A Systematic Study of Neutral Pion Production in Small and Asymmetric Systems at PHENIX

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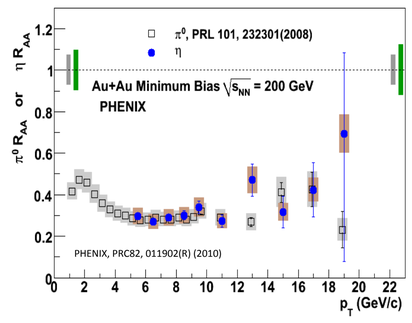
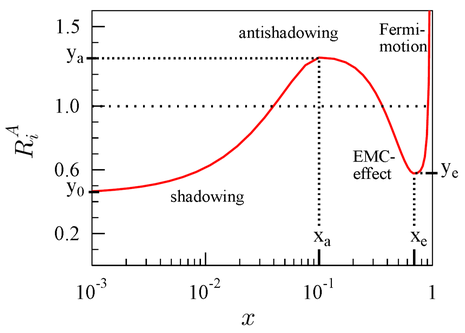
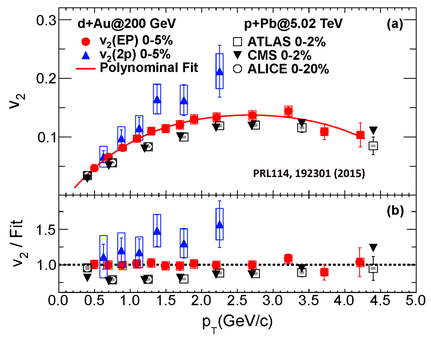
Motivation

- π^0 suppression in A+A evidence of parton energy loss





- p(d)+A previously considered baseline for CNM effects
  - Shadowing, k_T broadening, etc.

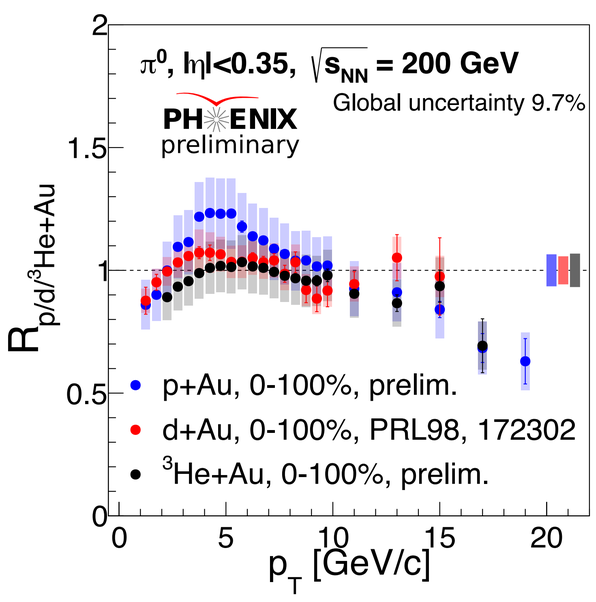


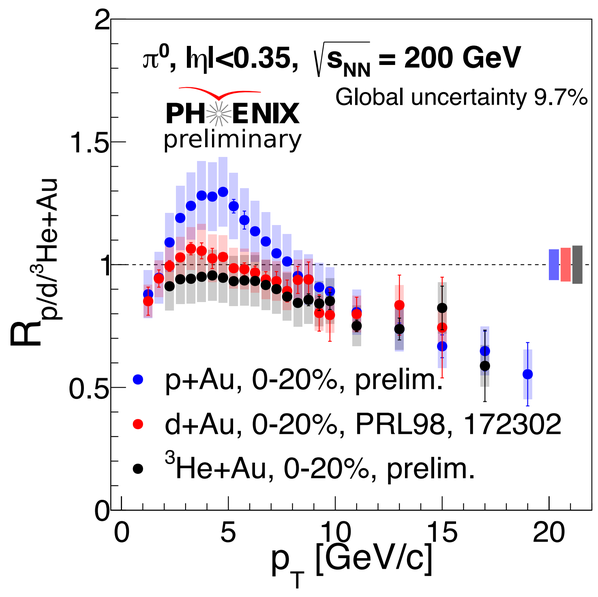
- Recent small system measurements indicate effects from a strongly interacting medium
  - A mini-QGP?

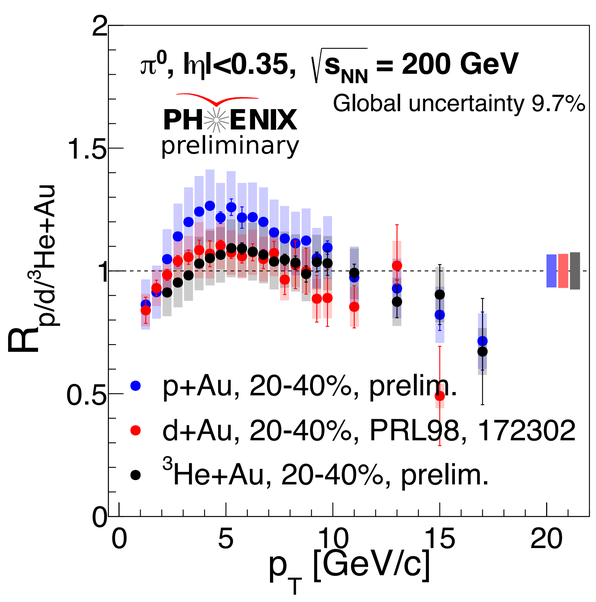
Systematic study of the π^0 yields and R_{AA} in "small" systems can shed some light on the characteristics of the medium(s) produced

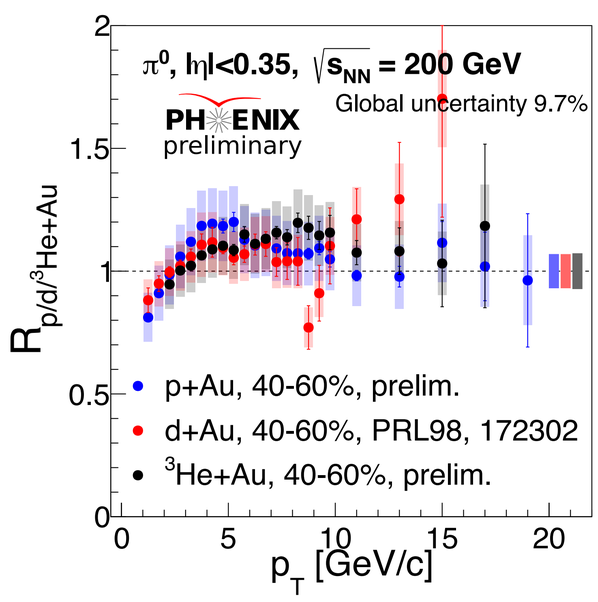
Results

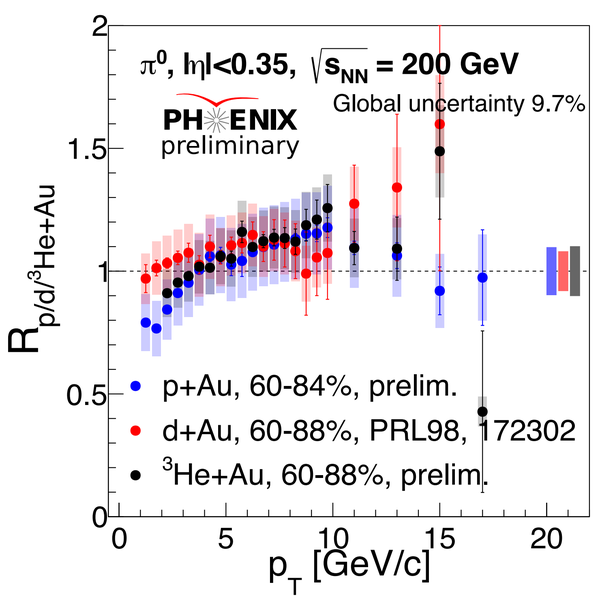
- R_{AA} ordering for $p_T < 5$ GeV/c, central collisions
  - $R_{pAu} > R_{dAu} > R^3_{HeAu}$
- All systems comparable at $p_T > 10$ GeV/c
- Large Cronin enhancement in p+Au



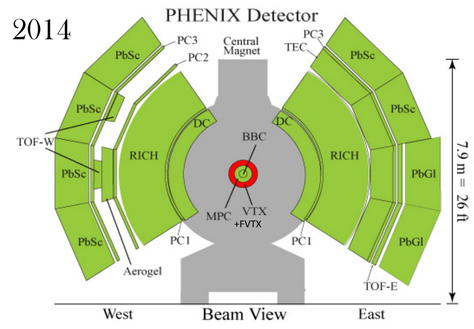




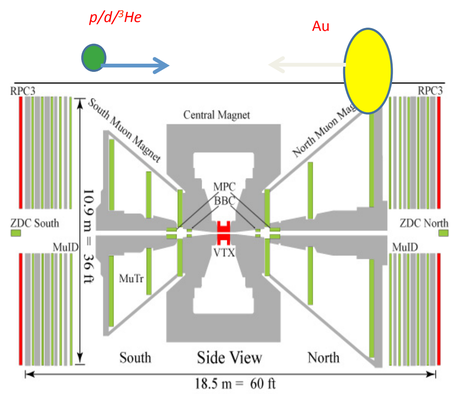




Experiment

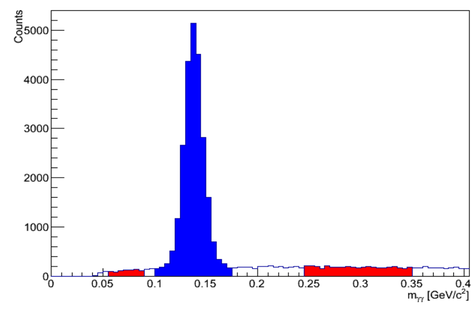


- BBC
  - Centrality
- EMCal
  - Photons



- p+Au 2015
- d+Au 2003
- ^{3}He+Au 2014

Method



- $\pi^0 \rightarrow \gamma\gamma$
  - Using mixed event subtraction
    - Normalized in red region
  - Counted in blue region
- Raw yields corrected for detector acceptance, reconstruction efficiency, conversions, and high p_T merging effects

Summary

- p(d)+A no longer a baseline system
  - Is there energy loss?
- Three systems show R_{AA} ordering in the most central collisions
  - Need to understand mechanism of enhancement or lack of in x+Au
- R_{AA} comparable at high p_T
  - Similar (hot?) matter produced?

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