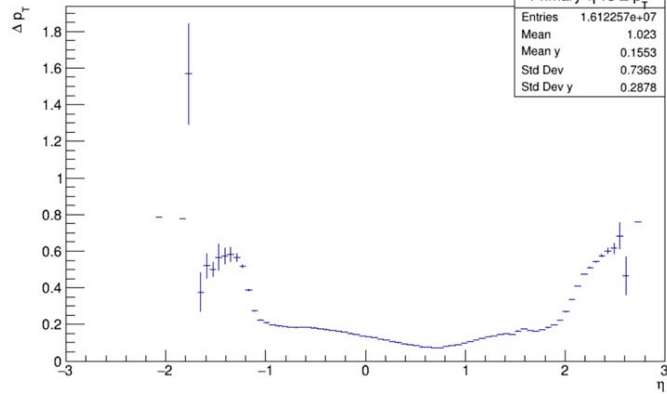




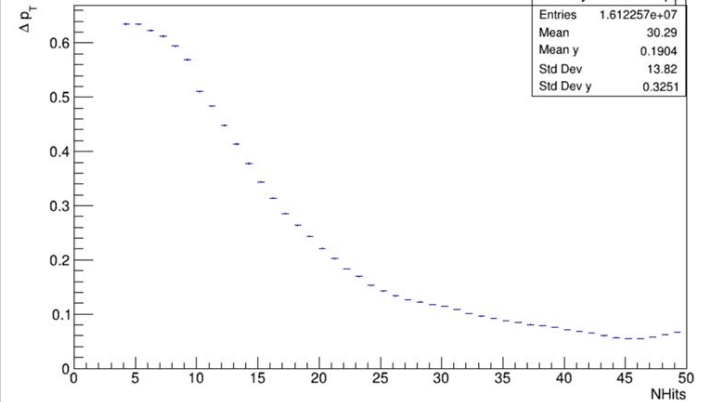
Centrality estimation in the Fixed Target Mode

Primary p_T resolution distributions

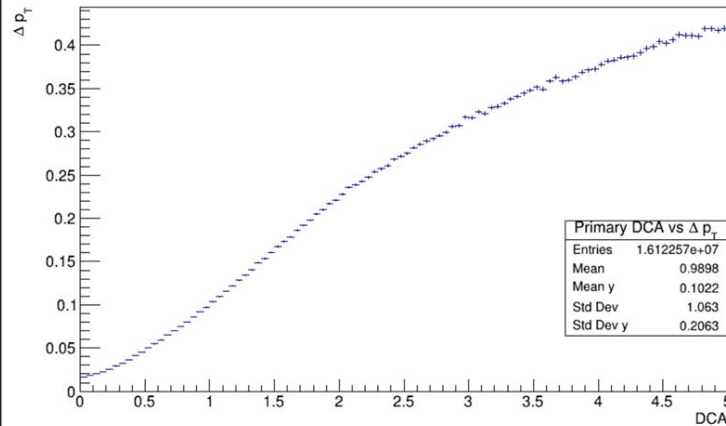
Primary η vs Δp_T



Primary NHits vs Δp_T



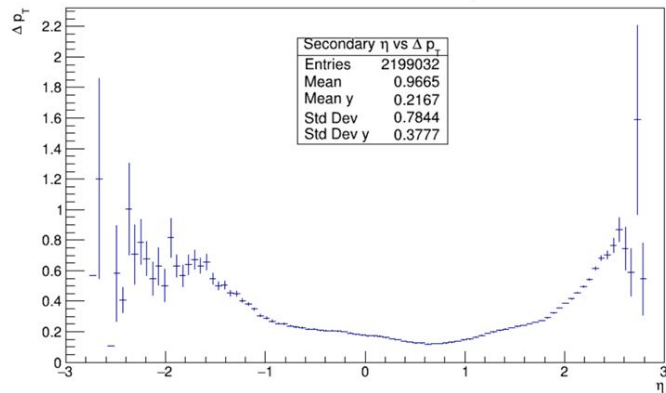
Primary DCA vs Δp_T



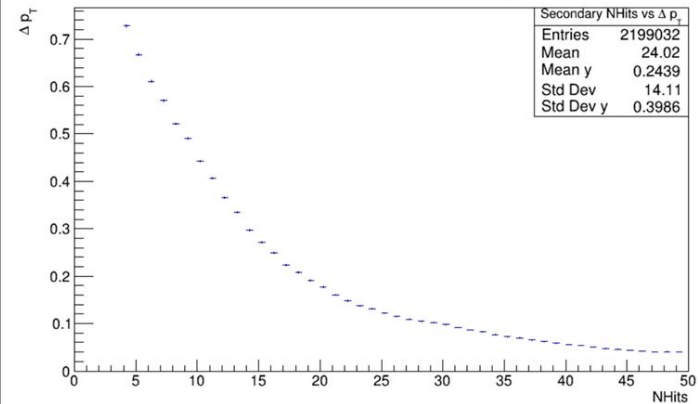
Cuts:
MCTracks > 304
RecoTracks > 3

Secondary p_T resolution distributions

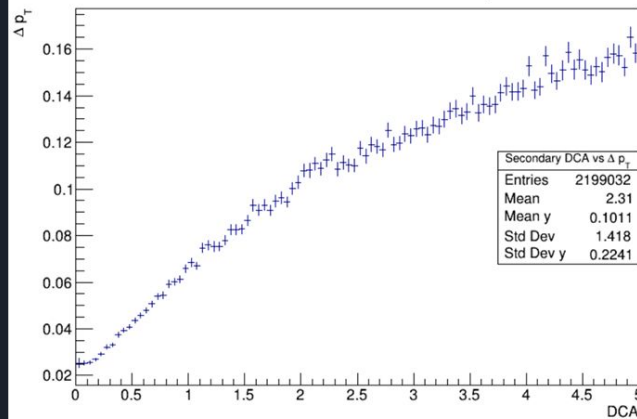
Secondary η vs Δp_T



Secondary NHits vs Δp_T



Secondary DCA vs Δp_T



Cuts:
MCTracks > 304
RecoTracks > 3



Cuts

Cuts used

η in $[-1,2]$

$DCA \leq 2$

$N_{hits} \geq 20$

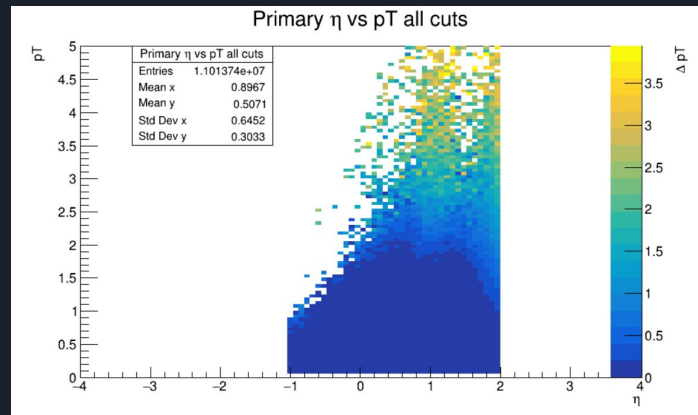
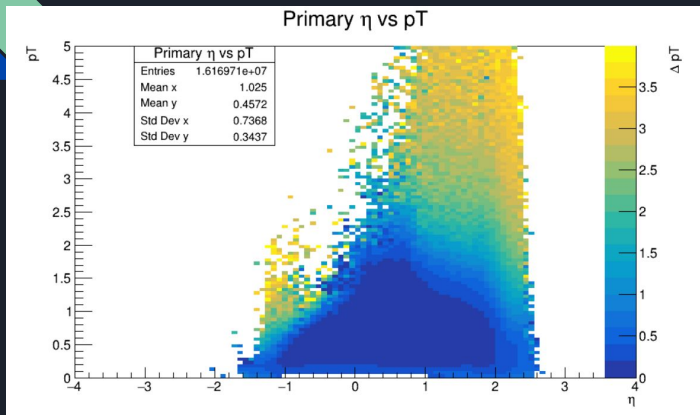
Number of events: 384,800

Reconstructed data

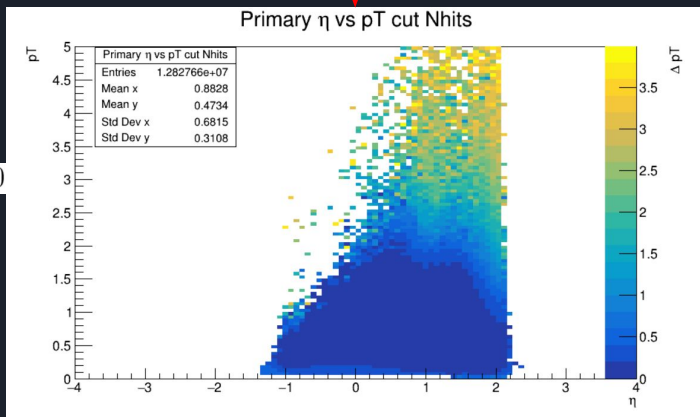
ncx cluster route:

`/scratch1/maldonado/FXT/SIM_85_XeW_2.5GeV/`

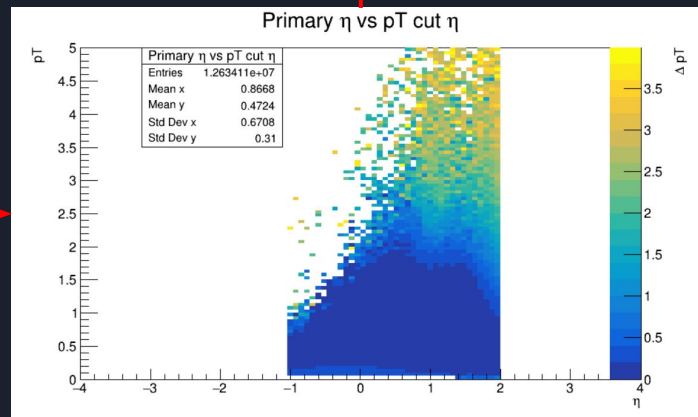
Primary eta vs pT distributions



$N_{hits} > 20$
 $\eta \in (-1, 2)$
 $DCA < 2cm$

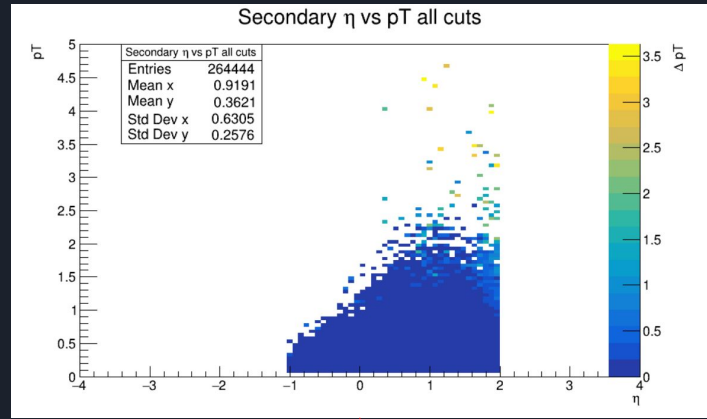
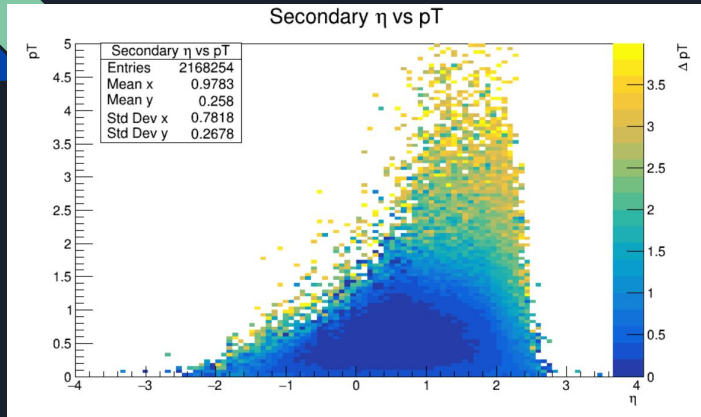


$N_{hits} > 20$

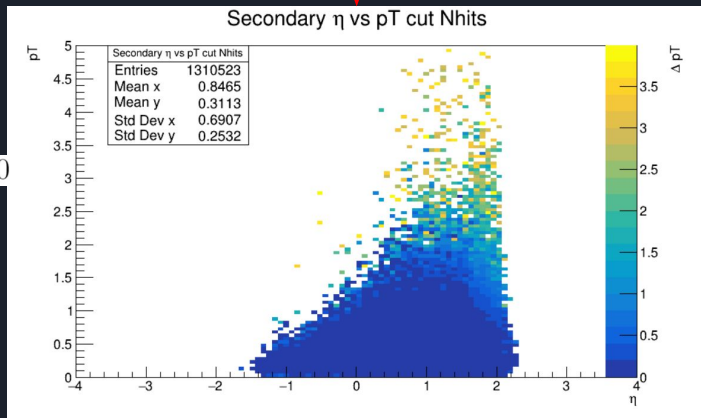


$N_{hits} > 20$
 $\eta \in (-1, 2)$

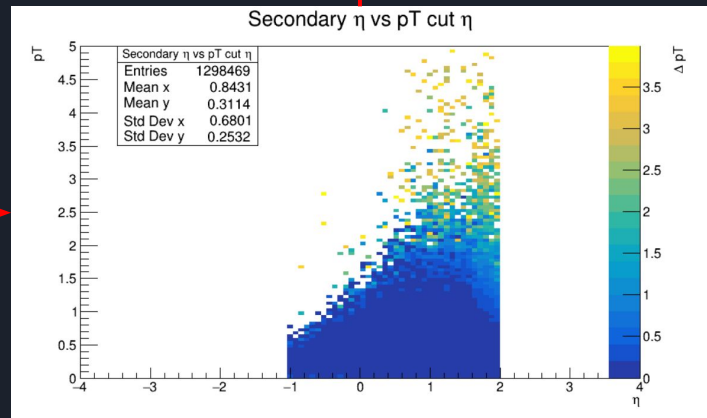
Secondary eta vs pT distributions



$N_{hits} > 20$
 $\eta \in (-1, 2)$
 $DCA < 2cm$

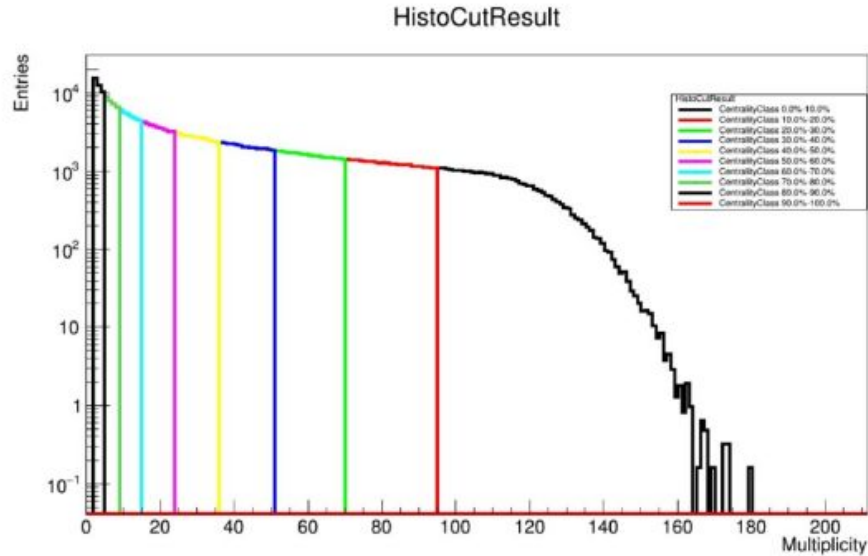


$N_{hits} > 20$

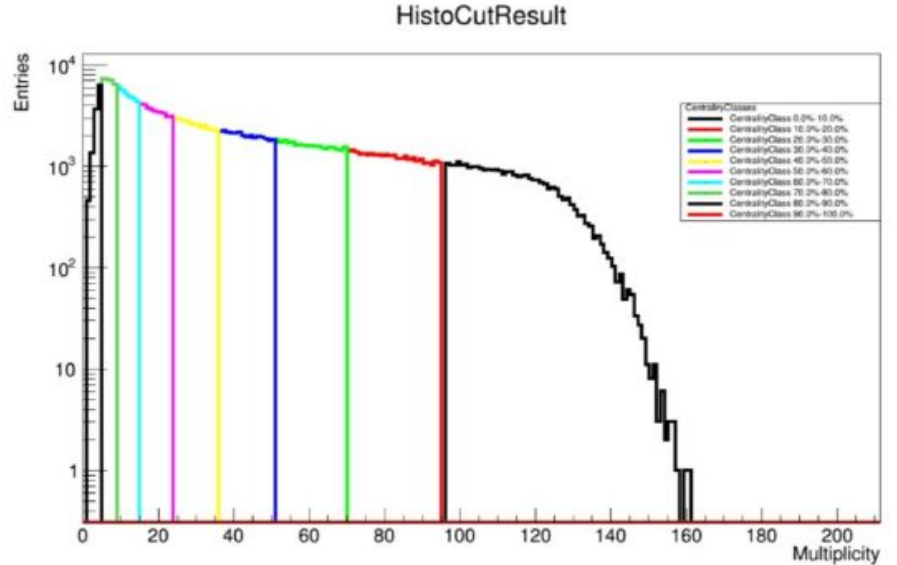


$N_{hits} > 20$
 $\eta \in (-1, 2)$

MC Glauber Results

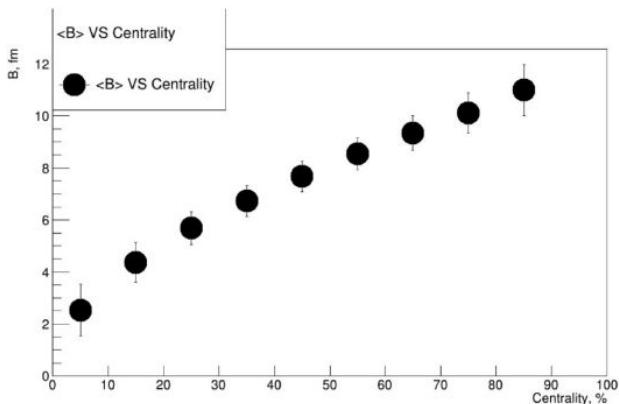


(a) Multiplicity fitted function

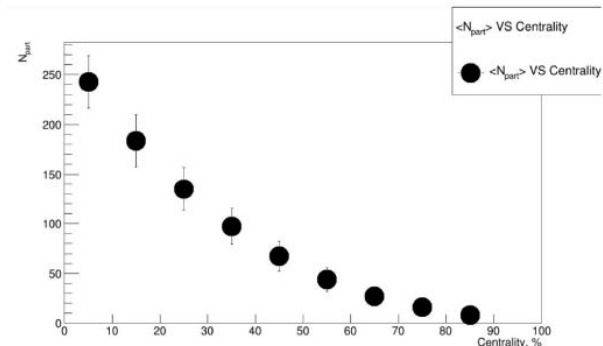


(b) Multiplicity input distribution

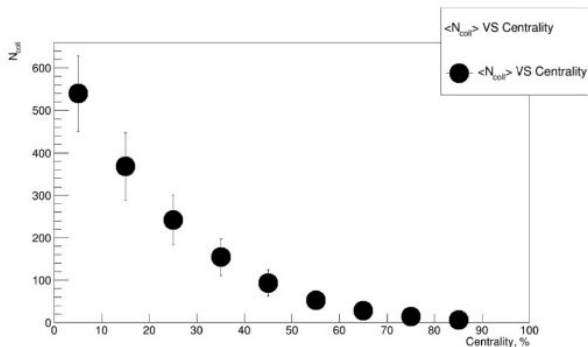
MC Glauber Results



(a) Mean impact parameter vs Centrality

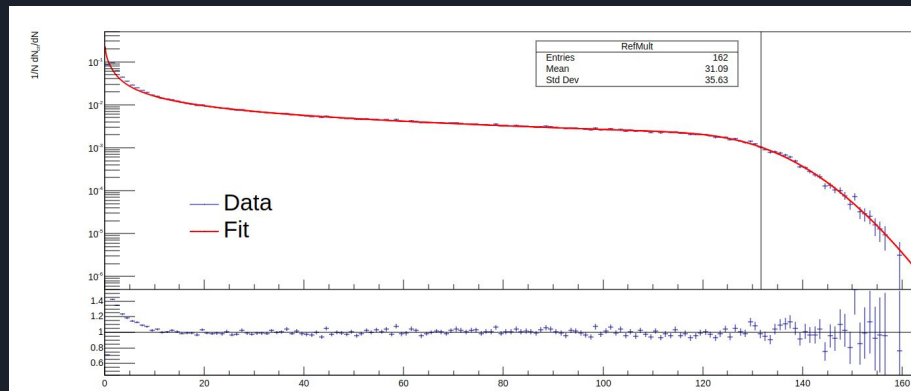
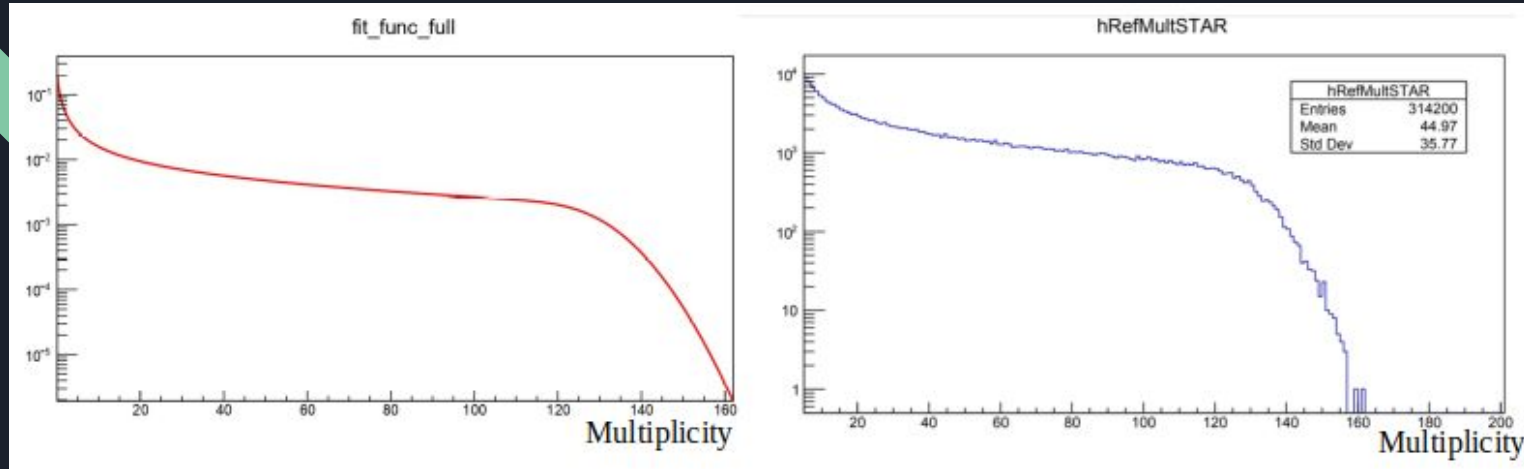


(b) Mean Number of participants vs Centrality

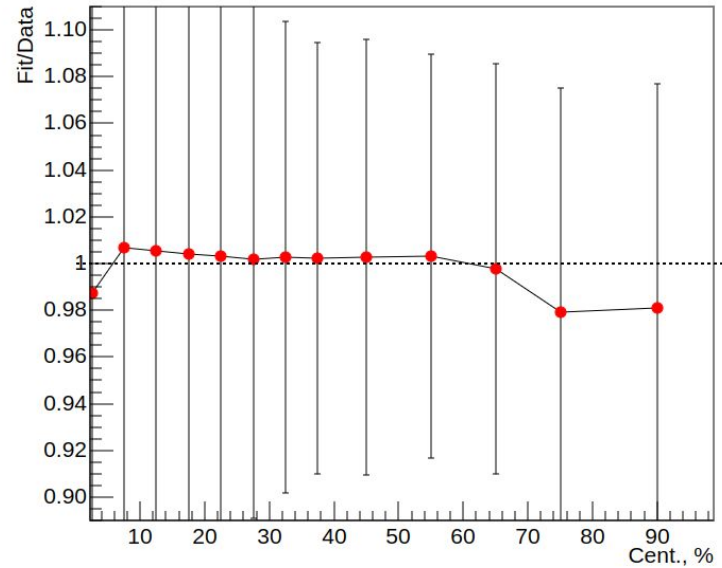
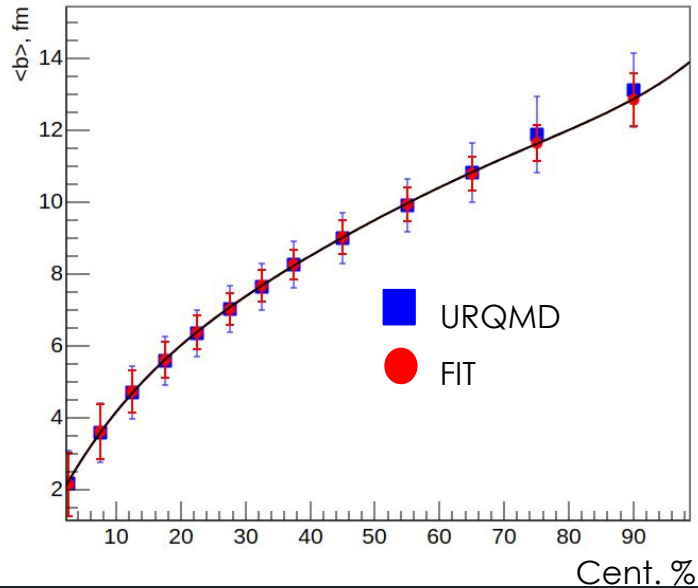


(c) Mean Number of collision vs Centrality

GammaFit Results



GammaFit Results



Comparison between Methods

Centrality, %	$N_{chMC}^{min}Glauber$	$N_{chMC}^{max}Glauber$	$N_{chGammaFit}^{min}$	$N_{chGammaFit}^{max}$	ΔN_{ch}^{min}	ΔN_{ch}^{max}
[0 - 10]	95	164	96	162	1	2
[10 - 20]	70	95	70	96	0	1
[20 - 30]	51	70	50	70	1	0
[30 - 40]	36	51	34	50	2	1
[40 - 50]	24	36	33	34	9	2
[50 - 60]	15	24	15	23	0	1
[60 - 70]	9	15	9	15	0	0
[70 - 80]	5	9	5	9	0	0
[80 - 90]	2	5	1	5	1	0

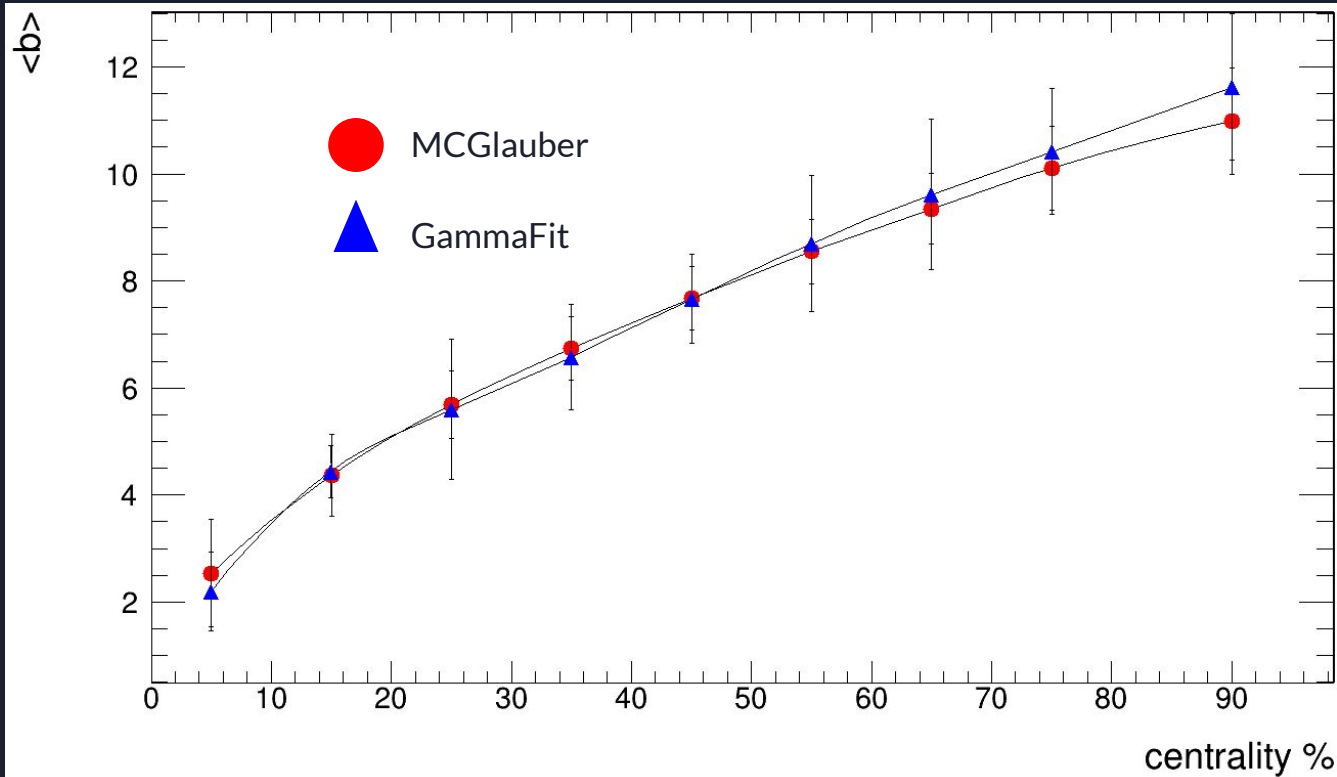
Table 4: Multiplicities extracted with the two methods and difference between them divided by centrality classes

Comparison between Methods

Centrality %	$\langle b_{MC\text{Glauber}} \rangle$	$\langle b_{\text{GammaFit}} \rangle$
0-10	2.54	2.21
10-20	4.37	4.7
20-30	5.69	5.62
30-40	6.74	6.4
40-50	7.68	7.68
50-60	8.55	8.24
60-70	9.35	9.02
70-80	10.11	10.84
80-100	10.99	11.63

Table 5: Average impact parameter comparison between methods

Graphic Impact parameter comparison by both methods



Report

This week we made a report of the centrality analysis we have done and present it to Dr. Petr Parfenovo to ask for advice on how to implement the wagon evCentrality.



JOINT INSTITUTE FOR NUCLEAR RESEARCH
Veksler and Baldin laboratory of High Energy Physics

Centrality estimation in the Fixed Target Mode at MPD experiment

Supervisor

Dr. Vadim Kolesnikov
Dr. Ivonne Alicia
Maldonado Cervantes
Dr. Viktor Kireyeu
Dr. Natalia Kolo-
moyets

Students

Adrián Lara Tlaxcala
Francisco Reyes

Github

In this week also started to upload the macros to github that can be found at the following link:

https://github.com/iamaldonado/START_Summer24.git

The screenshot shows the GitHub interface for the repository 'START_Summer24'. At the top, it indicates the repository is 'Public' and shows 1 watch, 0 forks, and 0 stars. The main content area displays a list of files and folders with their commit messages and dates. The files listed are: AdrianLara (adding principal code used by now, last week), AlejandroSJuan (commit message, 2 weeks ago), CarlosMarquez (commit message, 2 weeks ago), FrankReyes (commit message, 2 weeks ago), .gitignore (commit message, 2 weeks ago), and README.md (commit message, 2 weeks ago). On the right side, there is an 'About' section with no description, website, or topics provided, and a 'Releases' section with no releases published.

File/Folder	Commit Message	Time
AdrianLara	adding principal code used by now	last week
AlejandroSJuan	commit message	2 weeks ago
CarlosMarquez	commit message	2 weeks ago
FrankReyes	commit message	2 weeks ago
.gitignore	commit message	2 weeks ago
README.md	commit message	2 weeks ago



Future Work

Next thing to do is to obtain the reconstruction efficiency with the cuts implemented on centrality.

Also, we are working to implement the evCentrality Wagon to our Analysis. In particular we are looking for a way to obtain n_{Tr} to Centrality and Track Efficiency Histograms.



References

- FlowNICA. GitHub - FlowNICA/CentralityFramework: Грант РФФИ 18-02-40086 мера. GitHub. <https://github.com/FlowNICA/CentralityFramework>
- The NICA LHEP offline computing cluster. Accessed: 2024-07-31.
- M. Bleicher et al. Relativistic hadron hadron collisions in the ultrarelativistic quantum molecular dynamics model. J. Phys. G, 25:1859–1896, 1999. 22