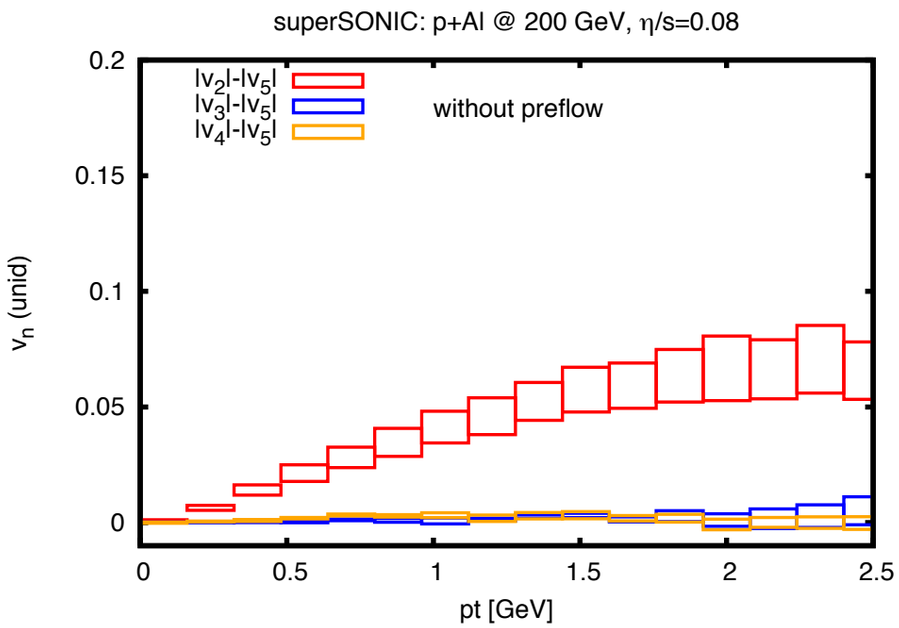
He3+Au





p+Al





smaller systems, higher harmonics, lower energies: more sensitive to earliest times

conclusions and outlook

- v_2 & v_3 measurements in high multiplicity He3+Au collisions
- detector upgrades & multiplicity triggers → qualitative improvements over 2008 d+Au data
- the future:
  - p+Au, p+Al collisions recently recorded at PHENIX
    - interesting in lower energy pA collisions within PHENIX to further explore this physics
  - additionally high multiplicity trigger was used in proton-proton collisions

great opportunities to systematically explore the boundaries of QGP formation!