# Centrality dependence of $\pi^-\pi^-$ BE correlations at 158 AGeV

(status report)

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# Outline

- Why do we analyse centrality dependence?
- About the analysis
- Our preliminary results
- Comparison
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# Why do we analyse centrality dependence?

In a naive picture of a heavy ion collision the spatial size of the particle emmitting source should increase with decreasing impact parameter.

This behaviour should be seen in the dependence of HBT Radii on centarlity.

If we assume the volume of the source to be described by

$$V_f = (2\pi)^{3/2} R_{long} R_{side}^2$$

we should see a monotonic increase with centrality.

# About the analysis

- Data: 158 A GeV minimum bias:
  00M (256 000 events), 00N (150 000 events), 01J (340 000 events)
- Analyzed bins:
  - Pair rapidity: $2.9 < Y_p < 3.4$
  - Pair transverse momentum: $0.1 < k_t < 0.2$ GeV / c
- Cuts
  - **Track cuts: Charge = −1**
    **DedxSigma(0.9, 1.1) (Pb+Pb, Pions)**
    **Minimum number of Points = 30 (global)**
    **Minimun ratio $N_{\text{Points}}/N_{\text{pot. Points}}$ = 0.5 (global)**
    **$|B_x| < 3$ cm, $|B_y| < 1$ cm**
    **$\chi^2 < 20$**

  **Pair cuts: minimum two track distance: 2 .. 4 cm**
- Bertsch−Pratt parametrisation in LCMS

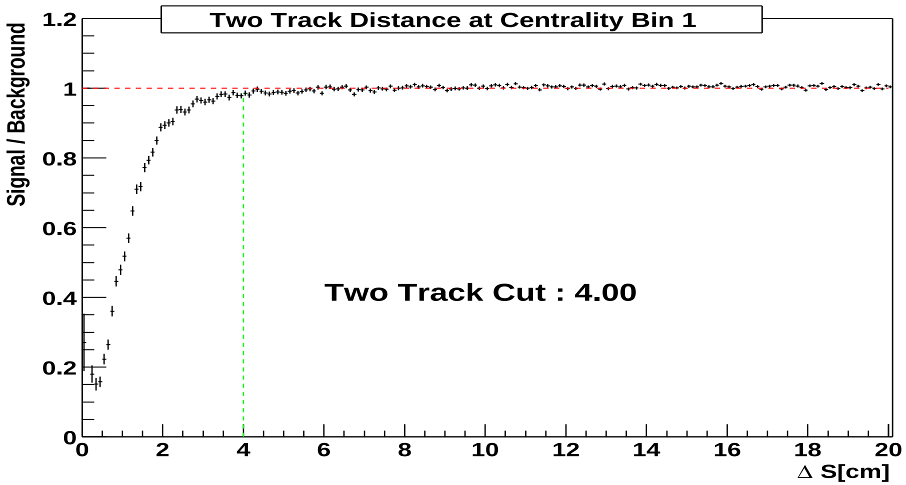
$$C(q) = 1 + \lambda \exp\left(-R^2_{side} q^2_{side} - R^2_{out} q^2_{out} - R^2_{long} q^2_{long} - 2R^2_{outlong} q_{out} q_{long}\right)$$

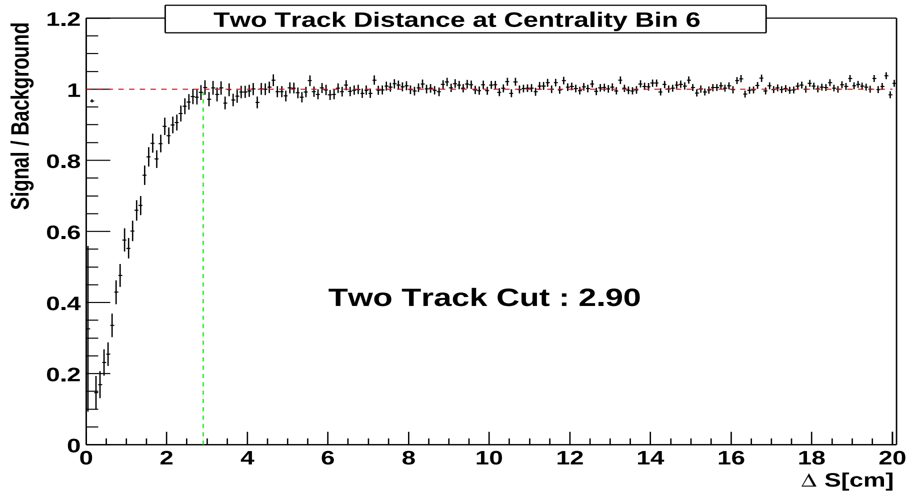
- Coulomb correction (background):

$$r_{Coul} = 20 \text{ fm}$$

# Two track cut

- Loss of pairs in signal due to finite track seperation



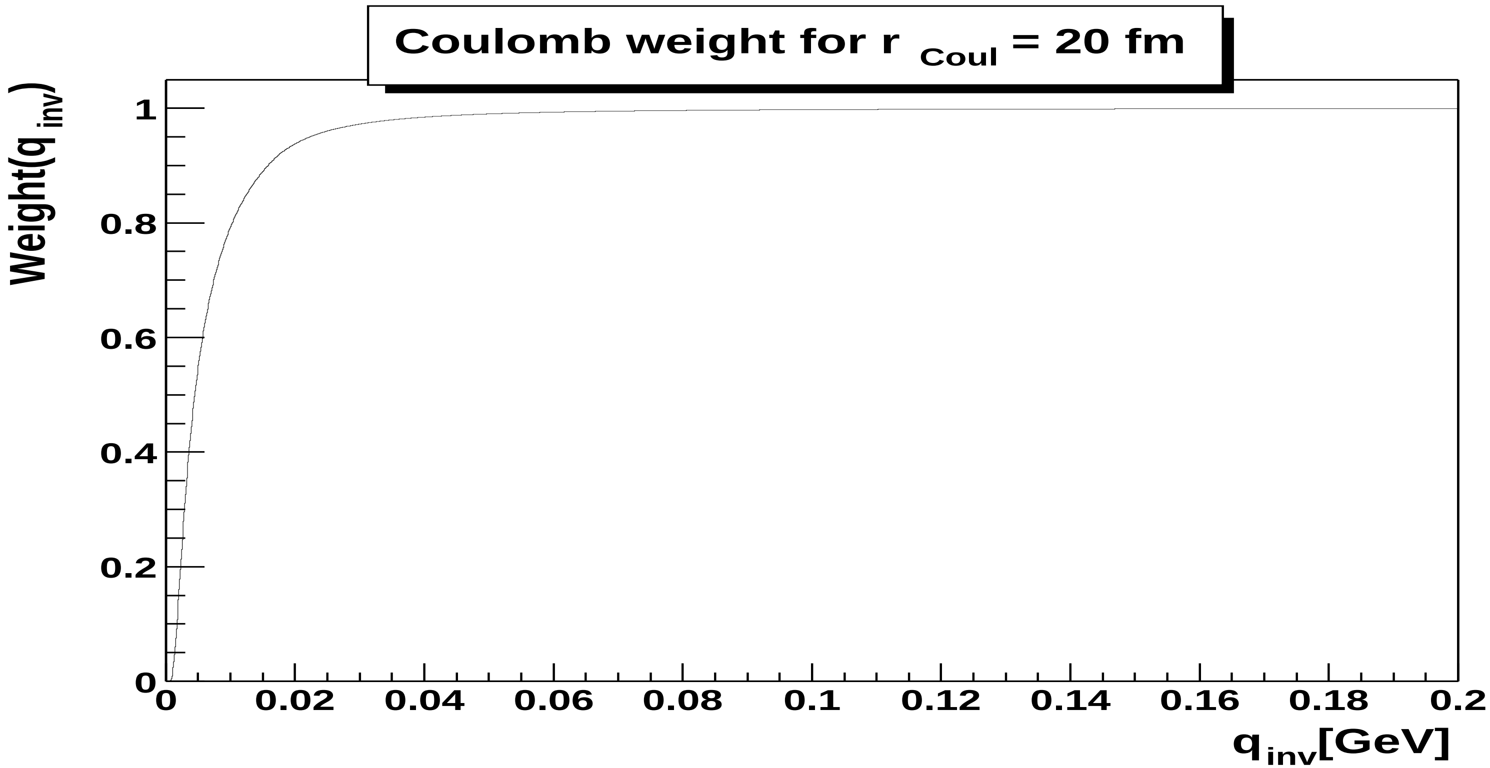

- Criterion for setting the two track cut:

$$Signal\ /\ Background \approx 1\ .$$

➔ two track cut varies from 4 cm (most central) to 2 cm (most peripheral)

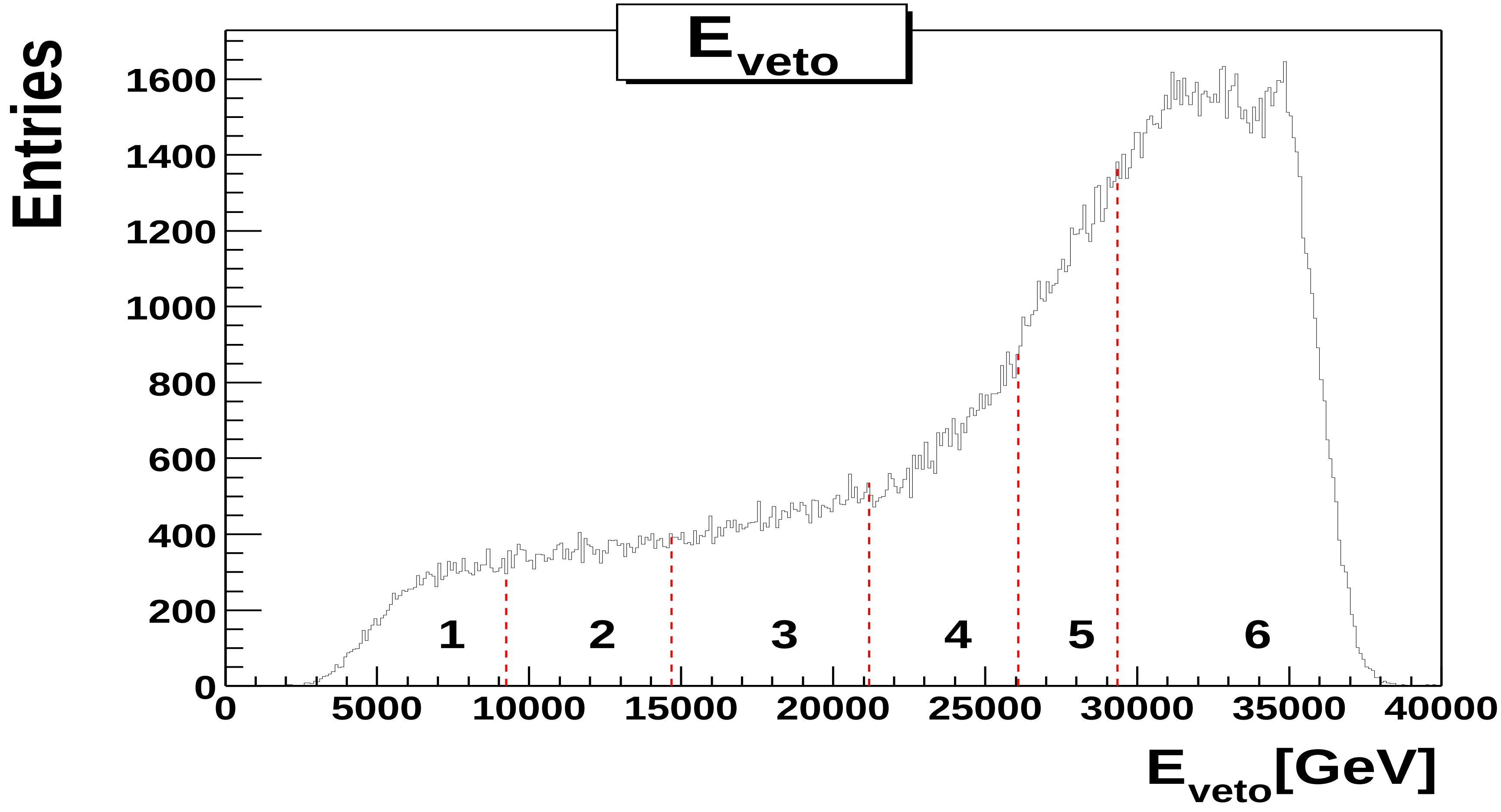
# Coulomb correction

- less pairs with small $q_{inv}$ in signal due to coulomb repulsion
- each pair in the background is weighted with a number depending on $q_{inv}$ (Sinyukov)

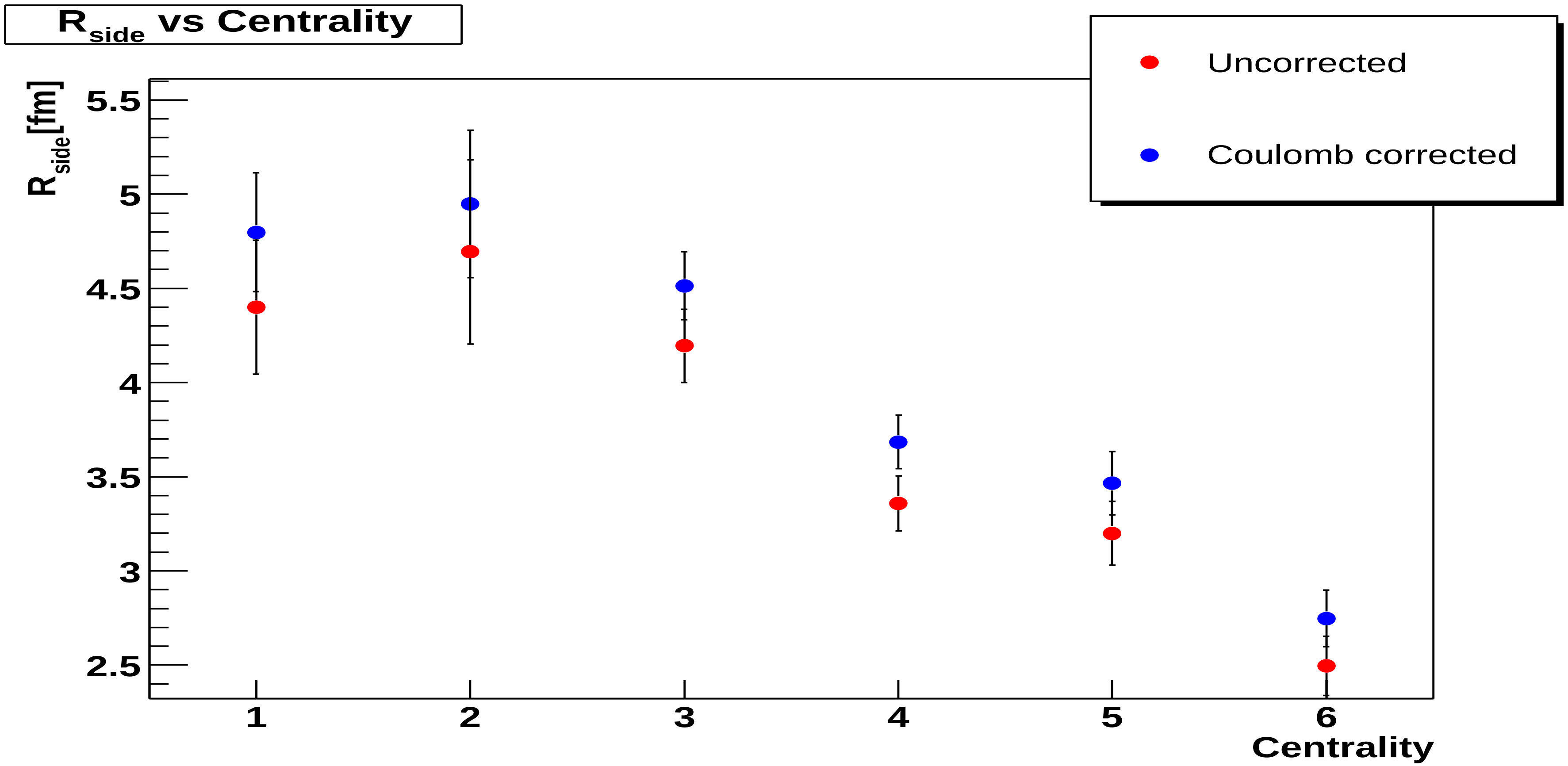


# Centrality classification:

The events are sorted by their veto enery into 6 bins of centrality.



# Our preliminary results

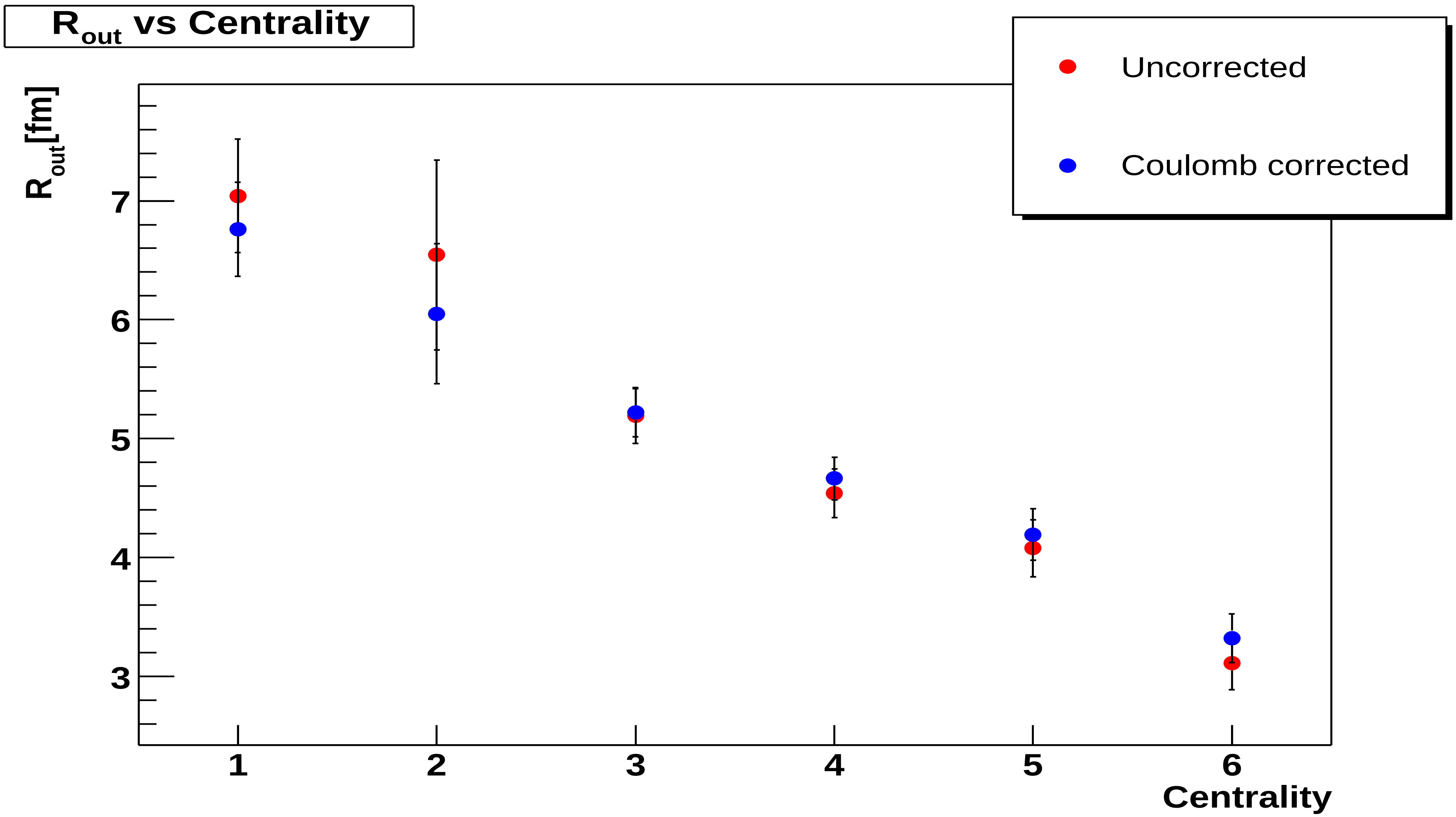



← most central events

➔Decreases with decreasing centrality

➔Large errors for central events

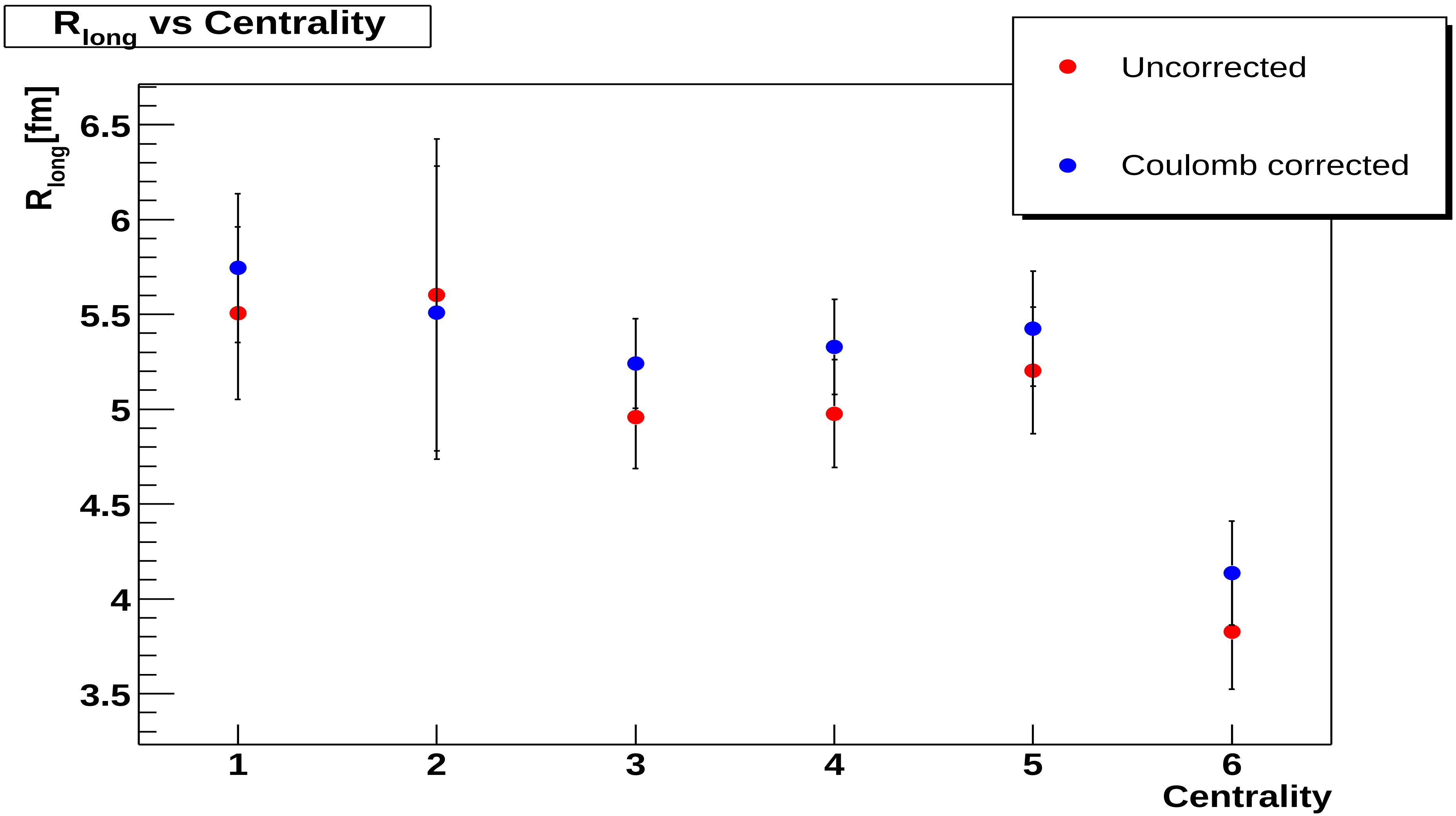
➔Unexpected behaviour at most central bin




← most central events

➔Shows a monotonic increase with increasing centrality

➔unexpected behaviour at most central bin not observed



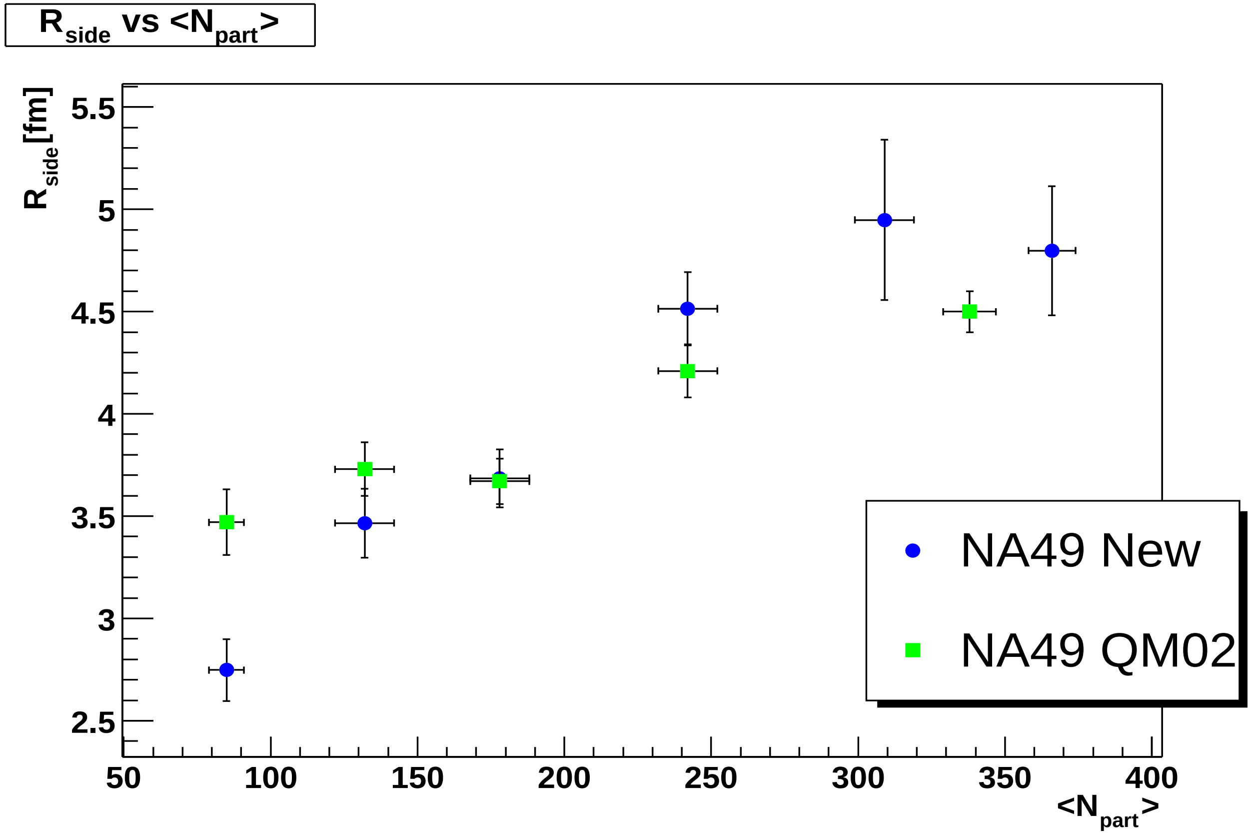

← most central events

➔Weak centrality dependence

➔Errors of the second bin very large

# Comparison

## Previous NA49 results (QM02)

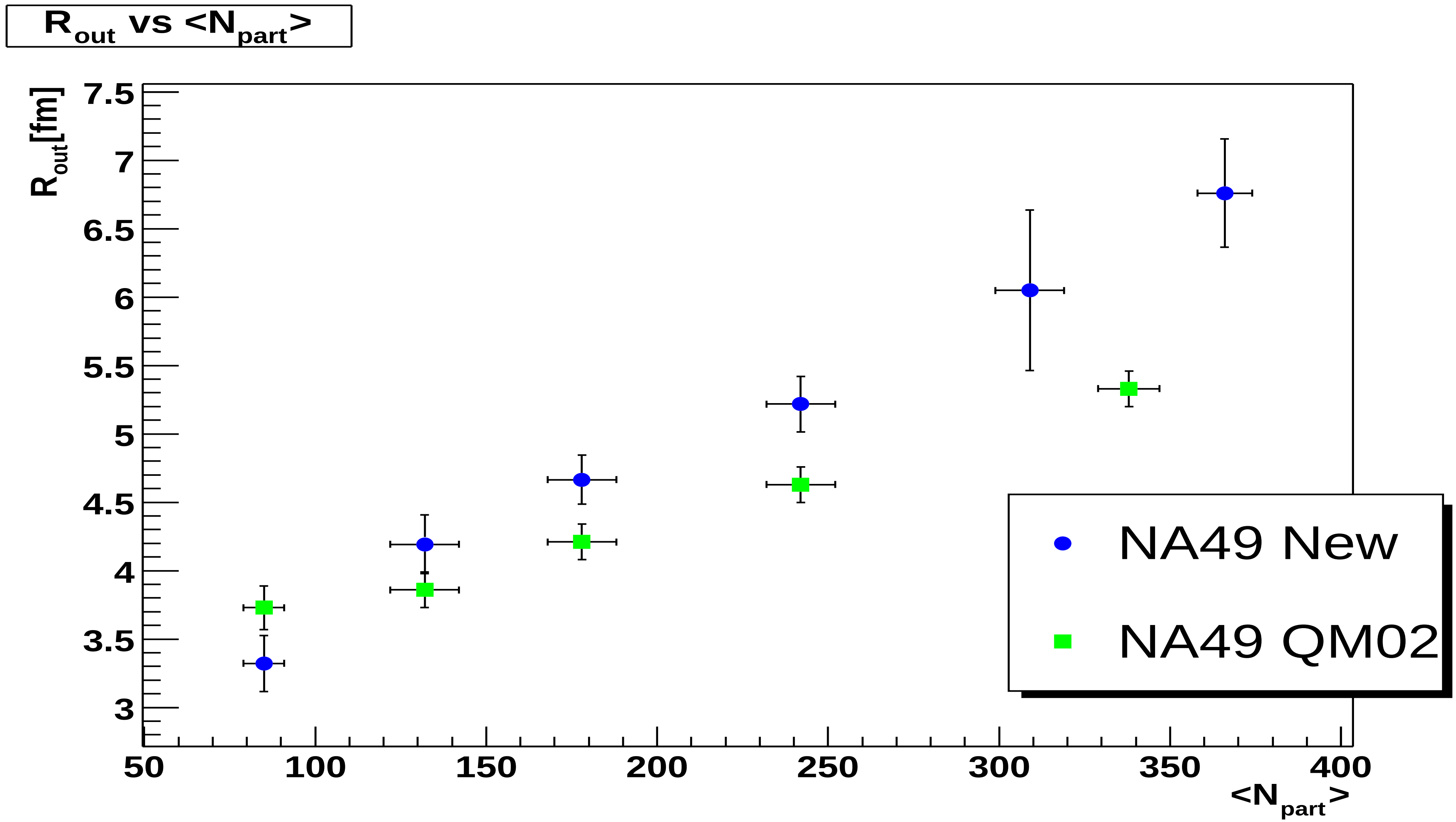



➔Different binning for the most central bins

➔Smaller for the most peripheral bins

➔Larger for the most central bins

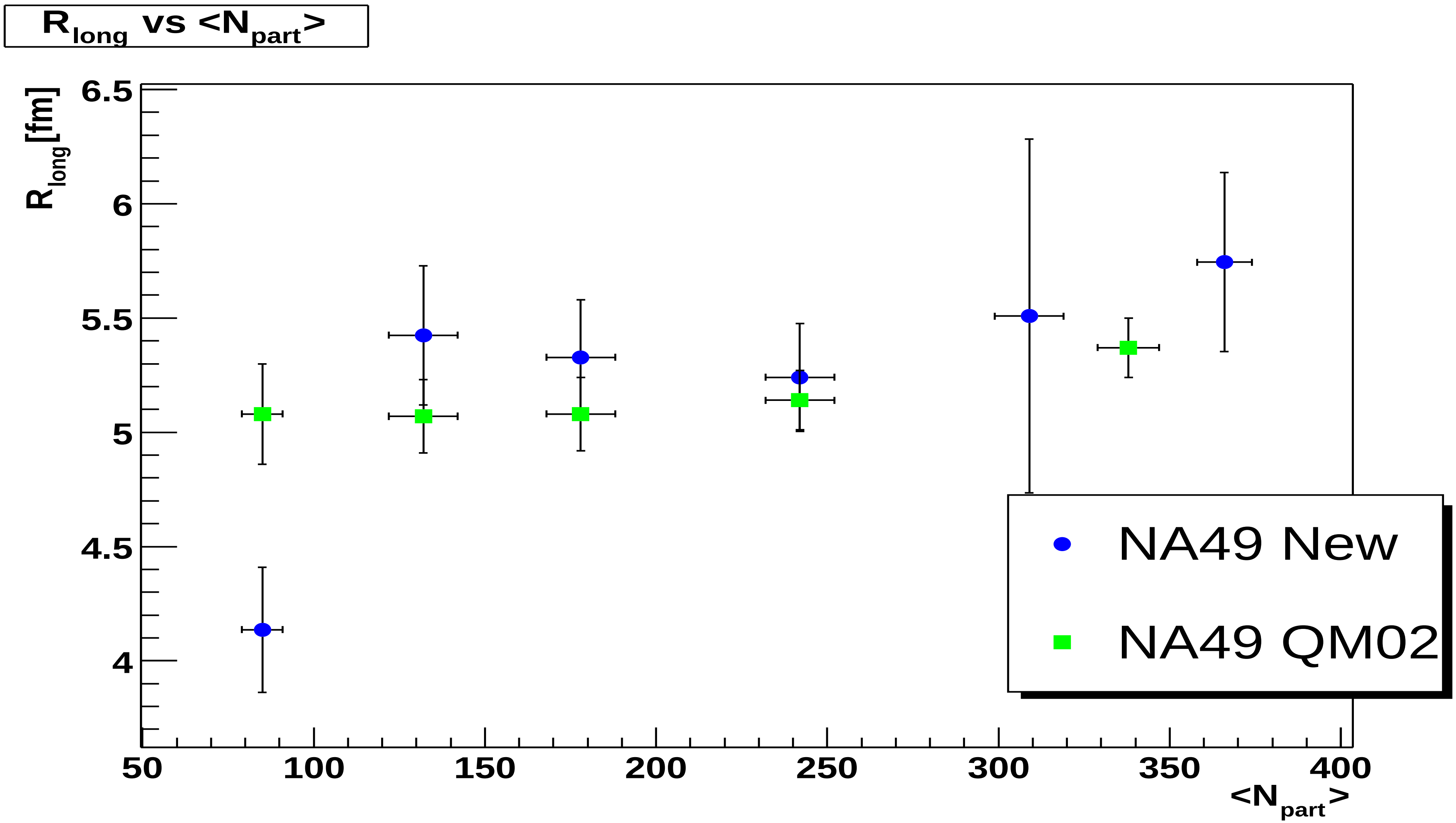
➔Unexpected behaviour at most central bin not observed




➔Both show a monotonic increase

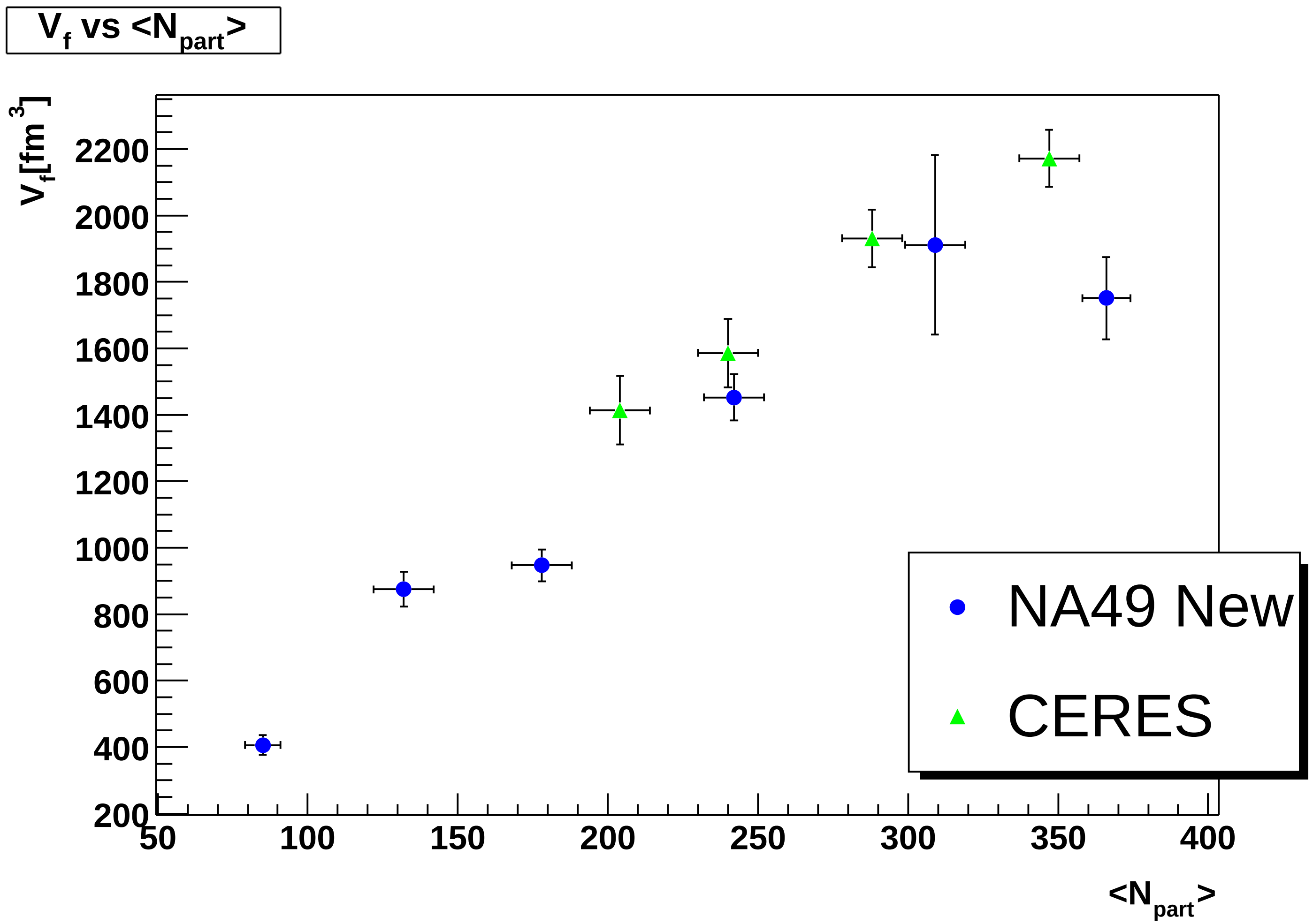
➔New curve: lower at low and higher at high centralities

➔Seems to be steeper




➔Old curve almost constant

# Comparison with CERES results




➔Both curves show a monotonic increase

➔New curve: Problem at high centralities ($R_{side}$)

# Outlook

- optimisation of cuts
- estimation of the systematic errors
- $k_t$ −dependence
- analysis of 40 A GeV minimum bias