MPD PWG2 weekly meeting 13.09.19

First glance at particle production with MPDRoot

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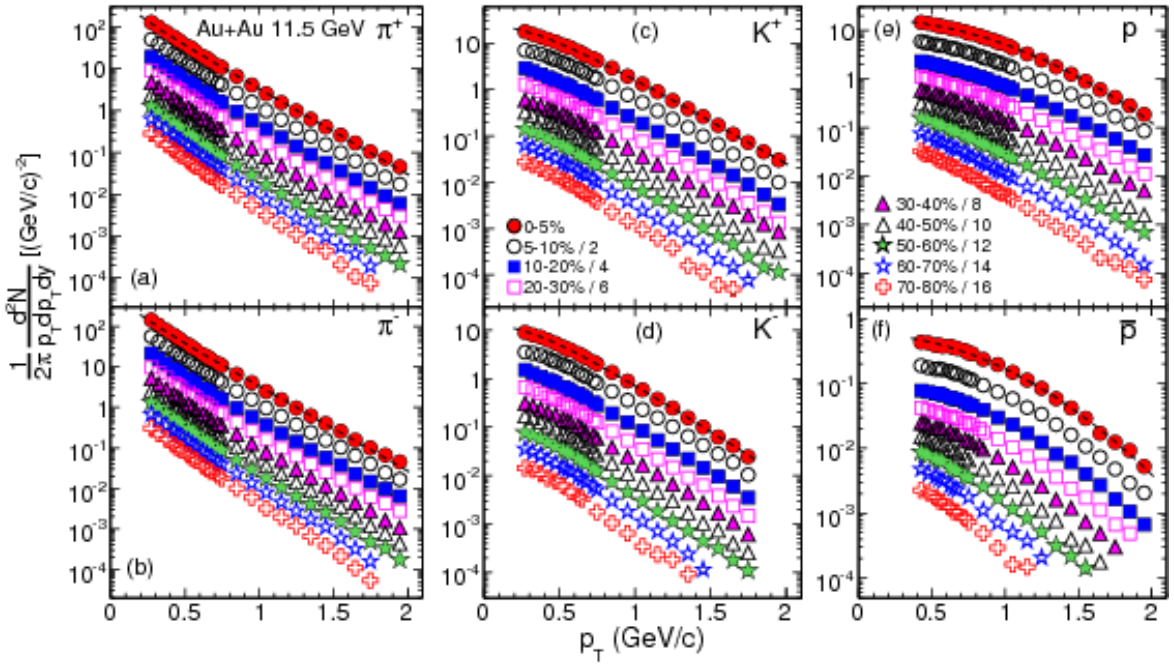
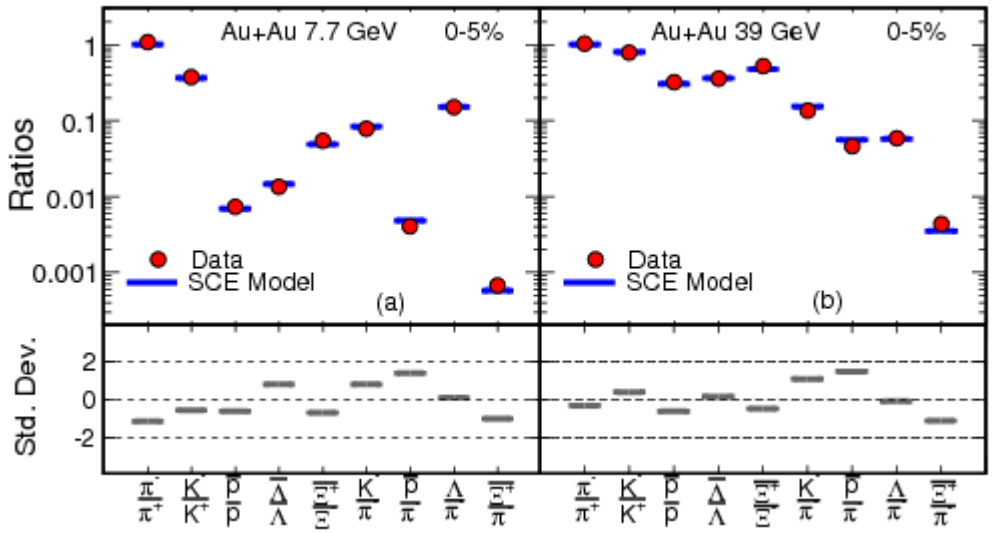
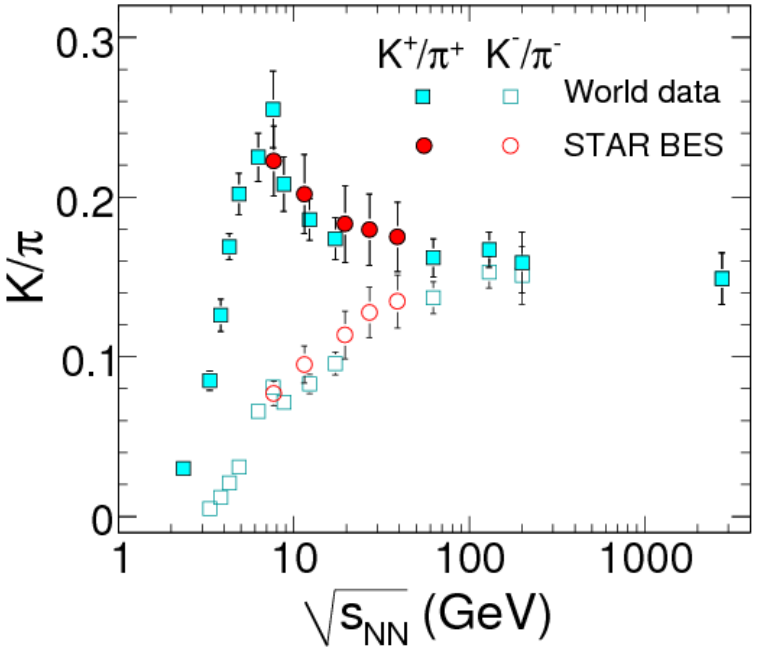
Motivation





A lot of published data in the energy region of NICA

Use MC data of the MPD to make rough estimations on some effects of identified particle production



STAR data: **Phys.Rev. C96 (2017) no.4, 044904**
arXiv:1701.07065v2 [nucl-ex]

First glance at MPD charged particle spectra

Applied cuts:
$0.2 < pt < 1.4$ GEV/c
$\eta < 0.5$

No centrality cut
No TPC hits limitation

Particle identification:
MpdPID function (by A.Mudrokh)
Fprobcut = 0.9, sigE = sigM = 2.0

MPD Geometry stage 1

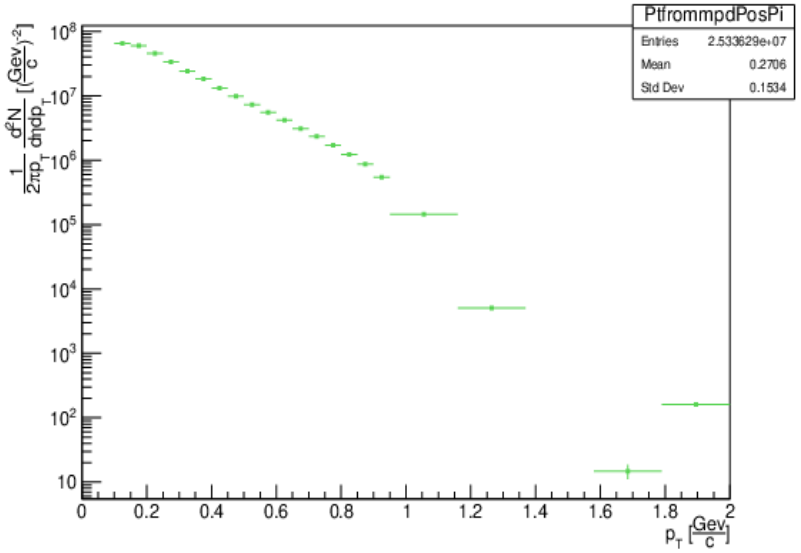
UrQMD 3.4, eos 0
Data generated by MPD team

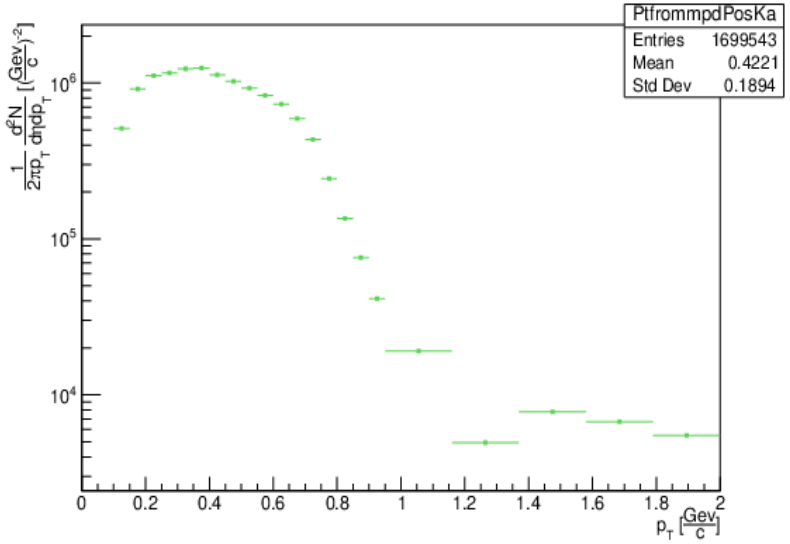
Sqrt = 4, 7, 9, 11 GEV

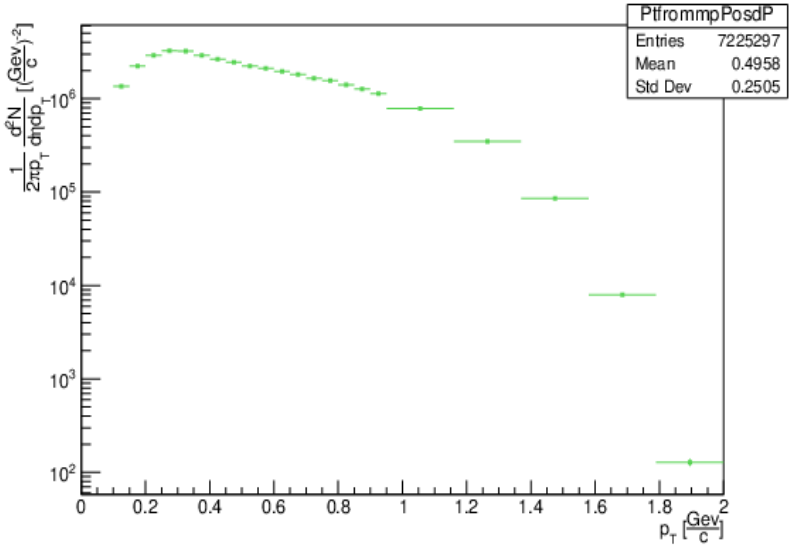
Can be found at
/zfs/store6.hydra.local/mpddata/data/exp

Spectra of positive particles 9 GEV

no cuts

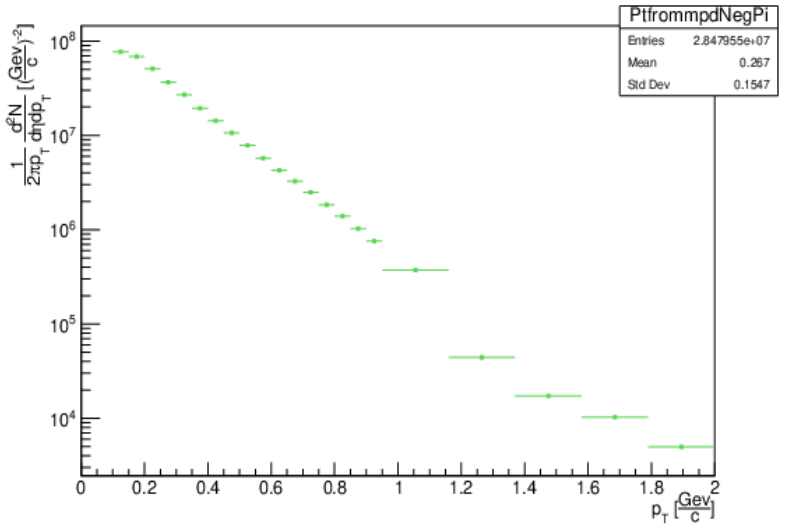


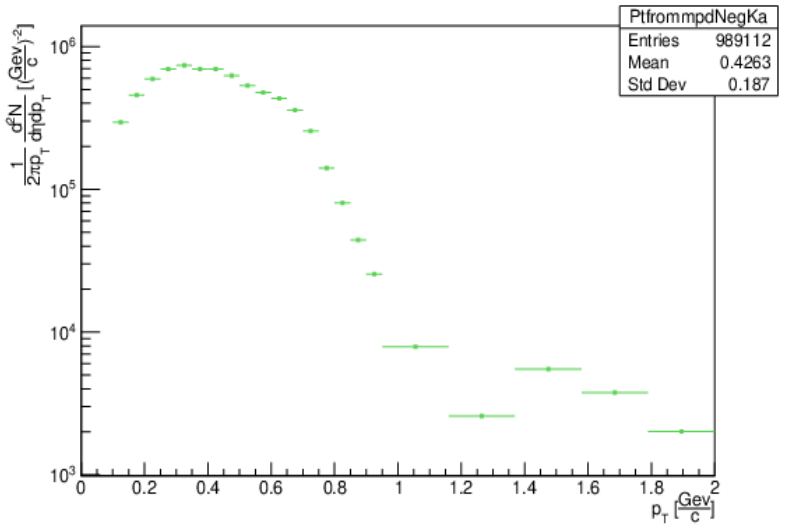


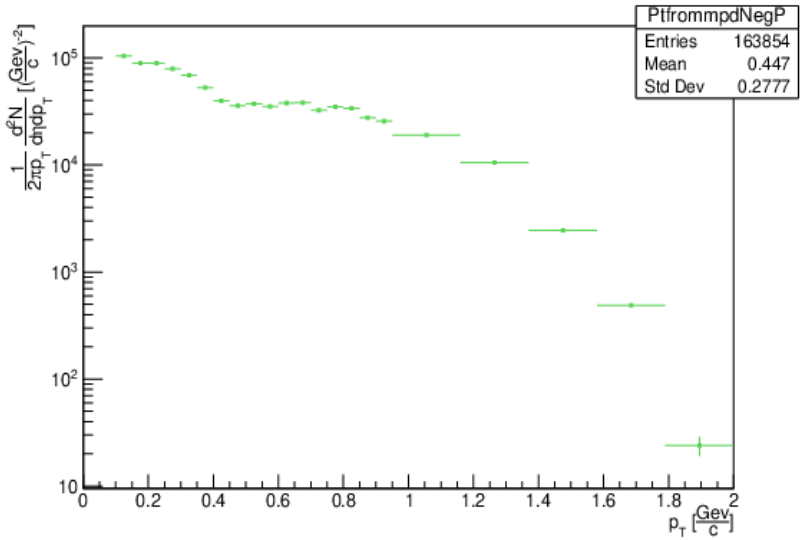


Spectra of negative particles 9 GEV

no cuts



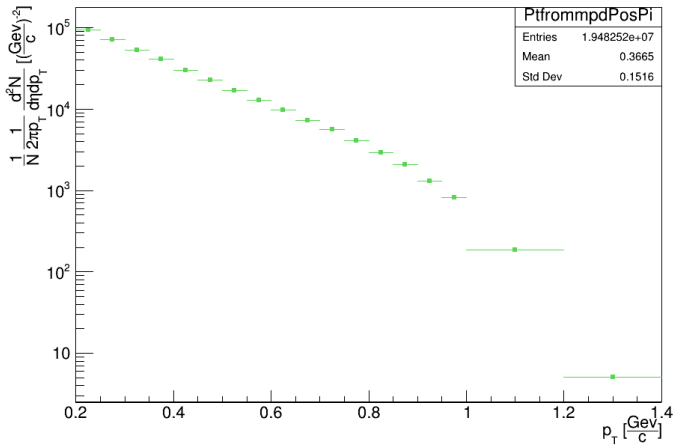




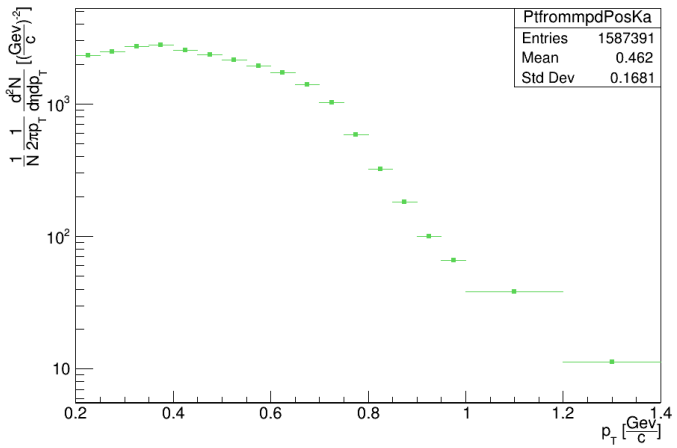
Revised spectra

with cuts

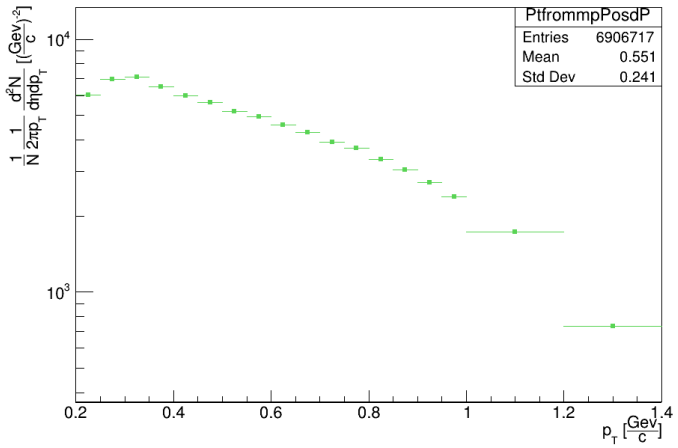
π^+ 9 GeV



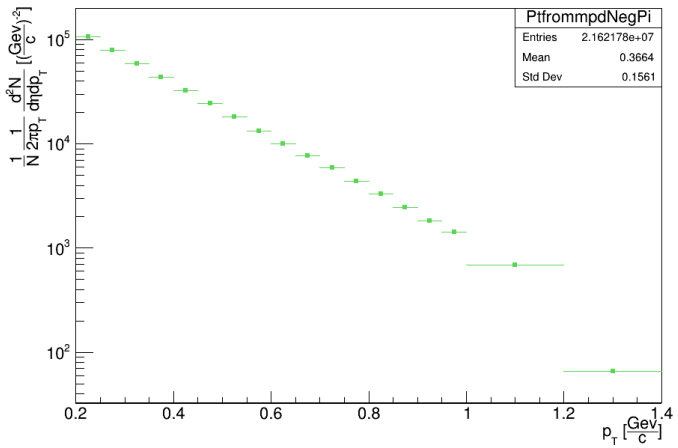
K^+ 9 GeV



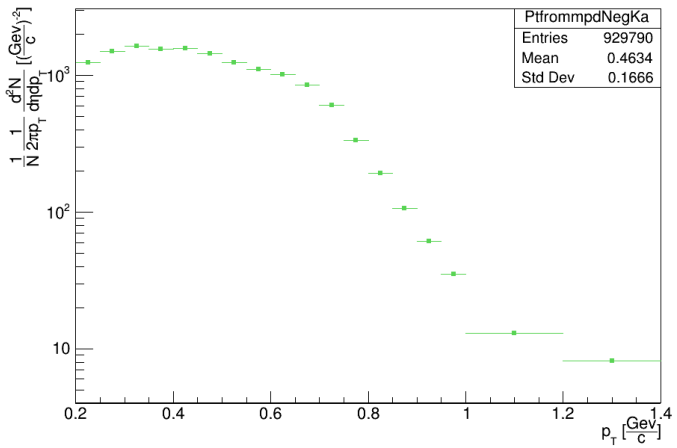
Protons 9 GeV



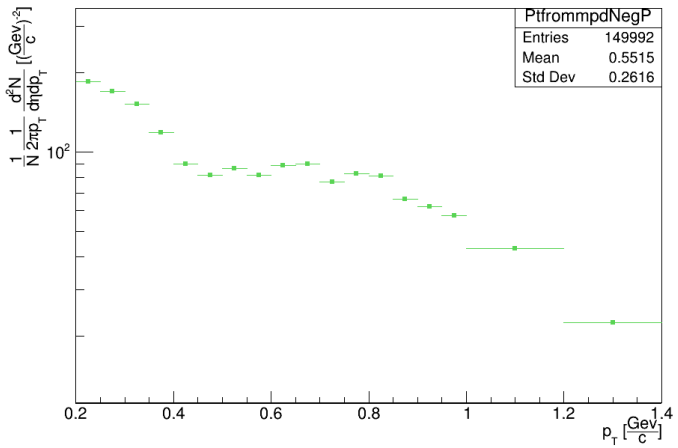
π^- 9 GeV



K^- 9 GeV



Anti protons 9 GeV



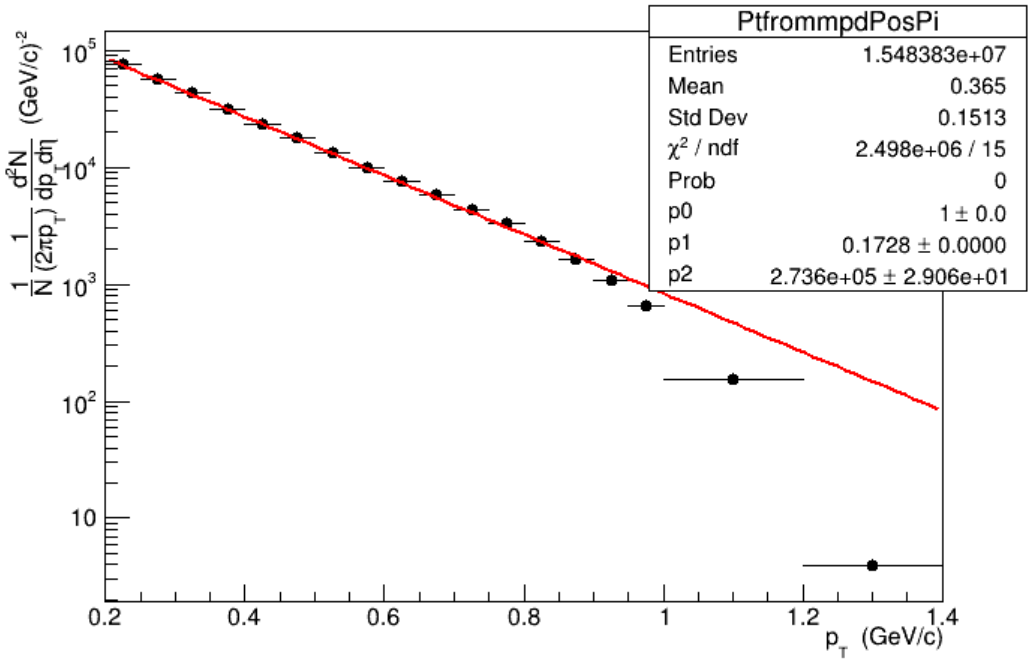
Data revealed several features:

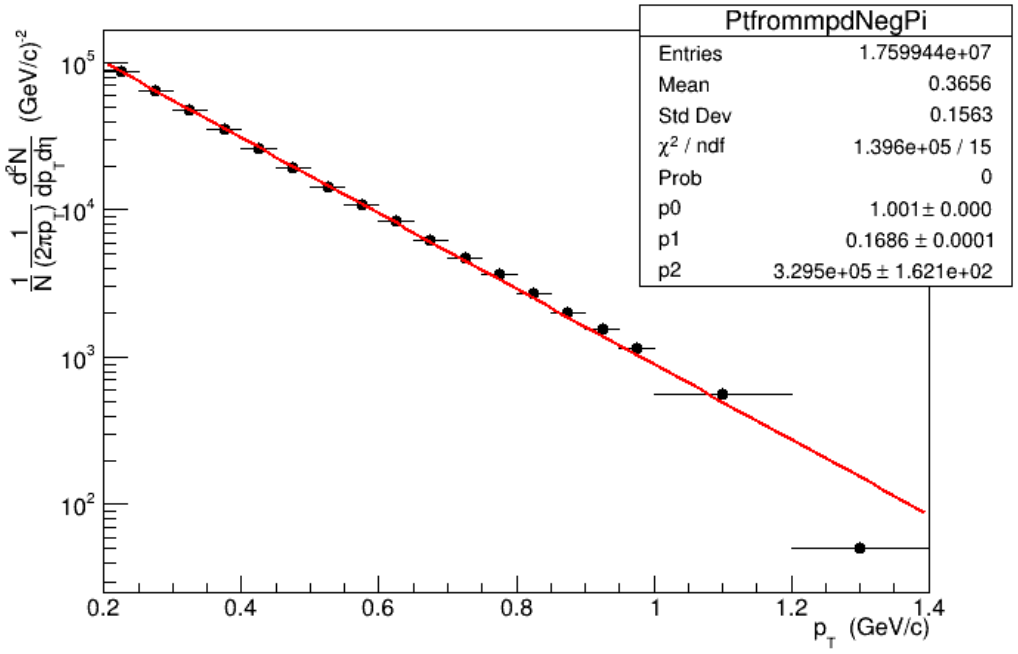
Smeared tails (kind of expected)

Two slopes in soft part (not expected) – this need careful investigation

Results of fitting spectra with Levy function

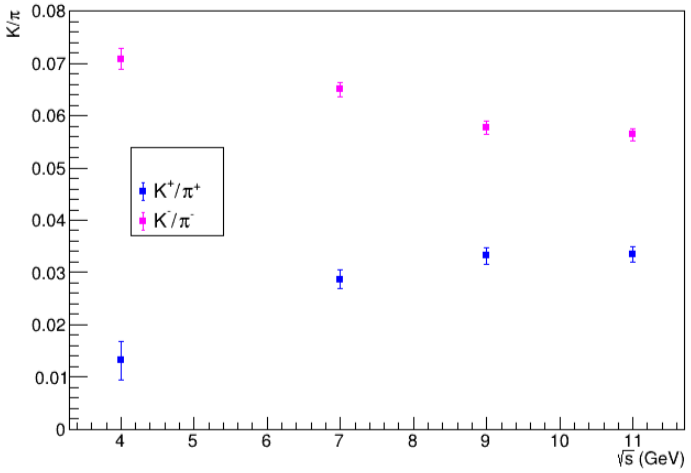
$$y = N * (1 + (q-1) * x/T)^{-1/(q-1)}$$





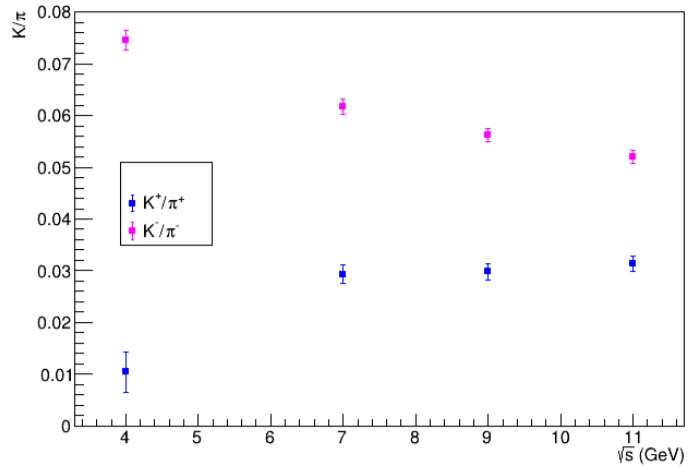
Particle ratios

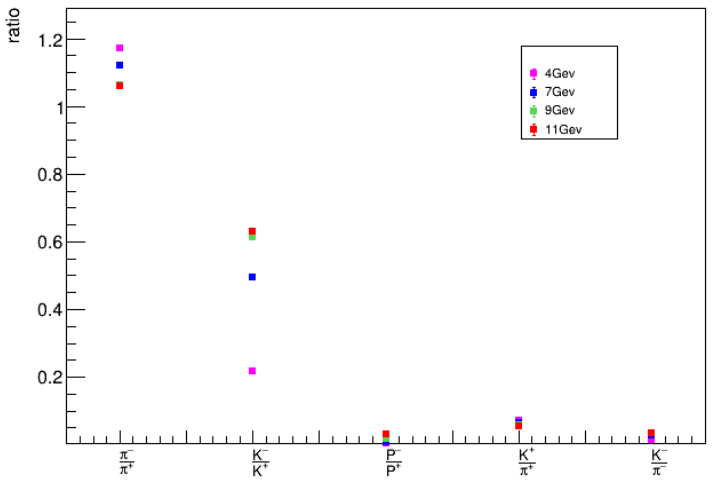
|η| < 0.5

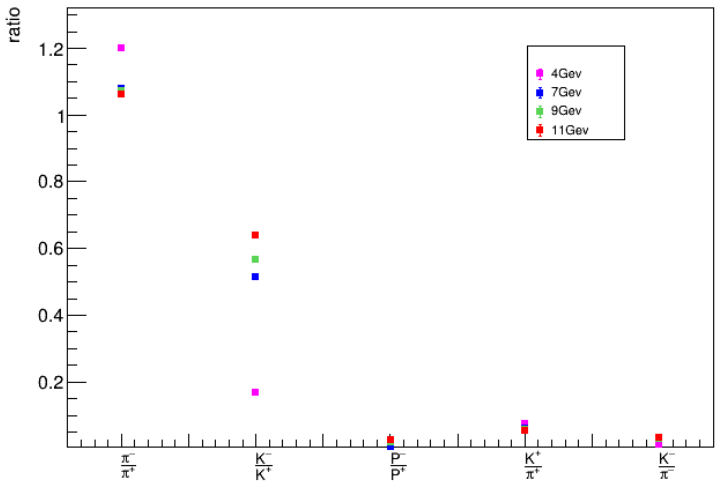


Positively charged K/π lays under negatively charged K/π
Less K+ or more π+?
Will investigate further

|η| < 0.1







Next steps and to do list

To do:

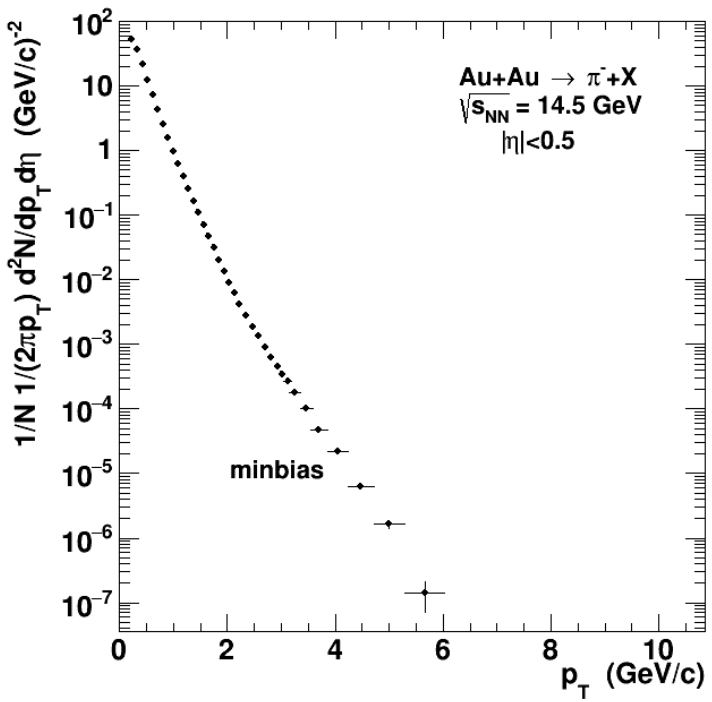
Need to choose appropriate cuts

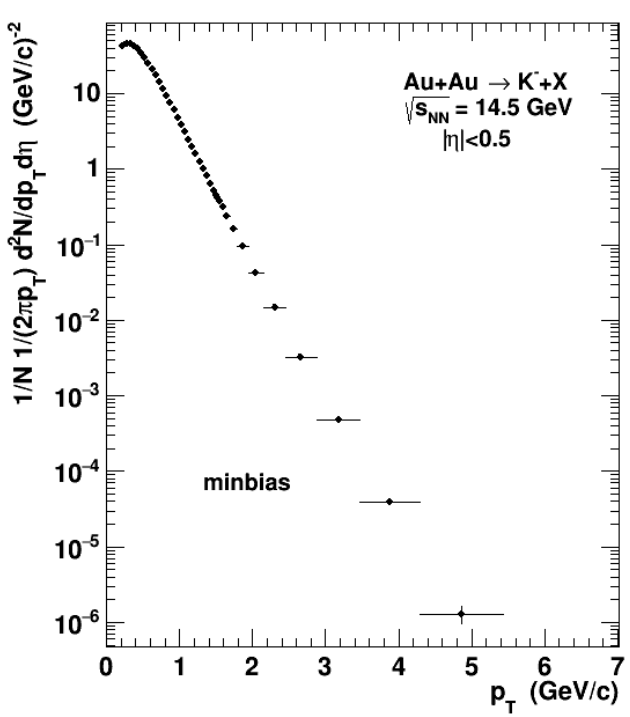
Check several models (which ones?)

Make a cross-check of the code

- Check PID efficiency
- Make adequate detector geometry
- Make proper MPDroot documentation
- Need separate queue for calculations of big statistics
- What else?

Backup slides
Raw UrQMD 14.5 GeV


Au+Au → π⁻+X
√s_NN = 14.5 GeV
|η|<0.5
minbias
1/N 1/(2πp_T) d²N/dp_T dη (GeV/c)⁻²
p_T (GeV/c)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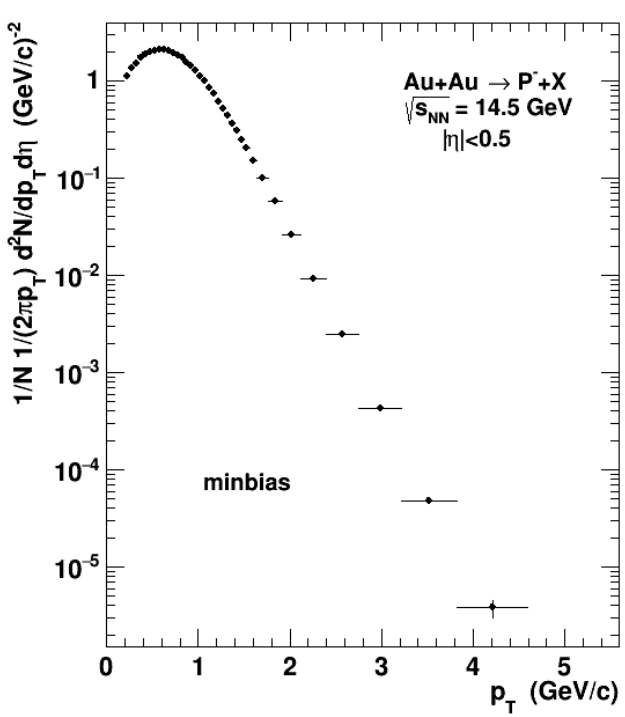
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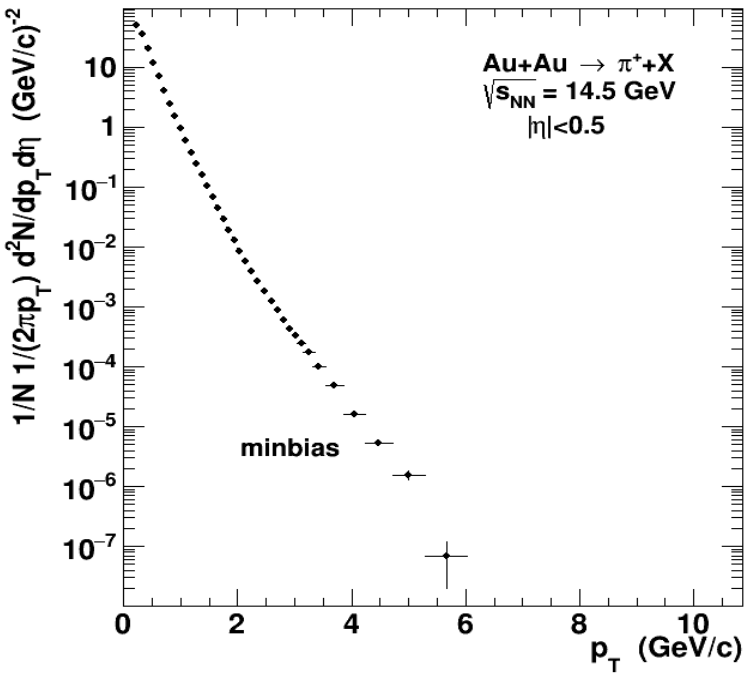
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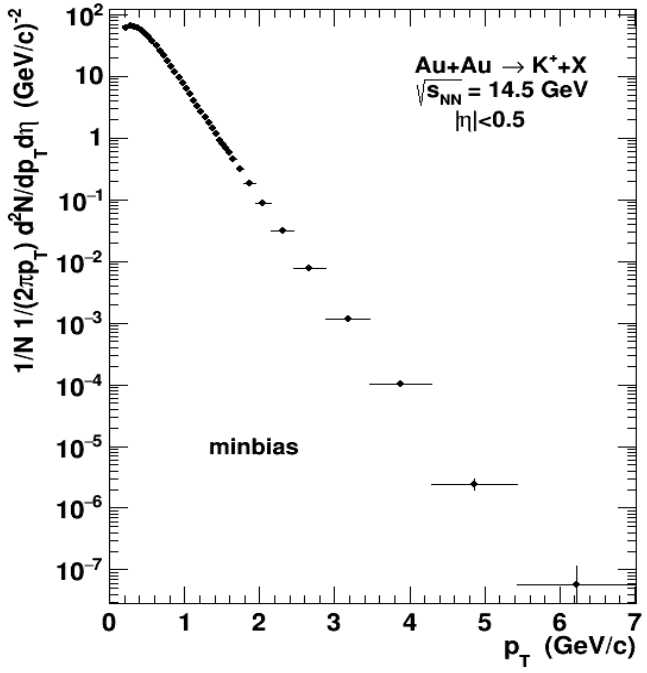
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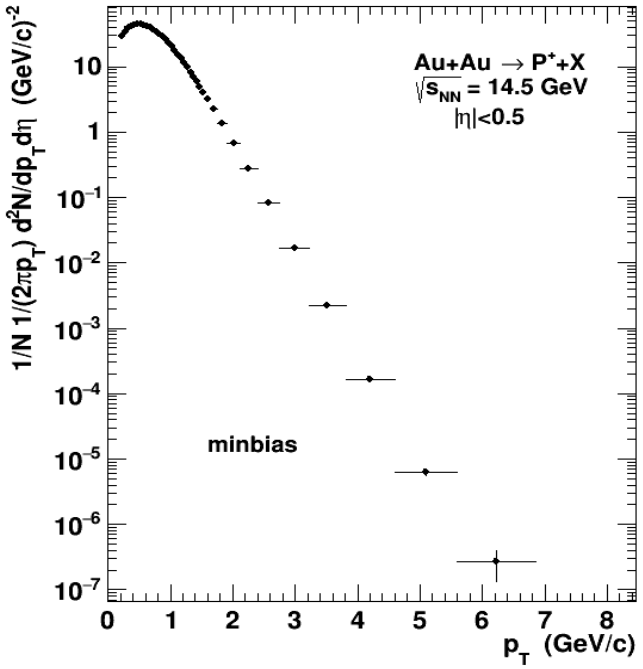
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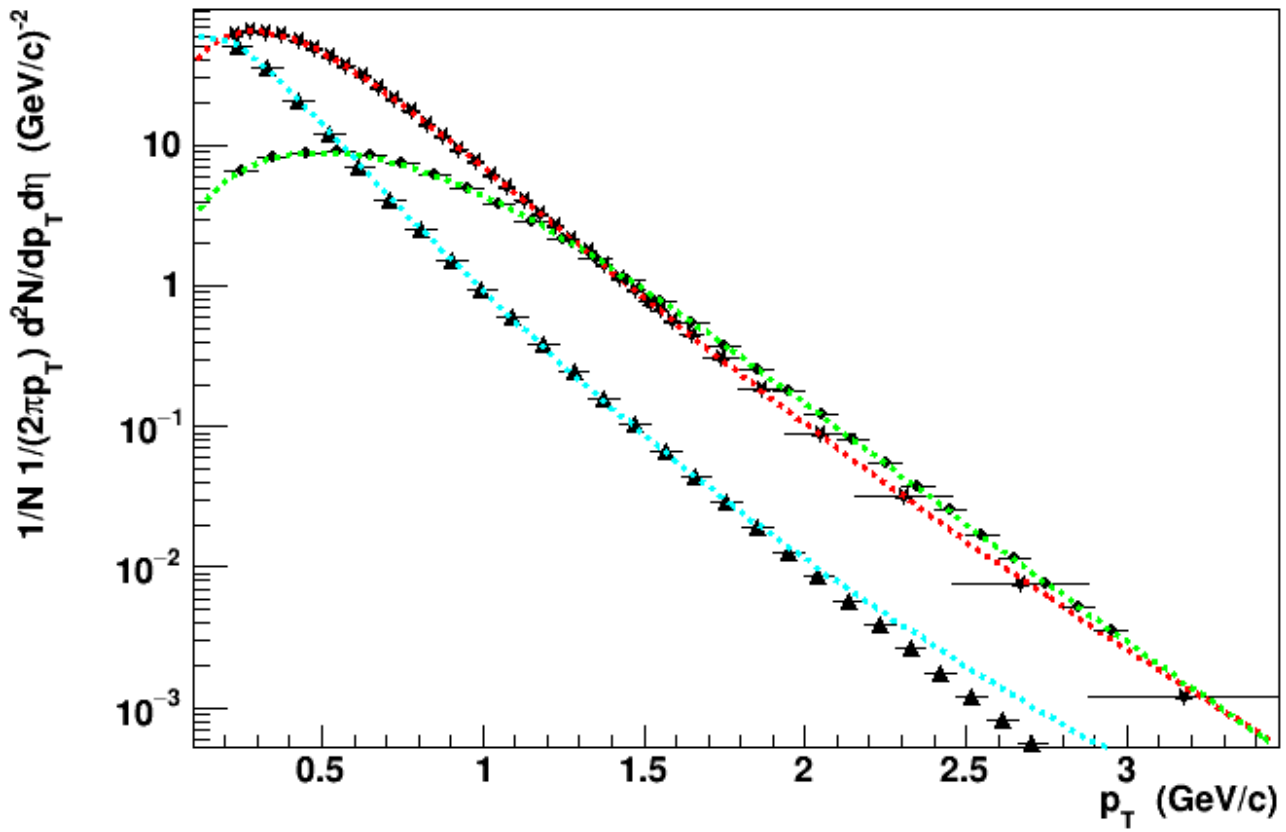
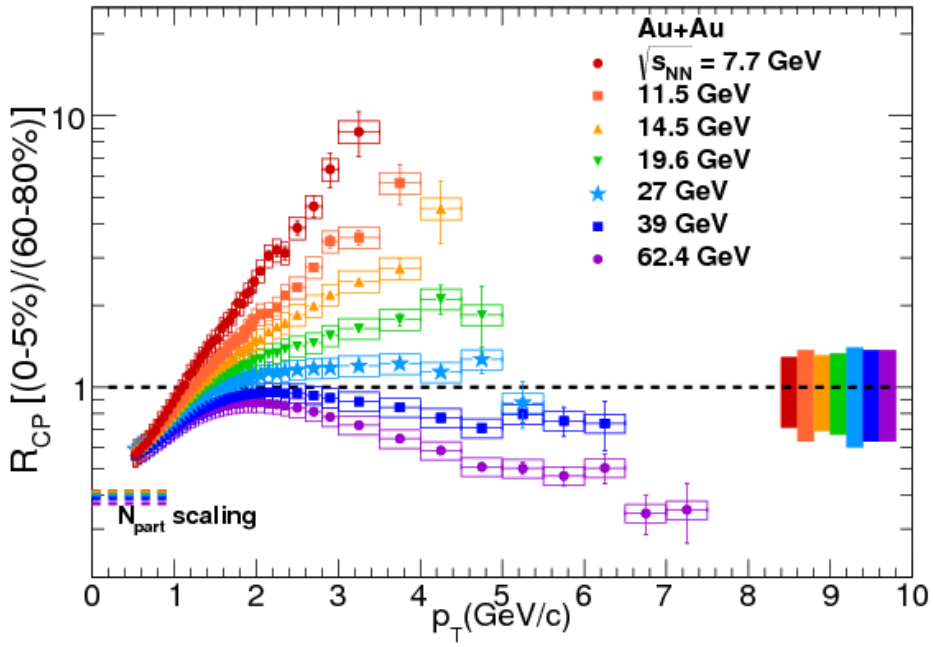

1/N 1/(2πp_T) d²N/dp_T dη (GeV/c)⁻²
10
1
10⁻¹
10⁻²
10⁻³
0.5
1
1.5
2
2.5
3
p_T (GeV/c)

Nuclear modification factor in Au-Au collisions

STAR data:



UrQMD 3.4, eos 0