

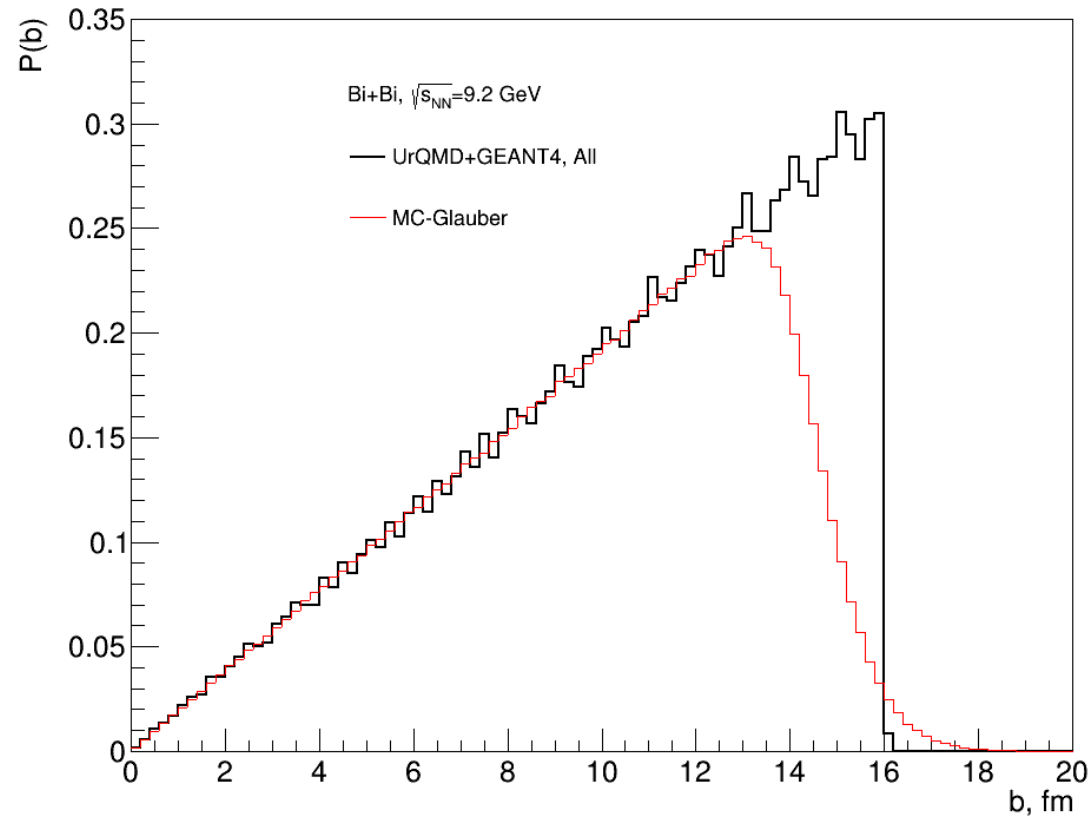
# Centrality determination for Bi+Bi collisions at $\sqrt{S_{NN}}=9.2$ GeV (REQUEST 25)

Idrisov Dim, Ilya Segal, Peter Parfenov

**NRNU MEPhI**

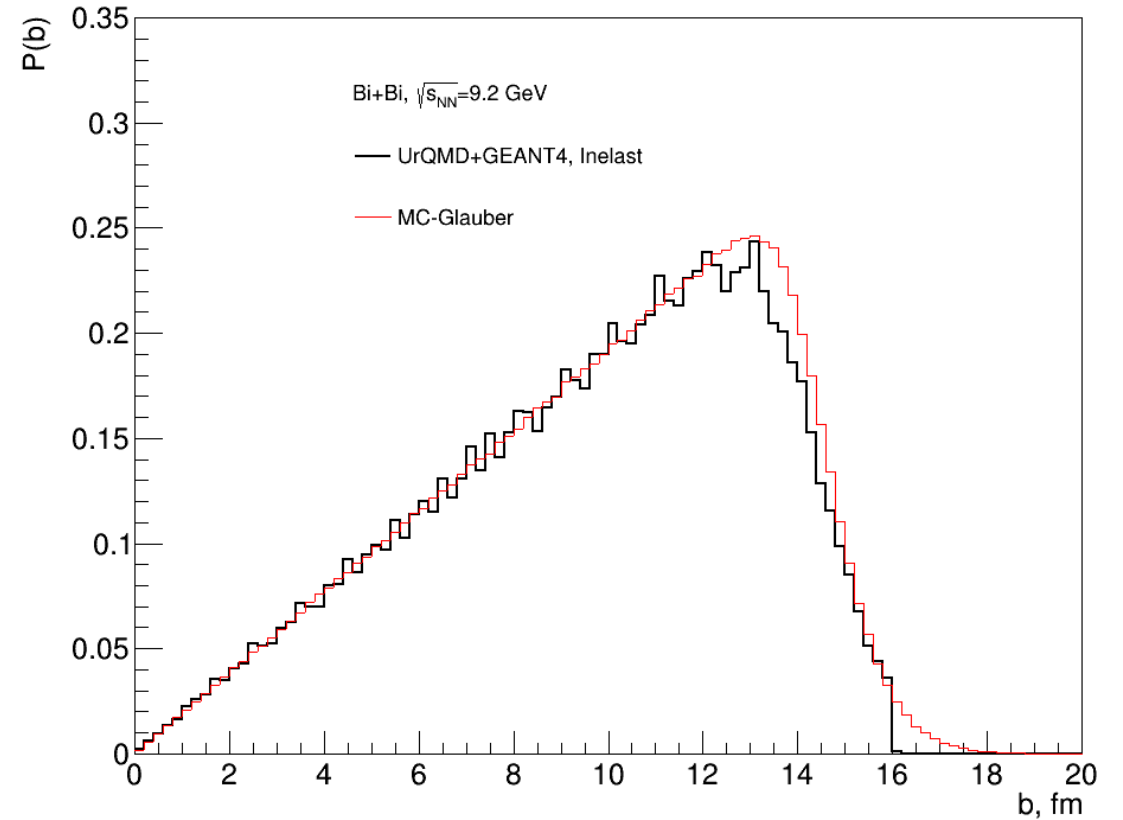
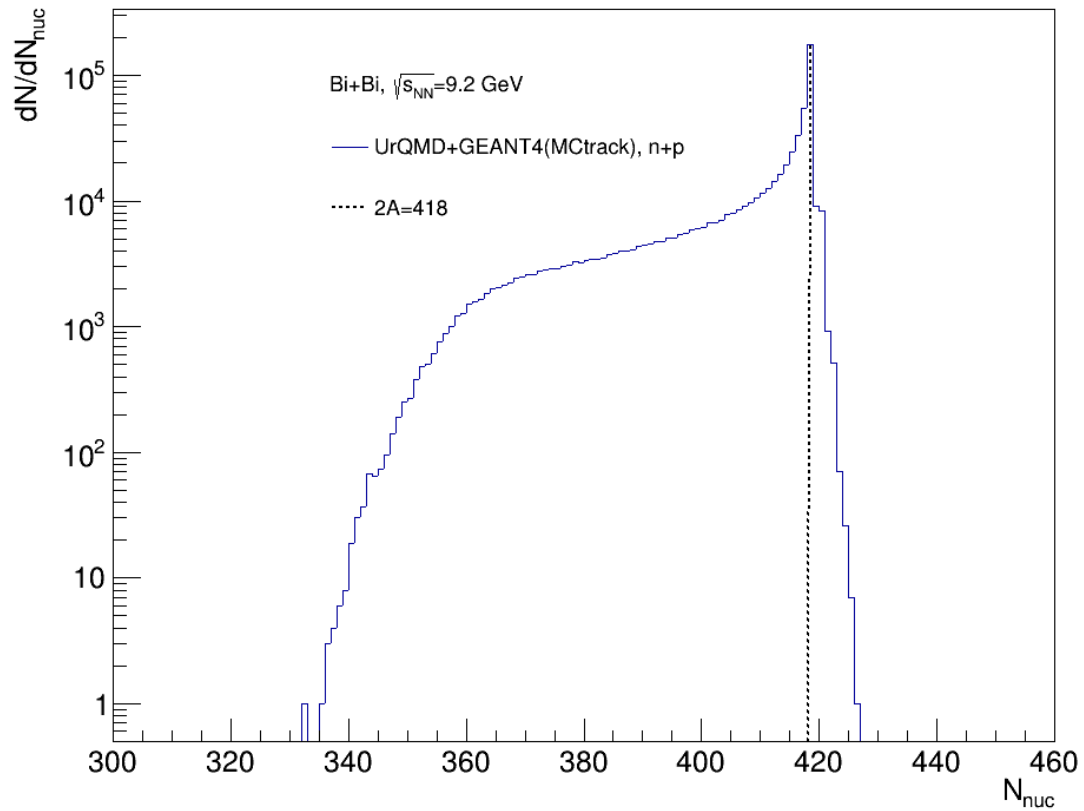
02.08.2022

# Comparison of impact parameter distribution from model and MC-Glauber



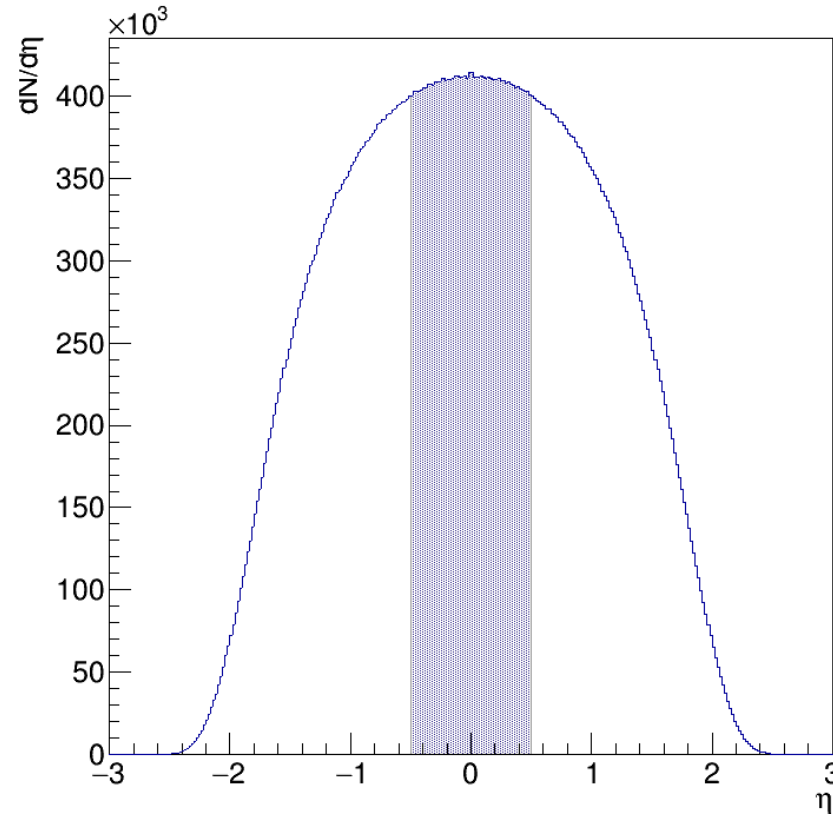
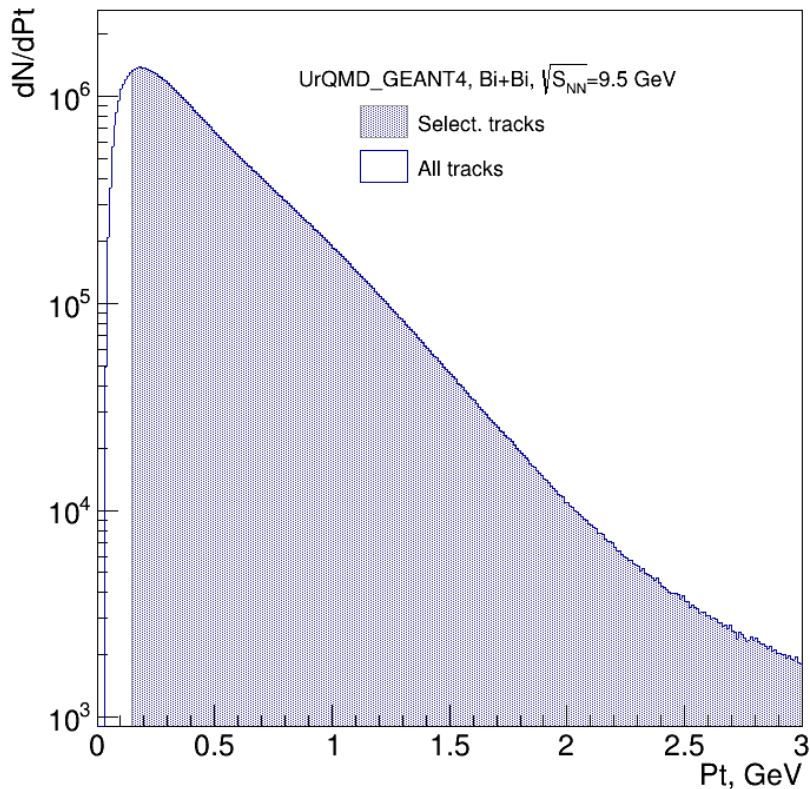
The difference between impact parameter distribution from model and MC-Glauber due to elastic collisions

# Impact parameter distribution for inelastic collisions



To select inelastic collisions, the numbers of protons and nucleons in the event was taken into account( $n+p \neq 418$ )

# The track selection criteria



## Hadron selection:

- Charged particles only
- $|\eta| < 0.5$
- $p_T > 0.15$  GeV/c

## Track selection(Primary):

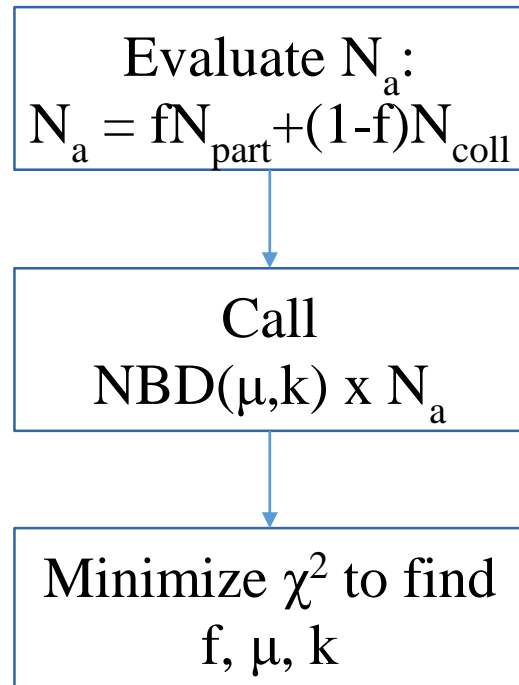
- MotherID=-1

## Track selection(Reconst.):

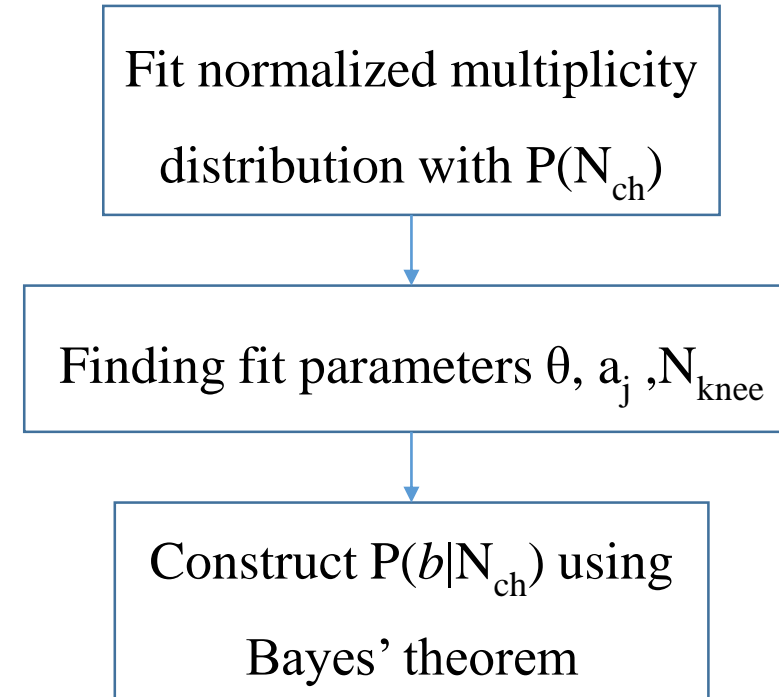
- $|DCA| < 1$  cm
- $N_{\text{TPC hits}} \geq 16$

# Centrality determination methods

## MC-Glauber



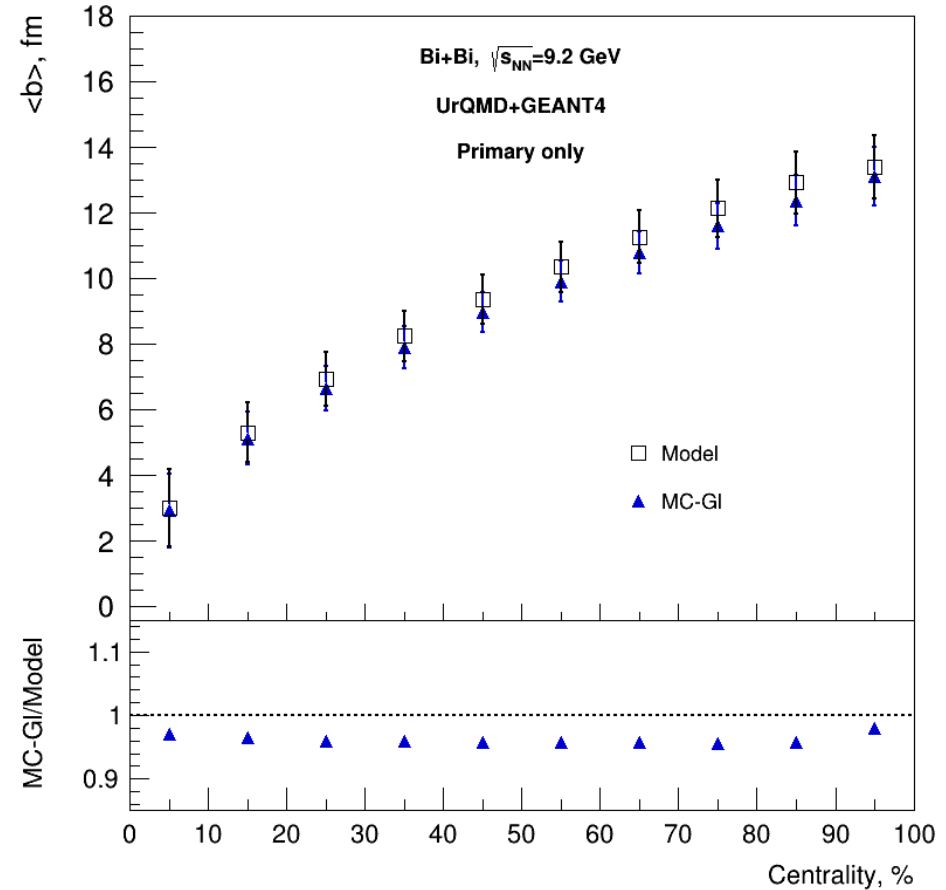
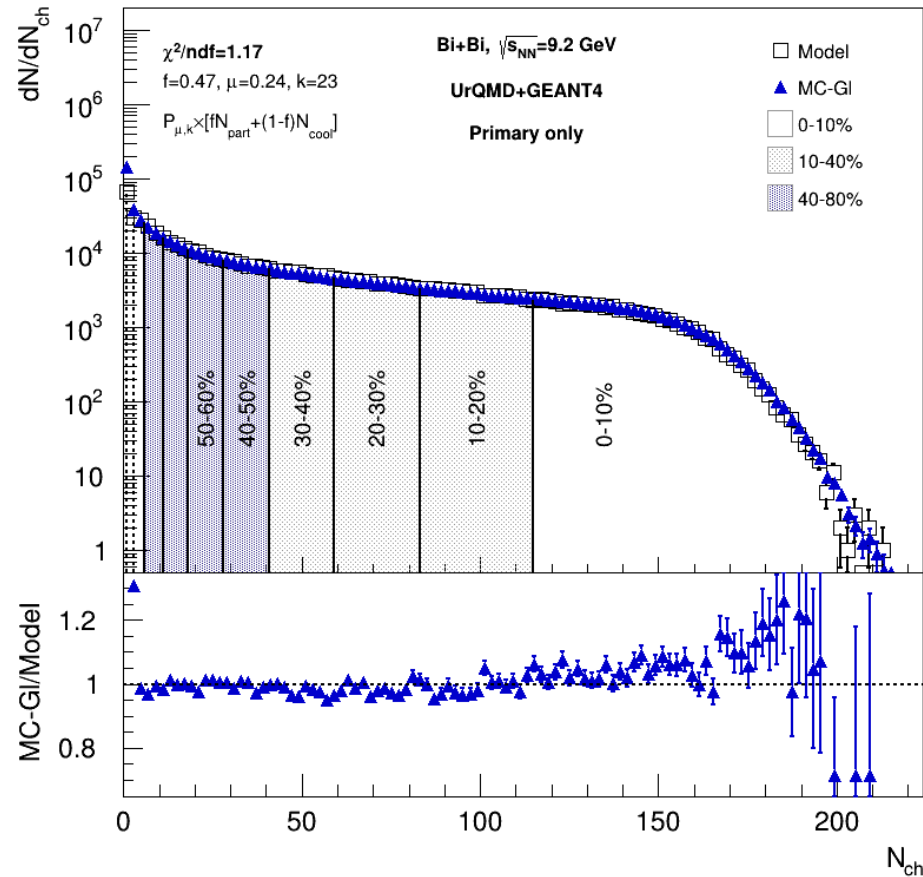
## The Bayesian inversion ( $\Gamma$ -fit)



Implementation for MPD: <https://github.com/FlowNICA/CentralityFramework>  
P. Parfenov, et al., *Particles*. 2021; 4(2):275-287

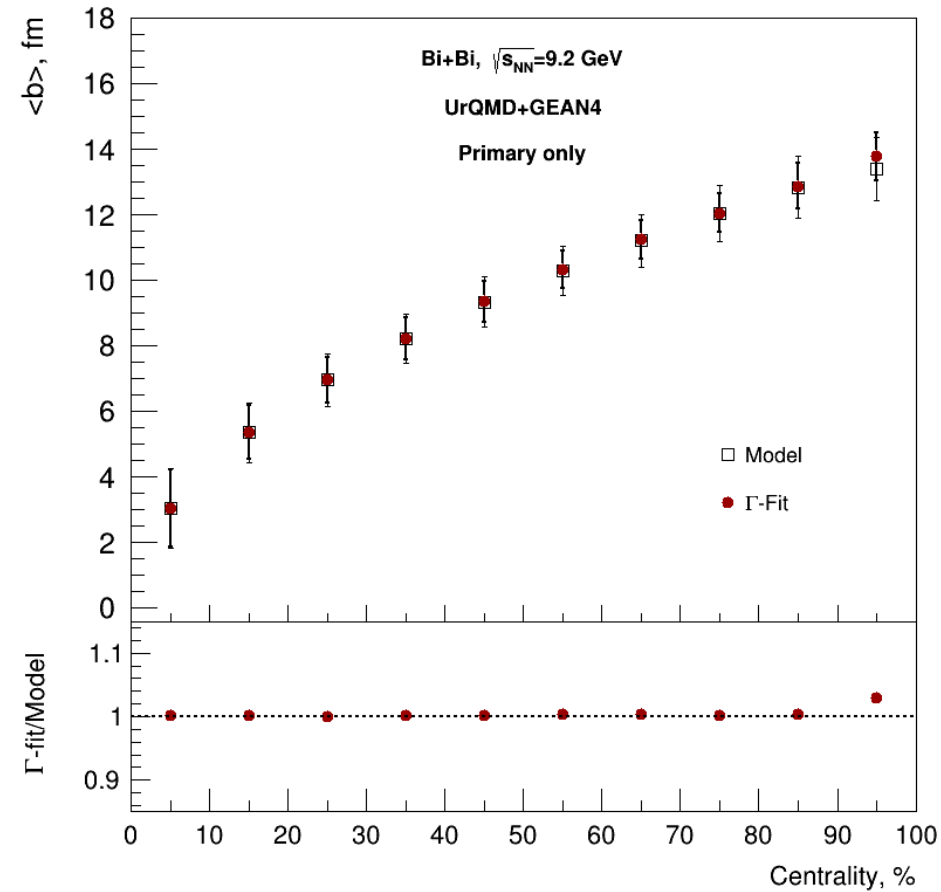
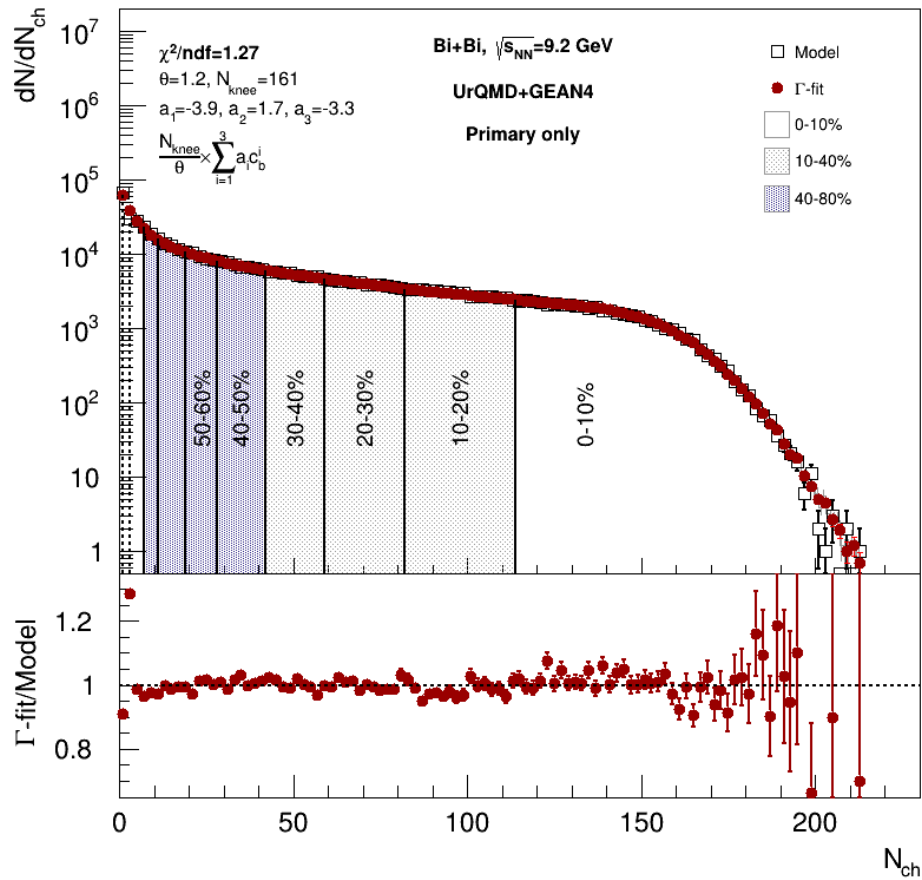
Implementation for MPD: <https://github.com/Dim23/GammaFit>

# Fit results from MC-Glauber method(Primary tracks)



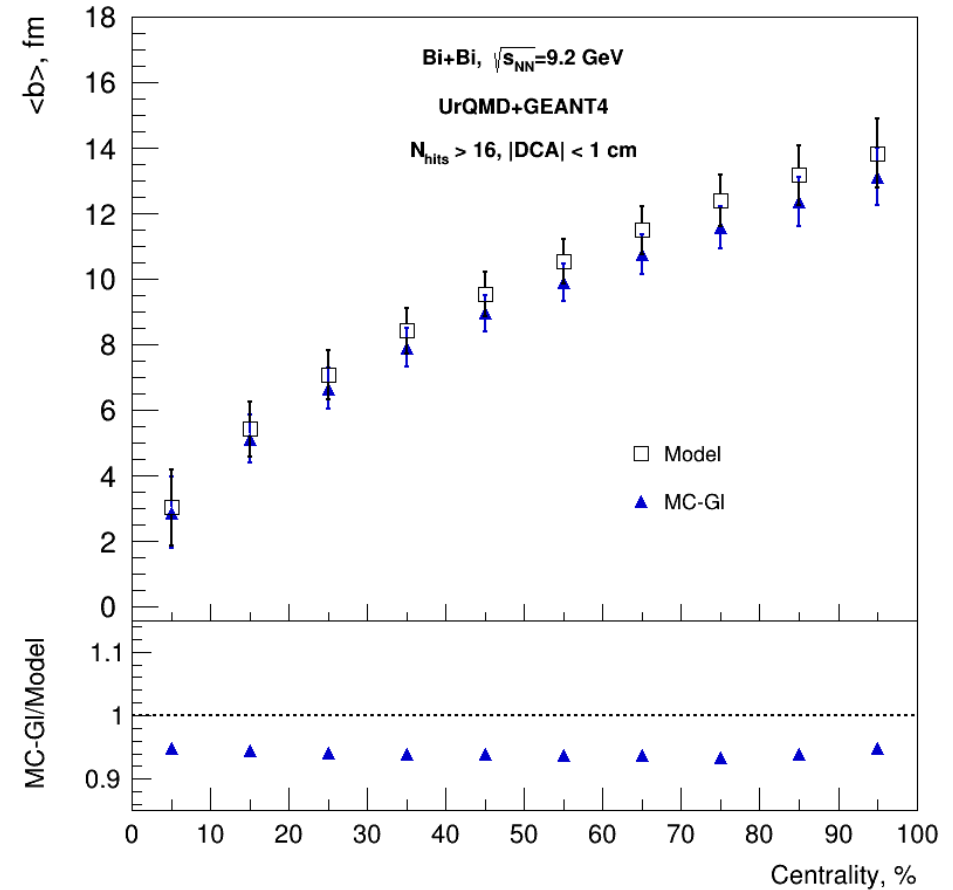
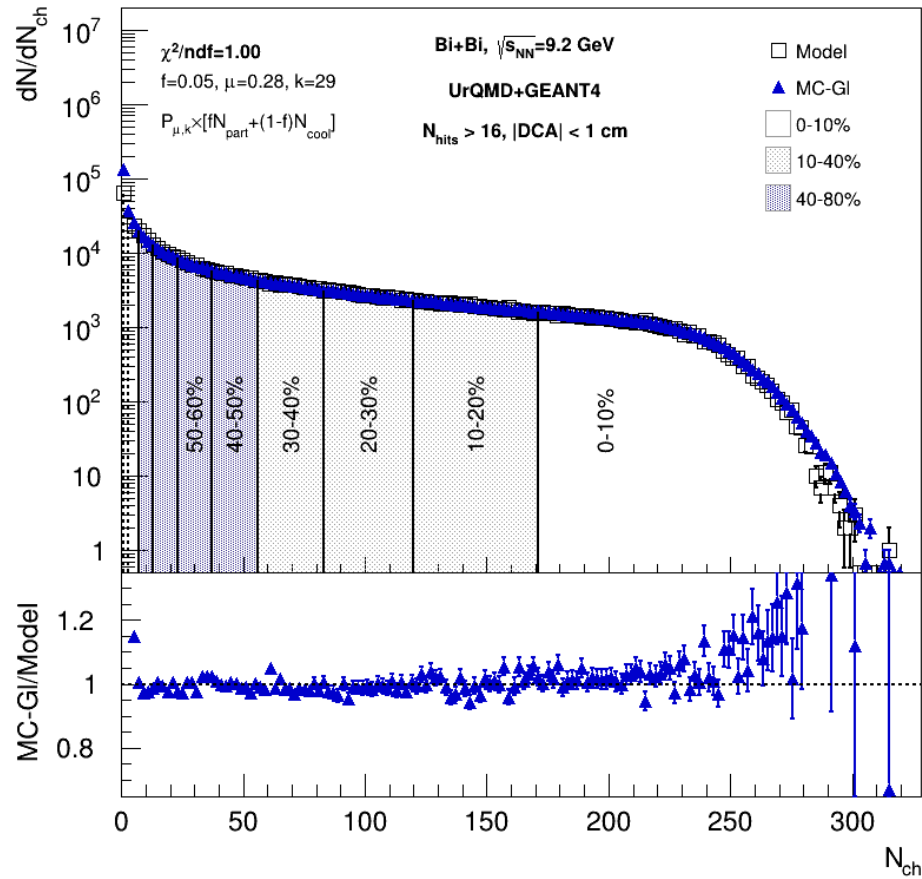
Good fit quality for MC-Glauber method

# Fit results from Bayes inversion method (Primary tracks)



Good fit quality for Bayes inversion method method

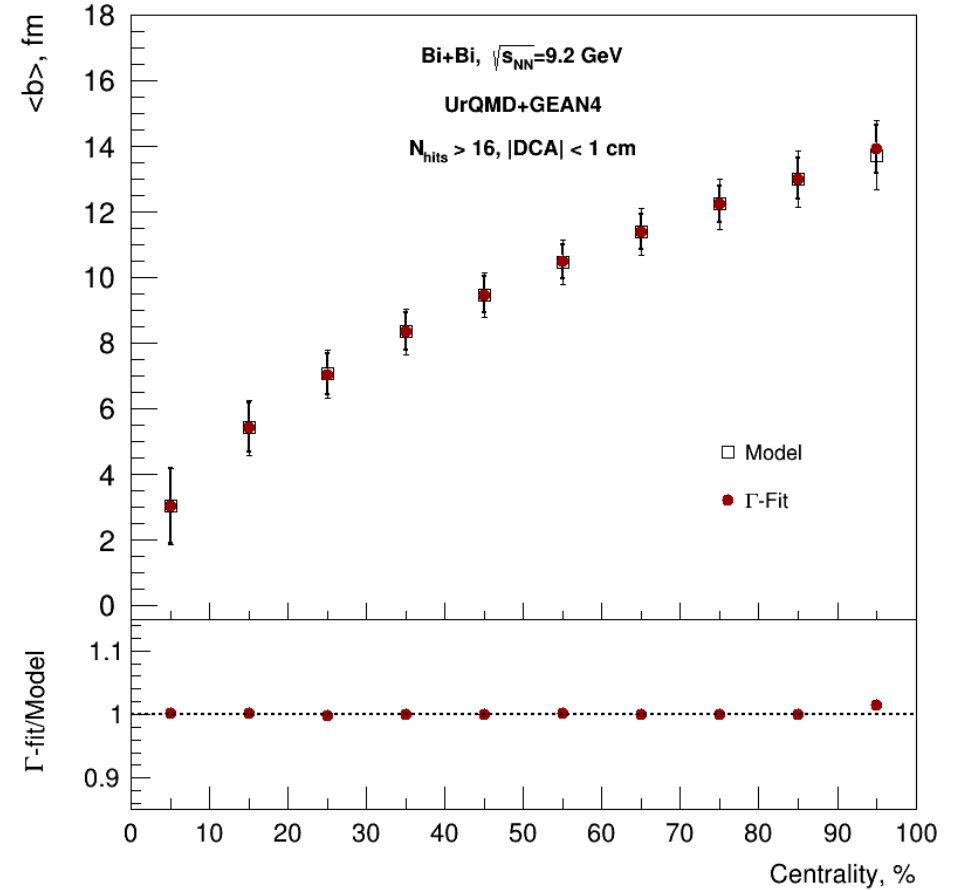
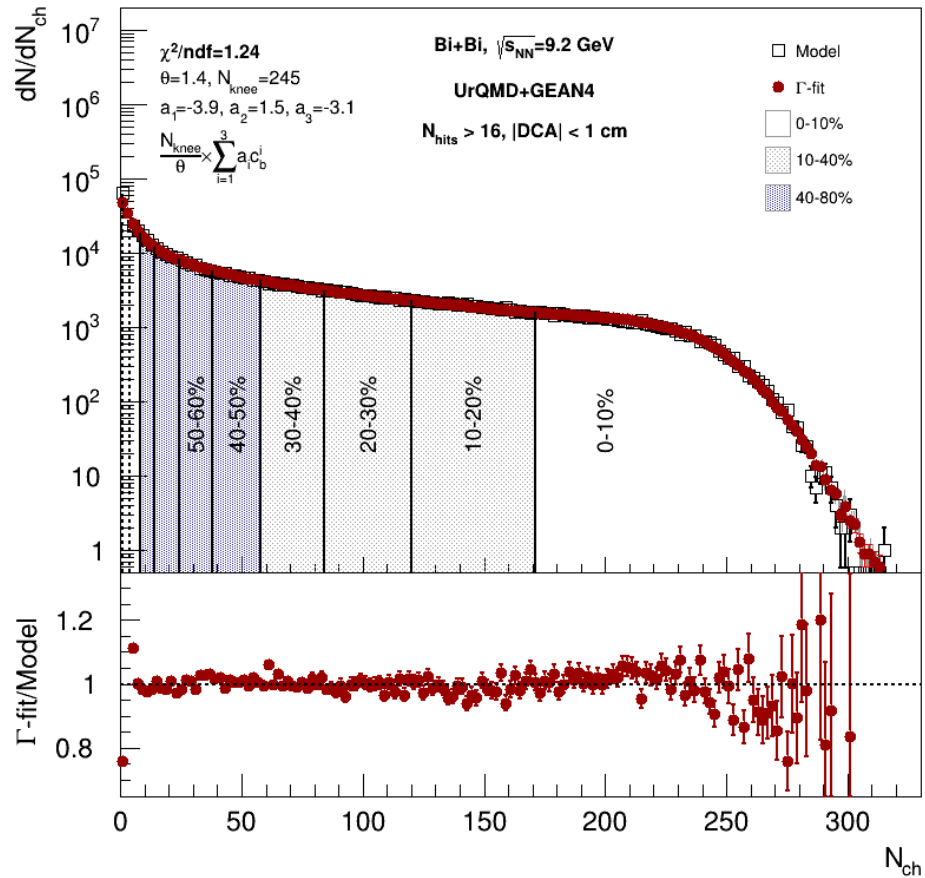
# Fit results from MC-Glauber method(Reconst. tracks)



Good fit quality for MC-Glauber method



# Fit results from Bayes inversion method (Reconst. tracks)



Good fit quality for Bayes inversion method

# Conclusions

- There are no problems in the production for using the centrality procedure
- Cluster's CPU time and storage usage might be optimized by rejecting all elastic events before the reconstruction chain
- Both methods can be effectively used for the centrality determination procedure in MPD experiment