Pythia and data revisited at very high multiplicity and number of events in the free Interpretation of Guy Paic

In collaboration with Aditya Mishra and Antonio Ortiz Instituto de Ciencias Nucleares, UNAM, Mexico City, Mexico



arXiv:1905.07208

INTRODUCTION

- □ The shape of the transverse spectra in pp and PbPb DO change with multiplicity
- □ The spectra with a large p_T range ~100 GeV/c cannot be fitted by exponential function neither in pp nor in PbPb with a single exponent!
- For each centrality in PbPb, I can have a corresponding spectrum in a given multiplicity (much smaller) in pp
- □ Well reproduced by Pythia but no explanation!!!??

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This is a fundamental feature of ALL collisions – a hardening of the spectra



Phys. Rev. C 99, 034911(2019) arXiv:1905.07208

THE EVOLUTION OF THE NS-TS SPECTRA

Double surprise!:

maximum p_{T}

 At high multiplicities, the very low momenta have a maximum
 At high multiplicities, the spectra are higher and do not reach the



The transverse momentum spectra have a strange behaviour both for pp and PbPb

by the spectra example a reasonable scaling into account the quark

gluon differences in energy loss calculations!!!

2D PLOTS MULTIPLICITY VS PT LEADING

Observation: There is a marked multiplicity range for the maximum p_T of particles. This maximum lies at ~ 50-60 particles in the $|\eta| < 0.8$

The correlation between maximum p_T and multiplicity is broken above M>60



NS in bins of Rt for MBnevents p_T is the largest for the 40-50 multiplicity!



THE TS SPECTRA RISE STRONGLY WITH MULTIPLICITY!

ANOTHER PIECE OF INTEREST THE ΣP_T VS MULTIPLICITY?!

□ Spectra above 10 GeV/c for 3 multiplicities corresponding to multiplicities below, at and above the multiplicity for the highest p_T reach



A TEASER FOR THEORISTS (PYTHIA)

When you generate more than ~10¹⁰ events you start seeing strange horns in the 2D plots! These are very rare events. Real? Fake?



The highest multiplicities have not the highest Σp_T !!!

FURTHER DISSECTING – THE SELECTION IN FUNCTION OF R_T AND MULTIPLICITY

- The multiplicity vs R_T (the multiplicity in the transverse side is shown:
- □ As we go up in multiplicity the tracks in the TS rise
 □ We take slices in M and R_T



Lets see whether the underlying event structure with multiplicity can help us

THE DETAILED BEHAVIOUR

□ The events have been investigated in the usual underlying event treatment, with the distinction that we report transverse momentum spectra in the transverse side (TS) and the difference of the spectra in the near side (NS) and the TS ones so we define the hard spectra as NS-TS



THE R_T CUTS IN MB SPECTRA

TS in bins of Rt for MB events

NS in bins of Rt for MB events



Note the slow rise of the NS spectra and very rapid rise of TS spectra!