



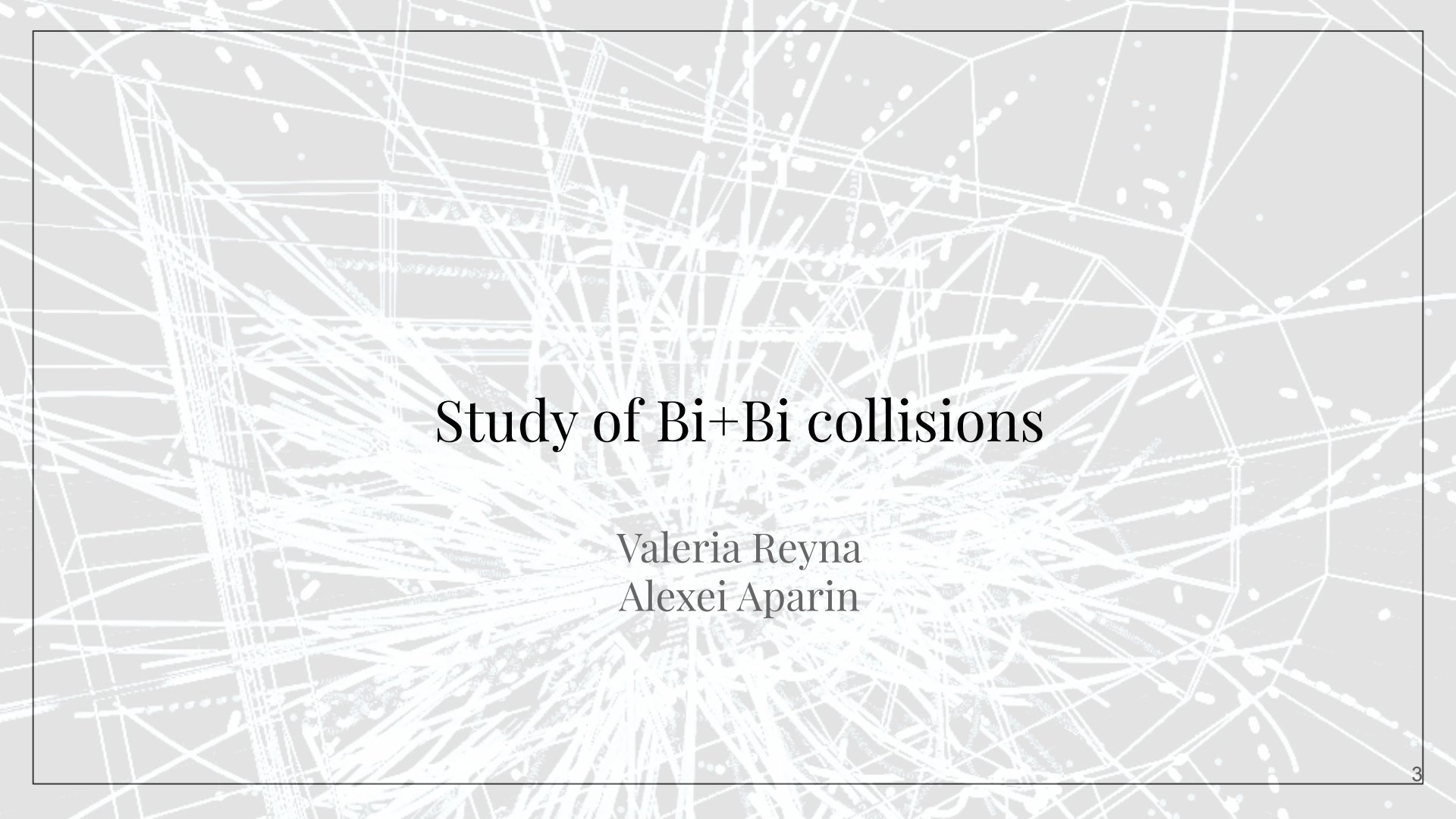
MexNICA collaboration winter Meeting 2020

Study of the Bi+Bi & p+p collisions
for the MPD/NICA

Valeria Zelina Reyna Ortiz

Index

- Bi+Bi collisions:
 - Interest program
 - Project Goals & Data sets
 - Transverse momentum distribution over centrality ranges
 - Efficiency results for TPC
- p+p collisions
 - Data set description
 - Multiplicity Distribution
 - $\langle p_T \rangle$ vs $\langle N_{ch} \rangle$
 - TPC MC vs Reco



Study of Bi+Bi collisions

Valeria Reyna
Alexei Aparin

The Interest program

INTERNational REMote Student Training at JINR

Wave 2 Novembre 02 - Dec 11

Official web page: <http://interest.jinr.ru/>



Register

Register on the website by clicking the REGISTER button and filling in the registration form. Afterwards, please check your e-mail for further instructions.



Choose a project and apply

Our programme runs in Waves. Each Wave has a fixed starting date and lasts for 4-6 weeks, depending on your agreement with the project supervisor. Therefore, choose a Wave. Select one or several projects that fit your field of interest and can be most beneficial for your work, thesis, etc. Read the project description and skill requirements carefully. Fill in the motivation box and press APPLY.



Get selected

Wait for the selection results that you will receive by email together with further instructions 5 days before the Wave starting date. You may be accepted only on one of the projects that you have chosen. The selection results will also be posted in the Wave section 5 days before the Wave starting date.



JINR



Project Goals

- To analyze Bi-Bi collisions at energies of $\sqrt{s} = 7, 9, 9.46 \text{ \& } 11 \text{ GeV}$; from statistical data using UrQMD Monte-Carlo generator for the MPD detector.
- Plot the particle outputs as function of the transverse momentum for the identified hadrons: kaons, pions, protons.

[2] Au+Au results

[3] The XXIV International Scientific Conference of Young Scientists and Specialists

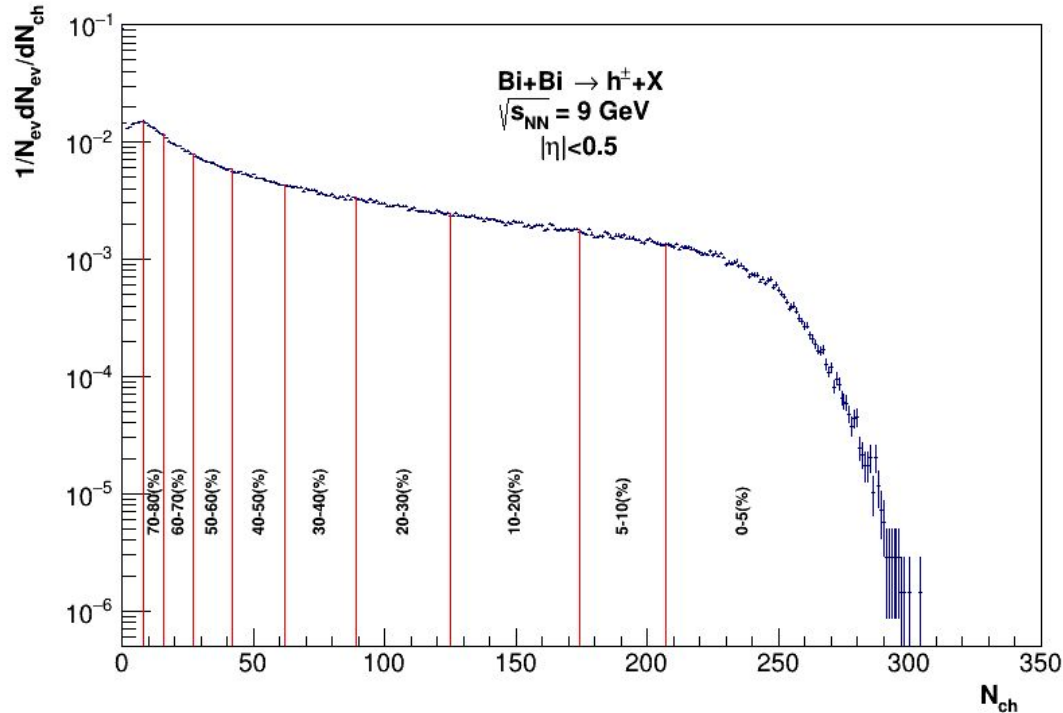
About the data sets

For the analysis we used the Monte-Carlo official data from the MPD/NICA collaboration which are located at the NICA LHEP offline computing cluster [4]. Using the available data of UrQMD at the center-of-mass energy range: $\sqrt{s} = 7.7, 9, 9.46$ GeV for Bi+Bi collisions and statistics of 5×10^5 events for each energy & 11 GeV BiBi collisions from the ICN online cluster at 100,000 events.

The particle outputs were plotted as function of the transverse momentum for the identified particles (kaons, pions and protons) for different collision energies. The following conditions were imposed on the spectra:

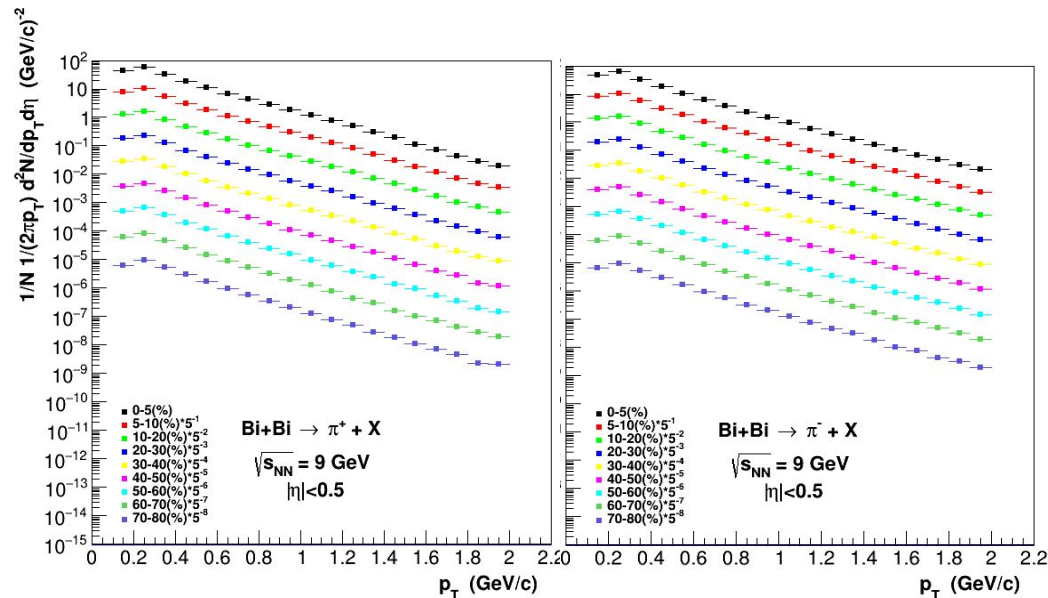
- TPC NofHits > 20;
- $|\eta| < 0.5$,
- $0.1 < p_T < 2.5$ GeV.

Multiplicity of particles in collision



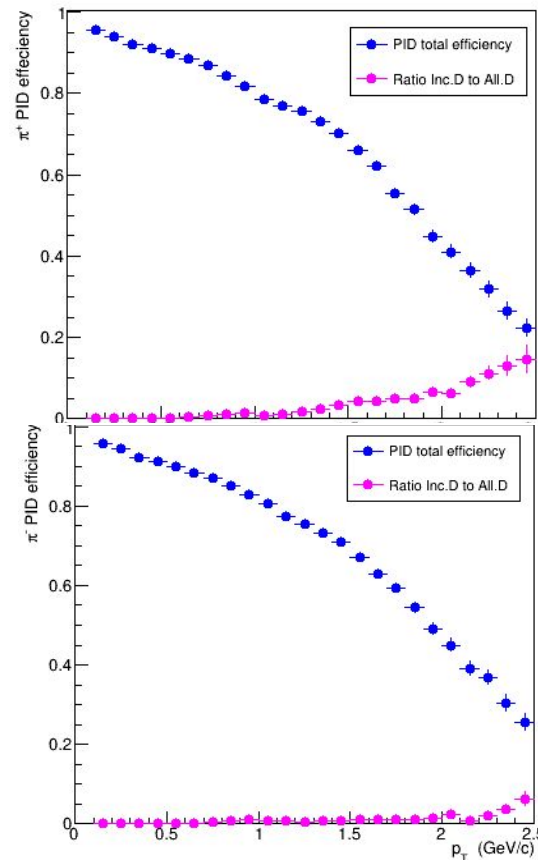
The centrality of collisions between interacting nucleon pairs determines the overlap region of colliding nuclei and is related to the impact parameter.

Yields π for different centrality classes and efficiency

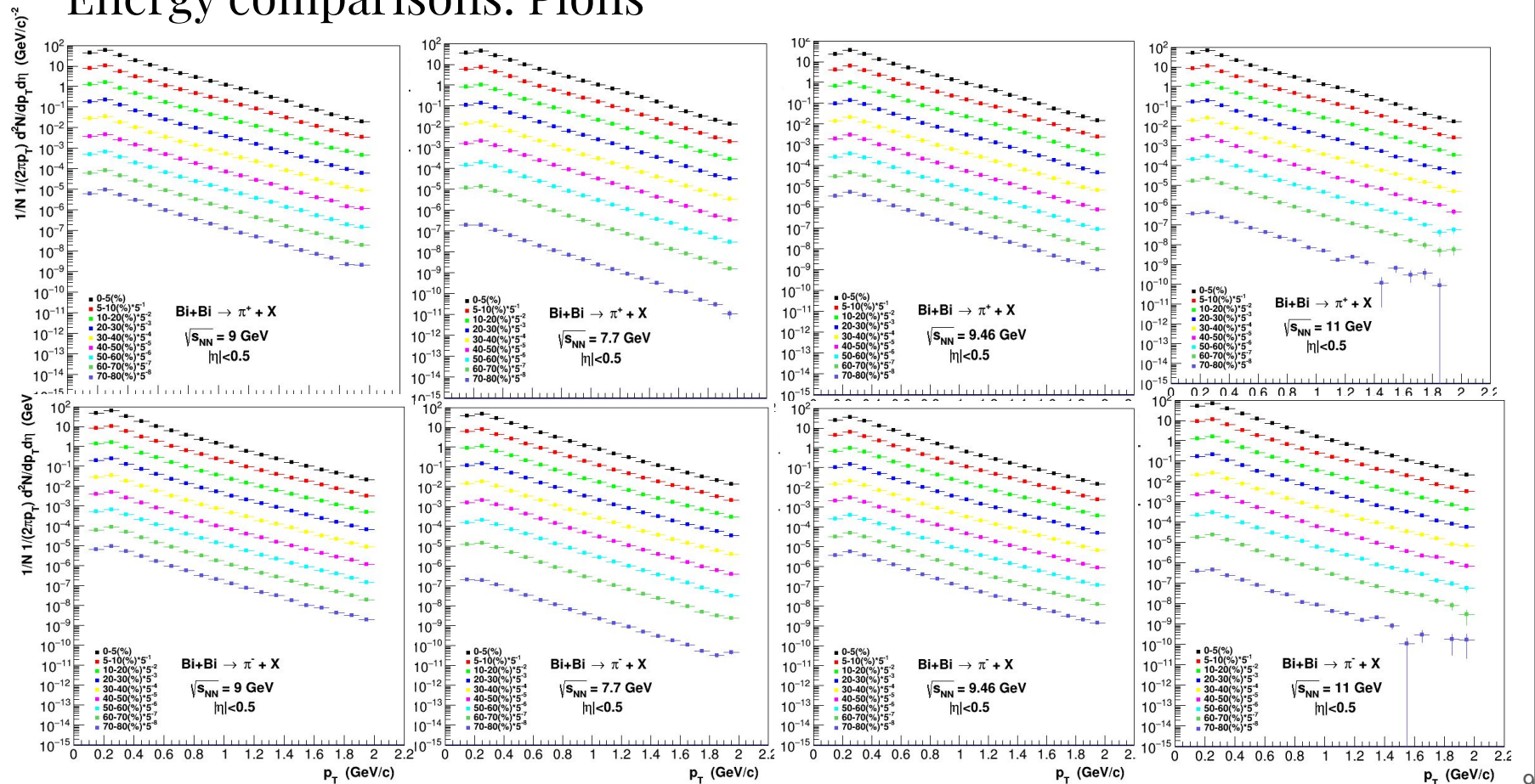


The graph on the left shows the outputs of π for different centrality classes.

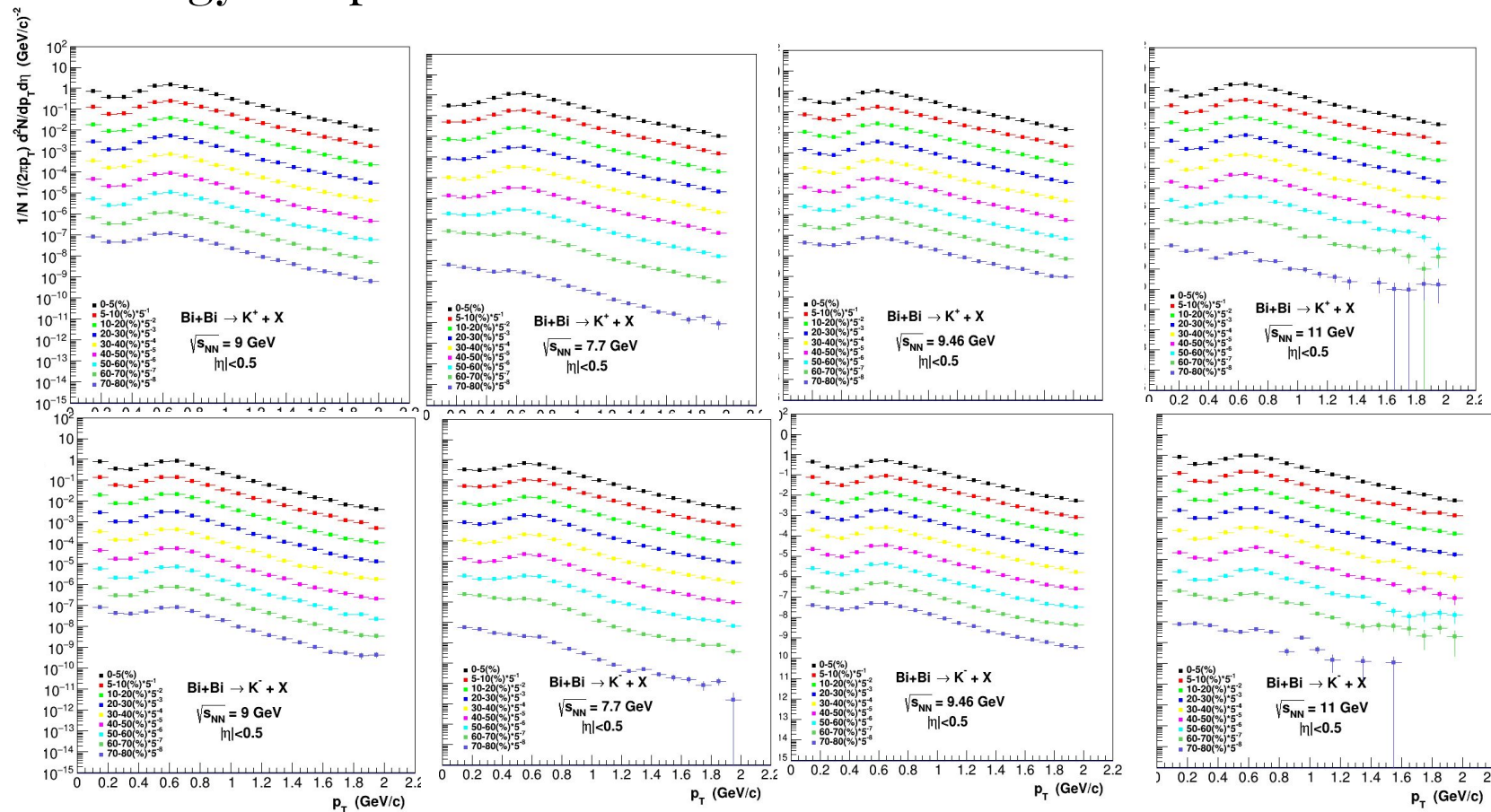
The graph on the right shows the pid total efficiency (blue), the ratio of incorrectly defined particles to all defined ones (magenta).



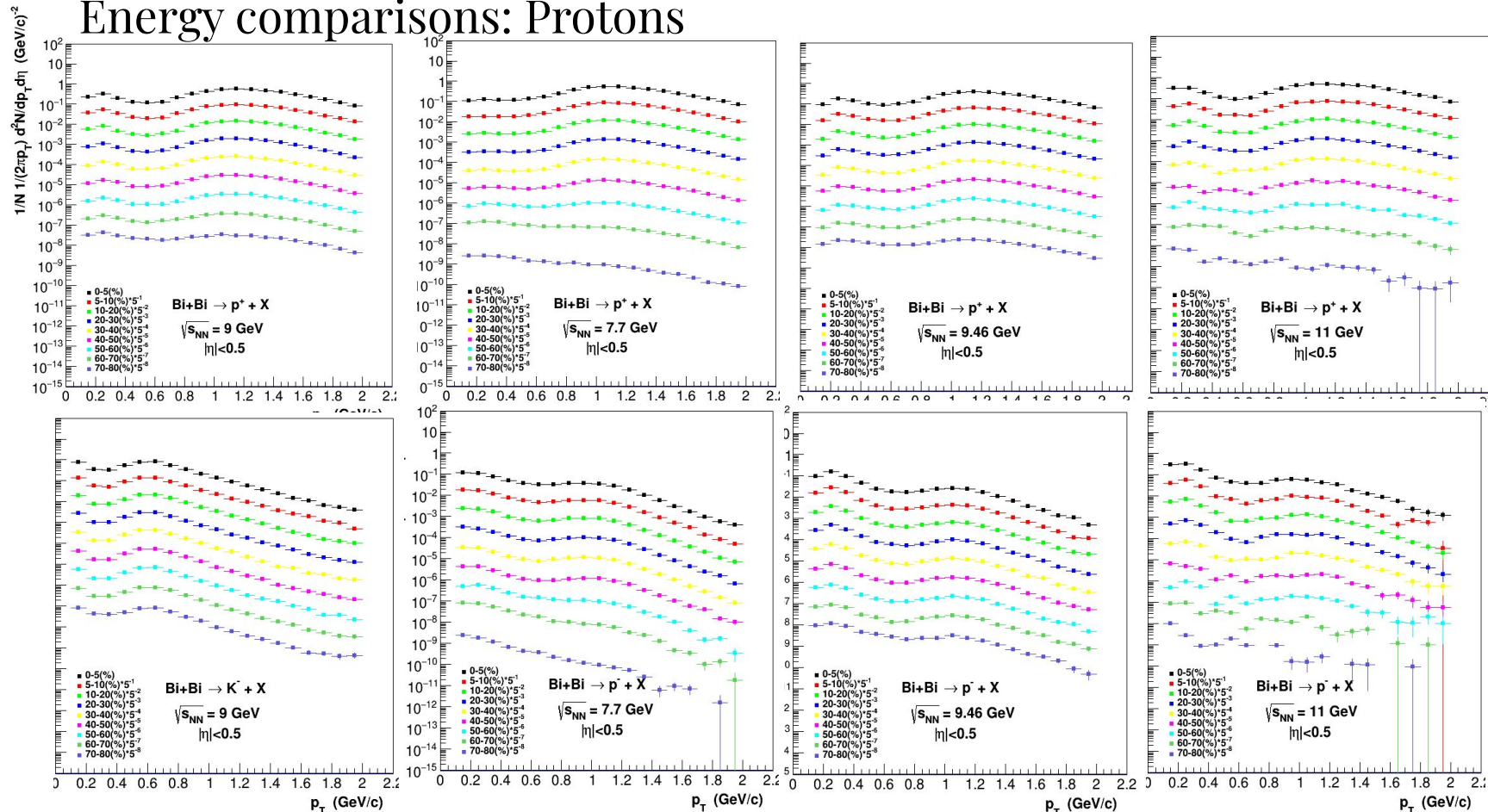
Energy comparisons: Pions



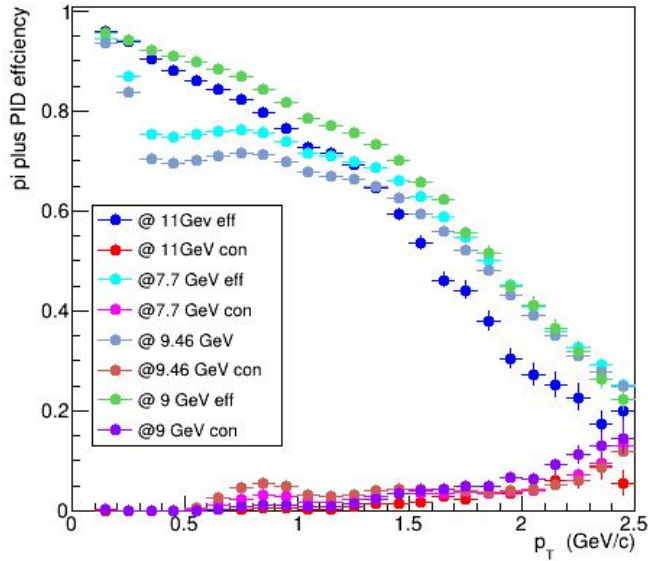
Energy comparisons: Kaons



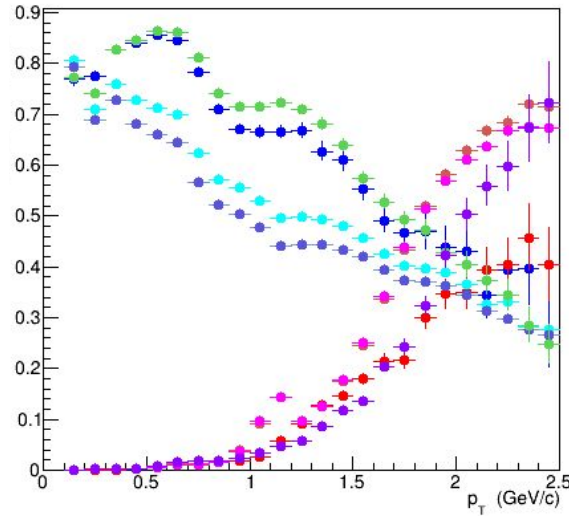
Energy comparisons: Protons



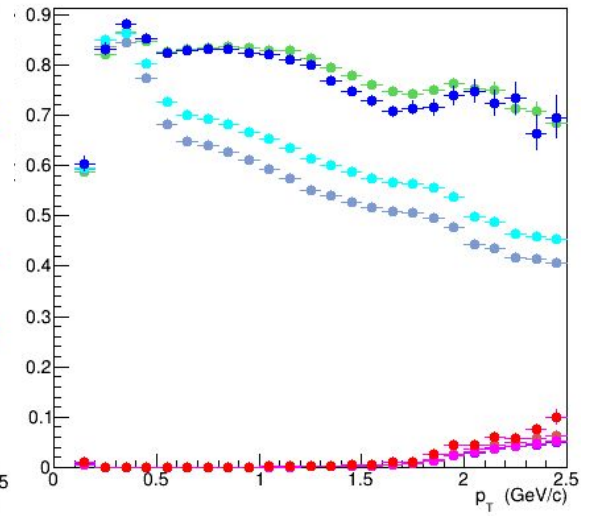
Efficiency: Positive Charged particles



Pions

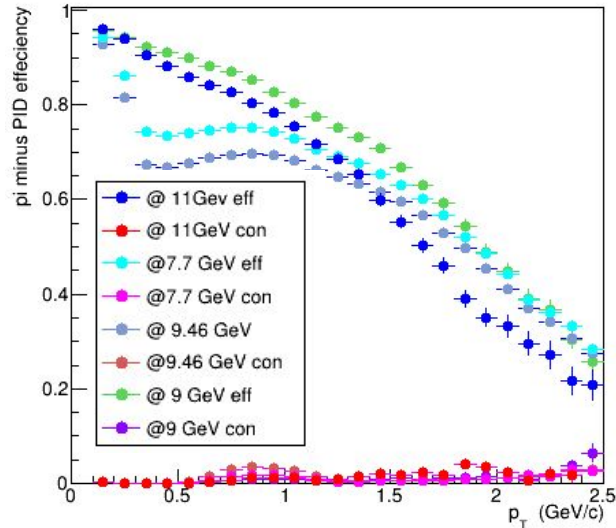


Kaons

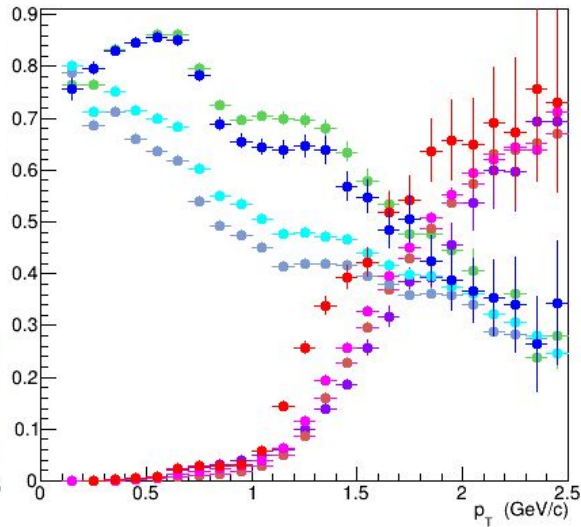


Protons

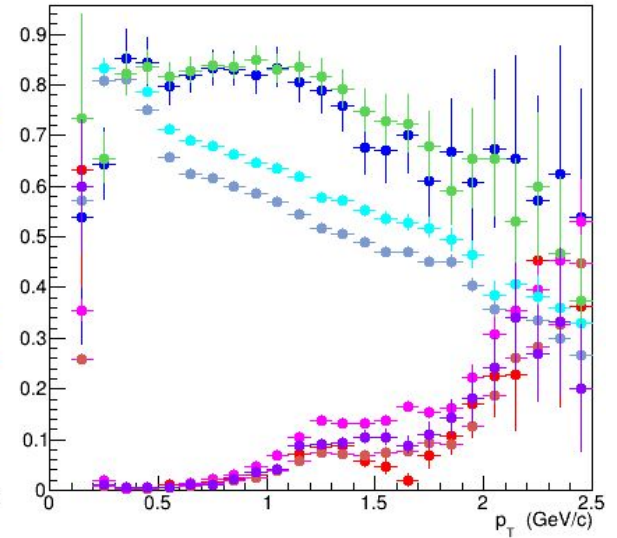
Efficiency: Negative Charged particles



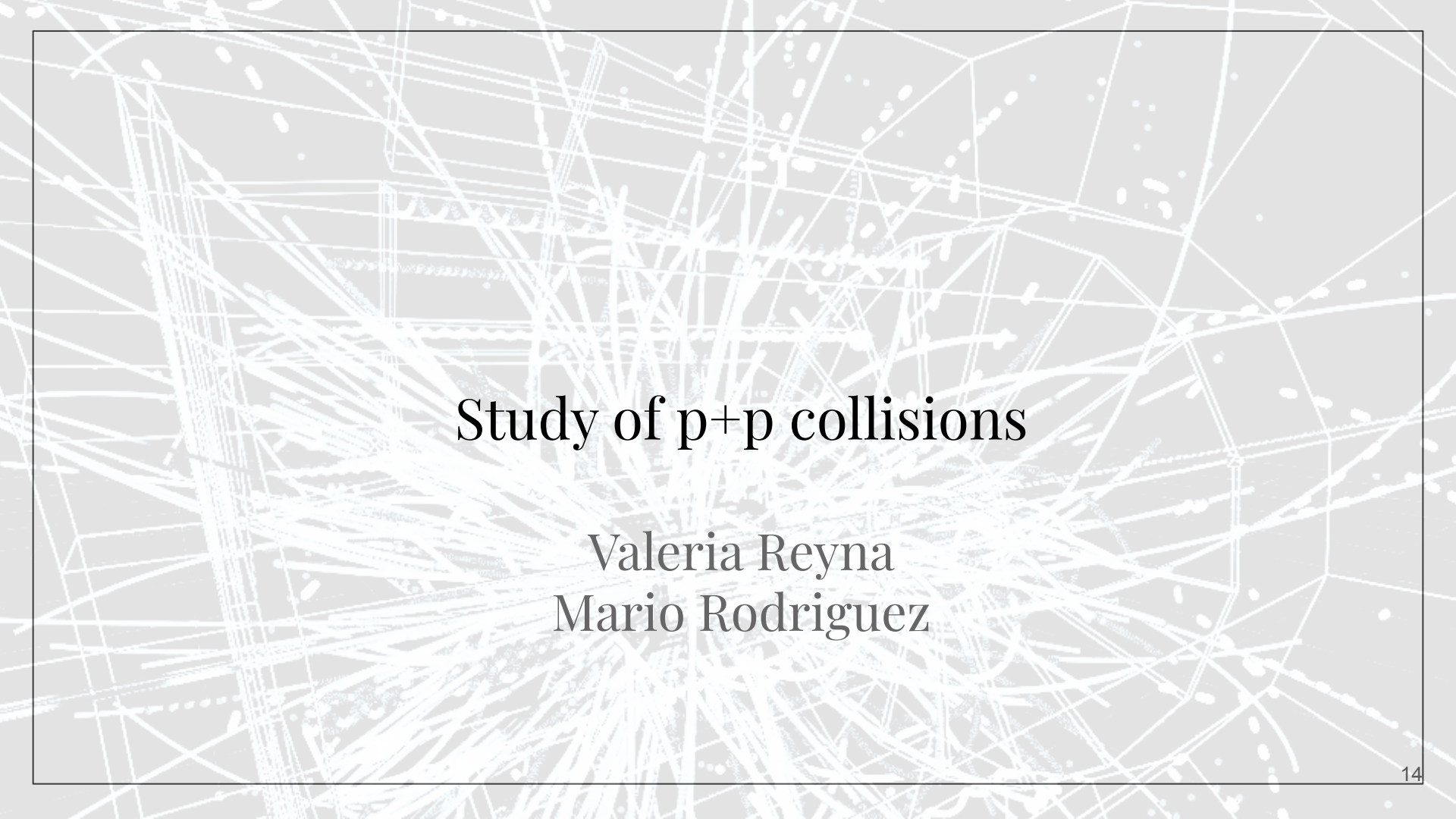
Pions



Kaons



Protons

The background of the slide is a complex, abstract visualization of particle collisions. It features a dense network of white lines and dots on a light gray background. The lines radiate from a central point, creating a starburst effect, and are interspersed with clusters of small dots, suggesting the paths and interaction points of particles in a high-energy collision.

Study of p+p collisions

Valeria Reyna
Mario Rodriguez

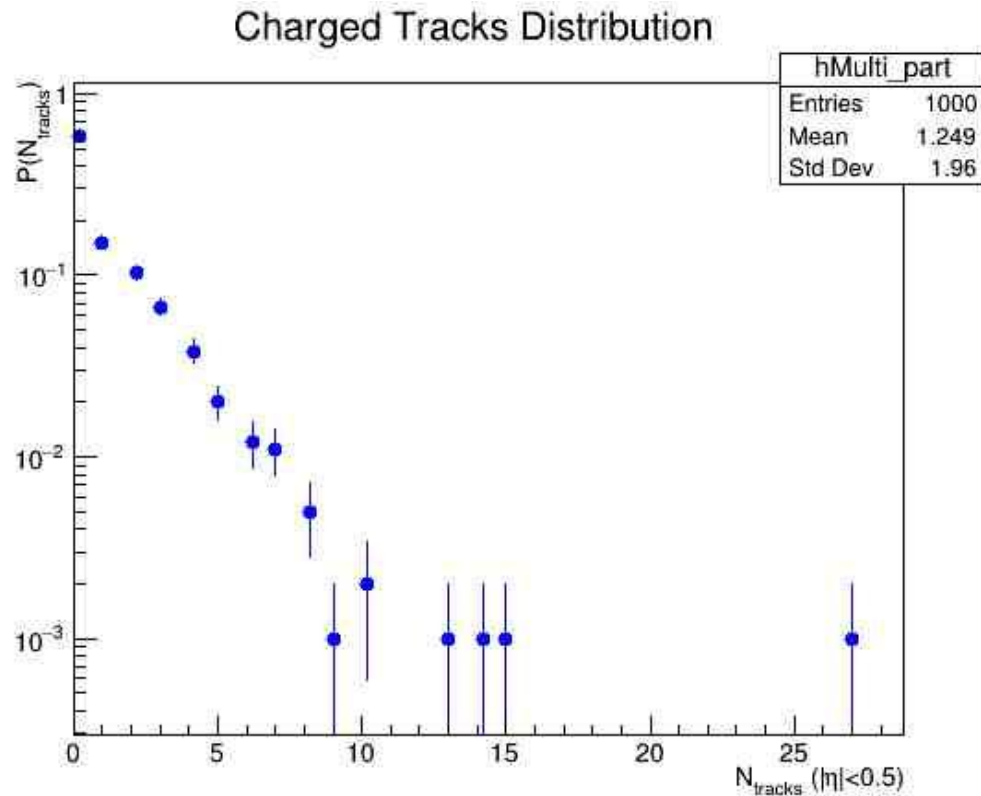
Reconstructed Tracks

MC description:

- 1000 events - UrQMD
- 10 GeV
- Tree: reconstructed
DST.root

Restricted to:

- Charged Tracks
- $|\eta| < 0.5$
- TPC,



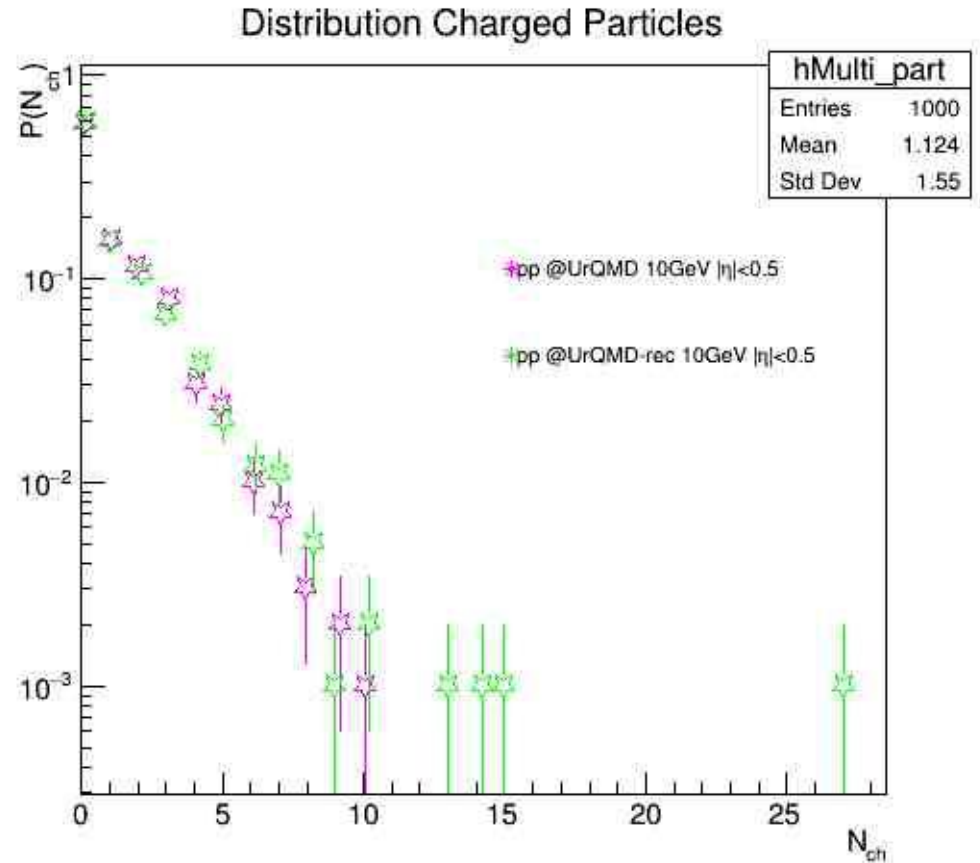
Reconstructed Tree compared with Urqmd Tree

MC description:

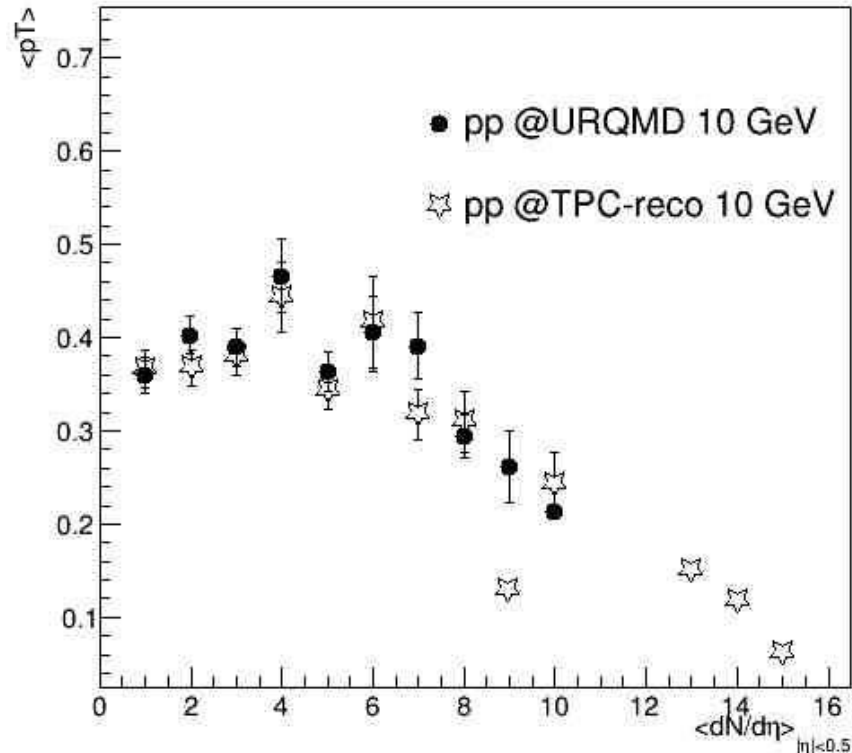
- 1000 events - UrQMD
- 10 GeV
- Same UrQMD production compared to after reconstruction data.

Restricted to:

- Charged Tracks
- $|\eta| < 0.5$



$\langle p_T \rangle$ vs $\langle N_{ch} \rangle$ Rec



Comparing with UrQMD 10GeV 1000 Events
(same urqmd production before reconstruction)

- Descending p_T tendency for particles & tracks
- Reco-Tree has some events with 0 tracks
- Similar points, error bars justify some of the differences,
- Reconstruction finds more points (why?)

Thank you!



References

- [1] Interest official page: <http://interest.jinr.ru/index.php>
- [2] **Investigation of the beam energy dependence of particle production in gold collisions at MPD energy region:** <https://indico.jinr.ru/event/1119/contributions/10494/>
- [3] The XXIV International Scientific Conference of Young Scientists and Specialists (AYSS-2020): <https://indico.jinr.ru/event/1119/>
- [4] Monte Carlo Data list for the MPD experiment: <https://mpdforum.jinr.ru/c/MCProd>