Acceptance correction for higher-order cumulants in UrQMD model

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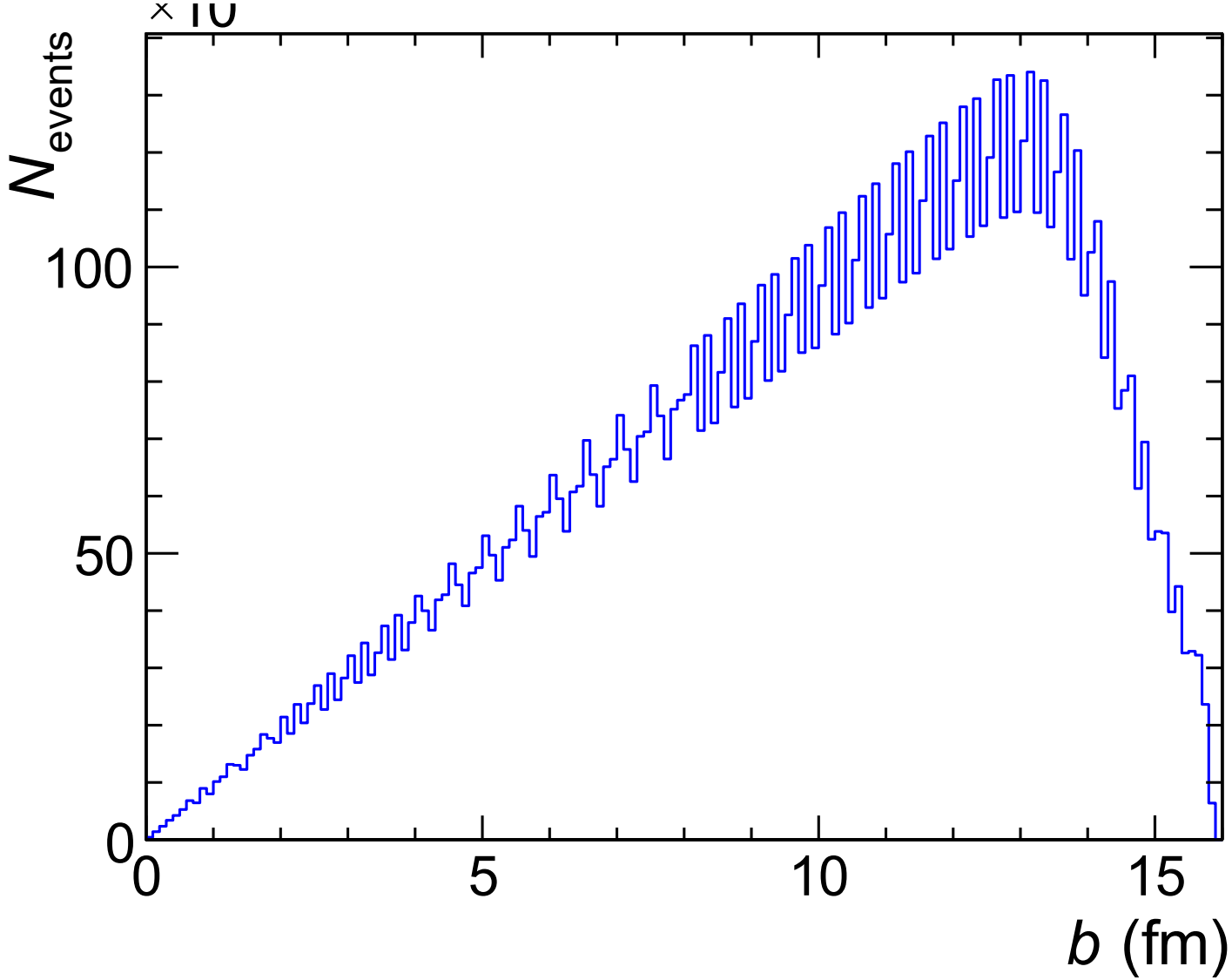
UrQMD data

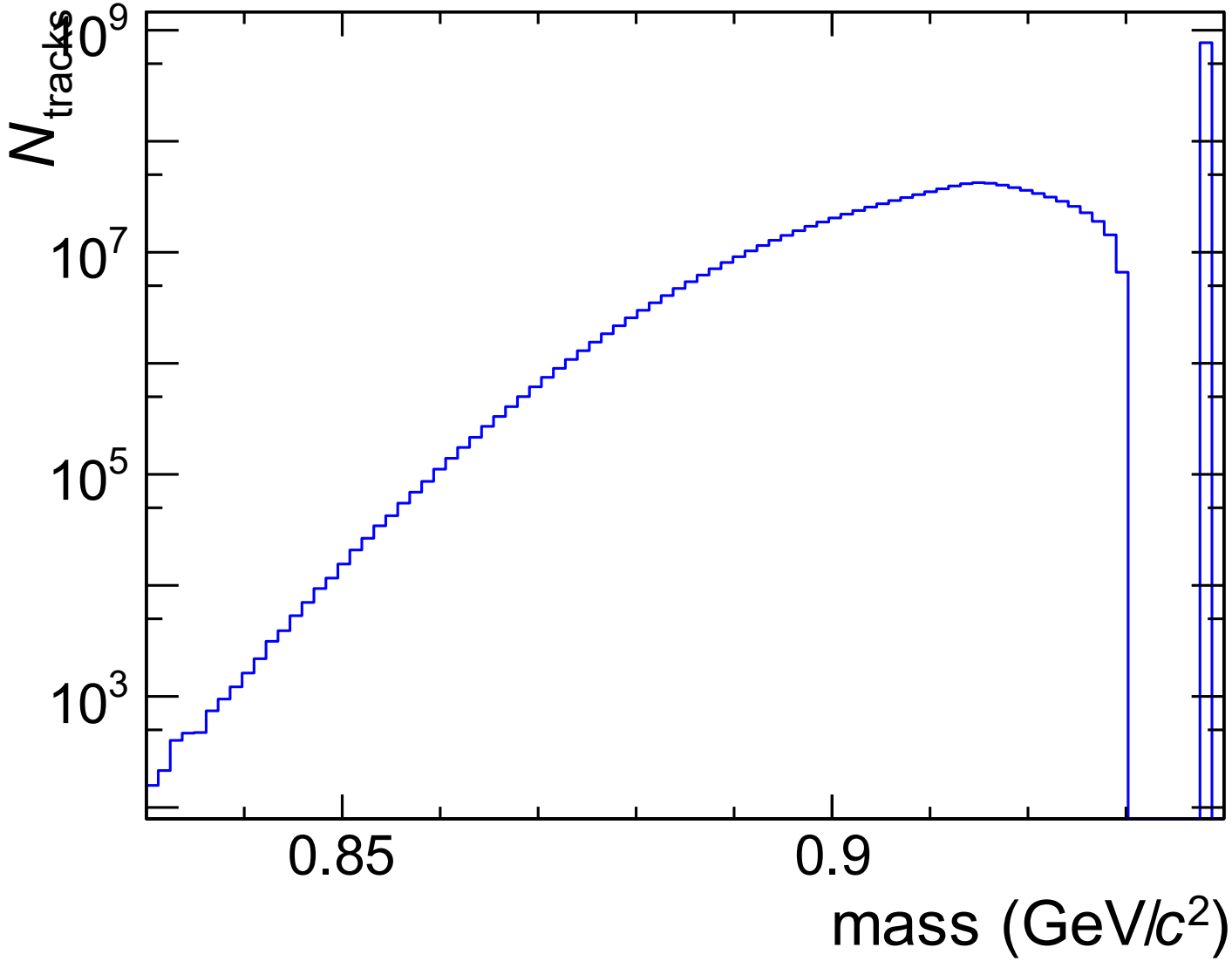
- Simulation (by Yuan Zhang)
  - Au+Au @ 3.0 GeV
  - Linearly weighted b
  - t = 200 fm/c
  - $N_{\text{coll}} \neq 0 \rightarrow b < 16$ fm
  - ~ 10^7 events
- Track cuts
  - Charge $\neq 0$
  - |mass−0.938| < 1.e−5
  - 0.4 GeV/c < p_{T} < 2 GeV/c
  - $|y| < 0.5$



Previous proton cut

- ityp==1 (N_{938})
- iso3==1 ($2I_3 = 1$)
- charge==1

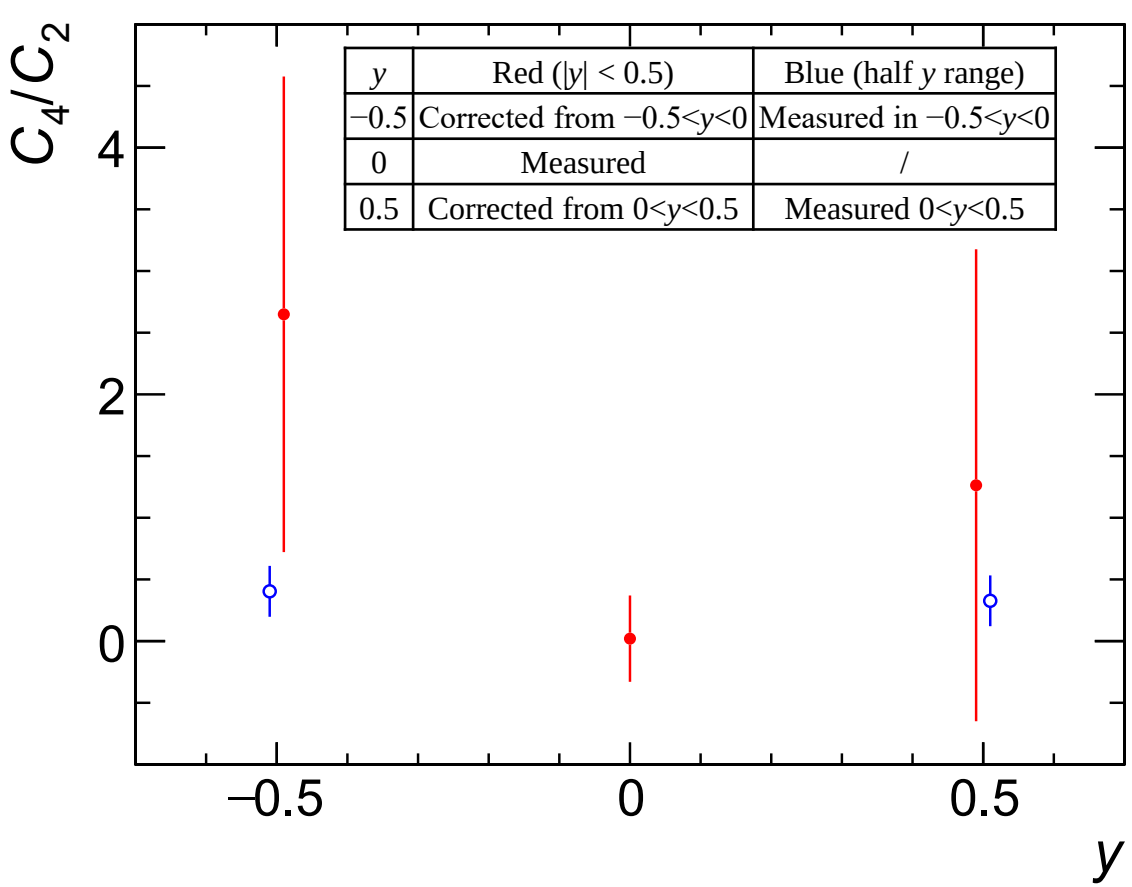
- Some tracks with mass $\neq 0.938$ GeV/c^2

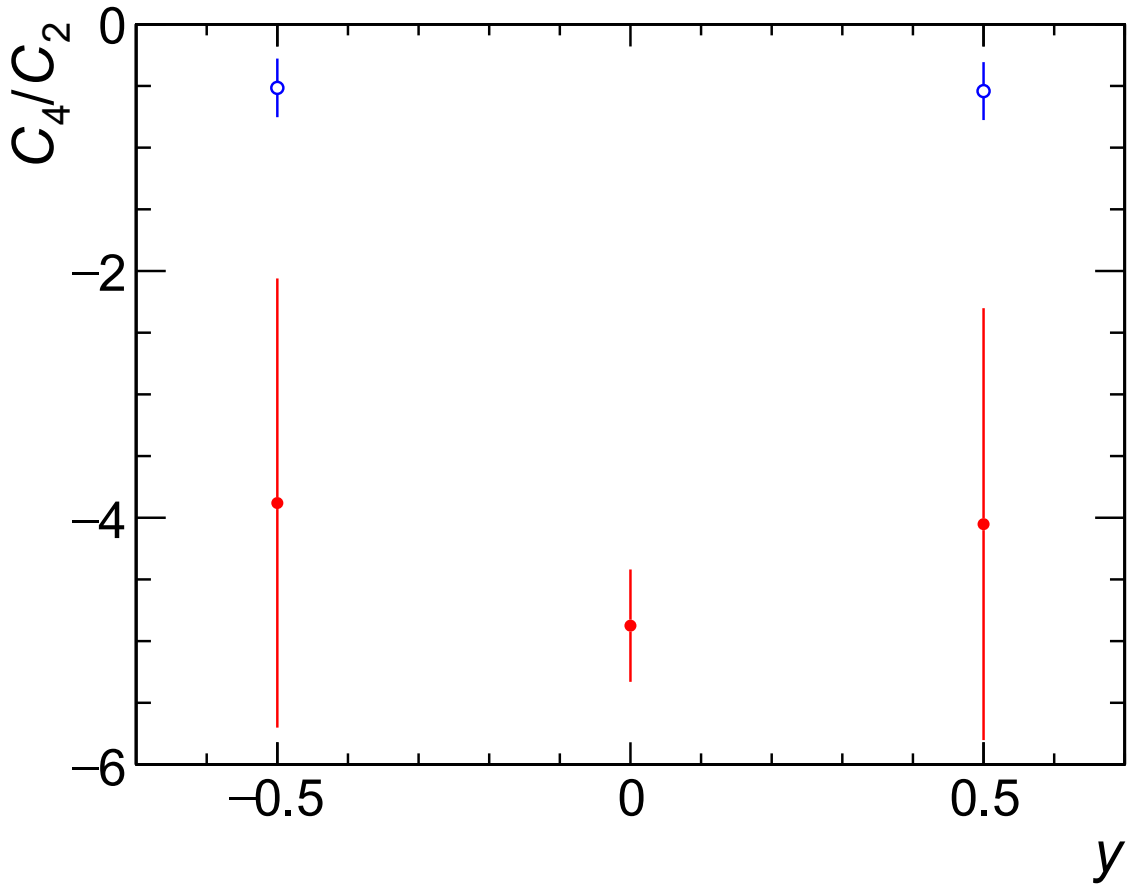


Rapidity correction

- Centrality: b (0.1 fm for CBWC)
- Centrality: RefMult3
  - Charge $\neq 0$, $|\eta| < 1$, $|\text{mass}-0.938| \geq 1.\text{e}{-5}$

y	Red ($\|y\| < 0.5$)	Blue (half y range)
−0.5	Corrected from $-0.5<y<0$	Measured in $-0.5<y<0$
0	Measured	/
0.5	Corrected from $0<y<0.5$	Measured $0<y<0.5$





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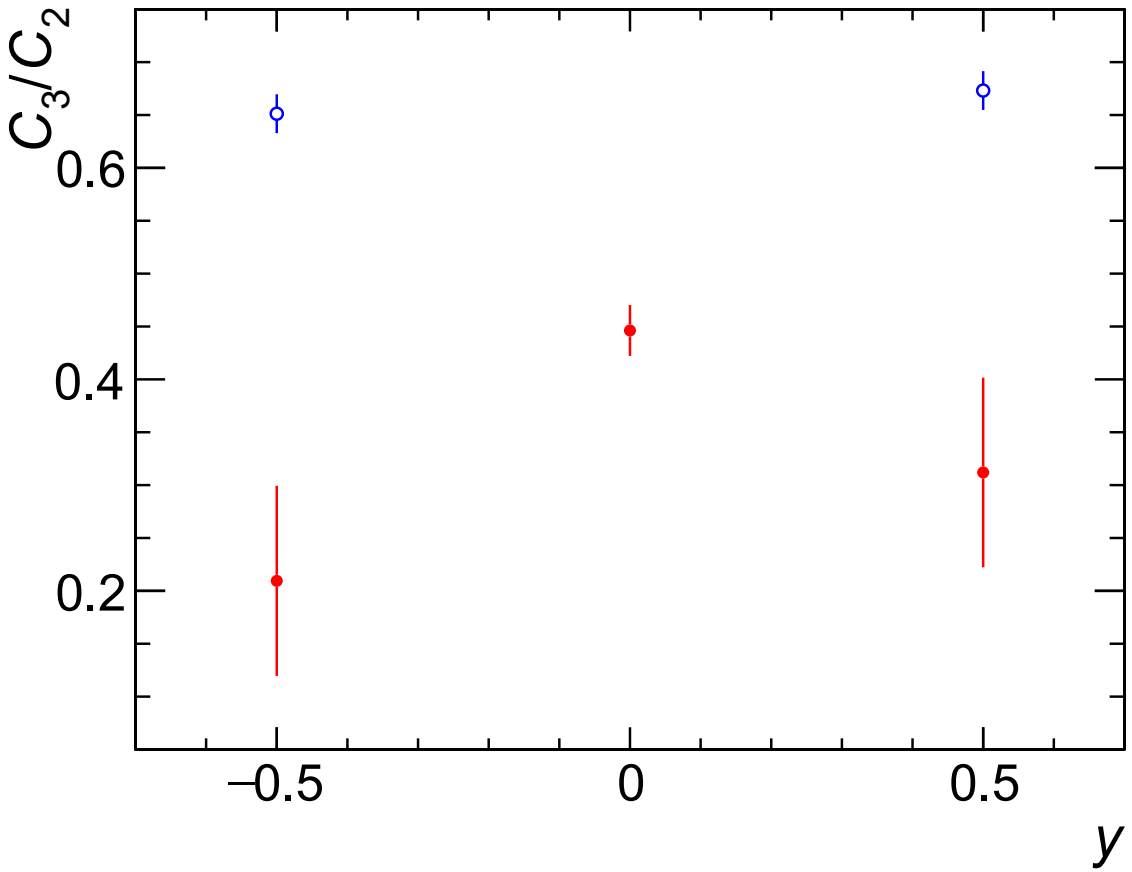

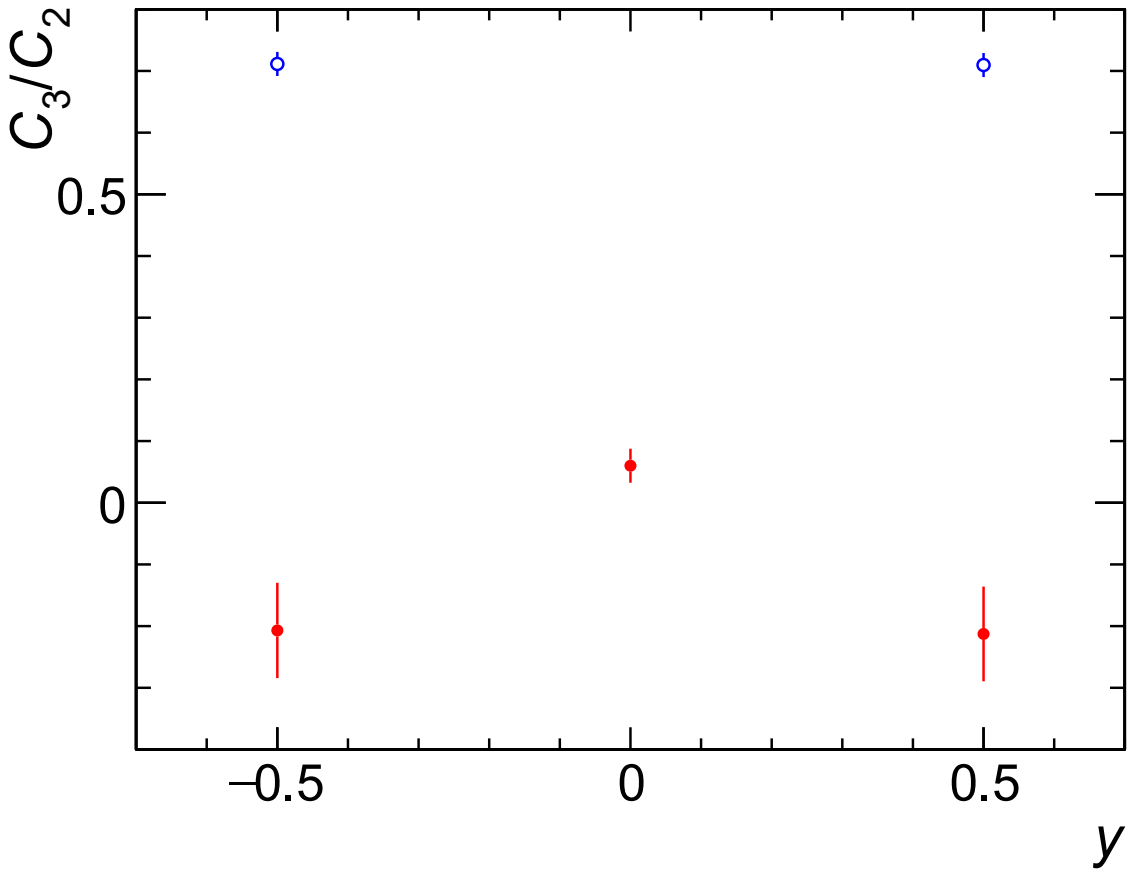

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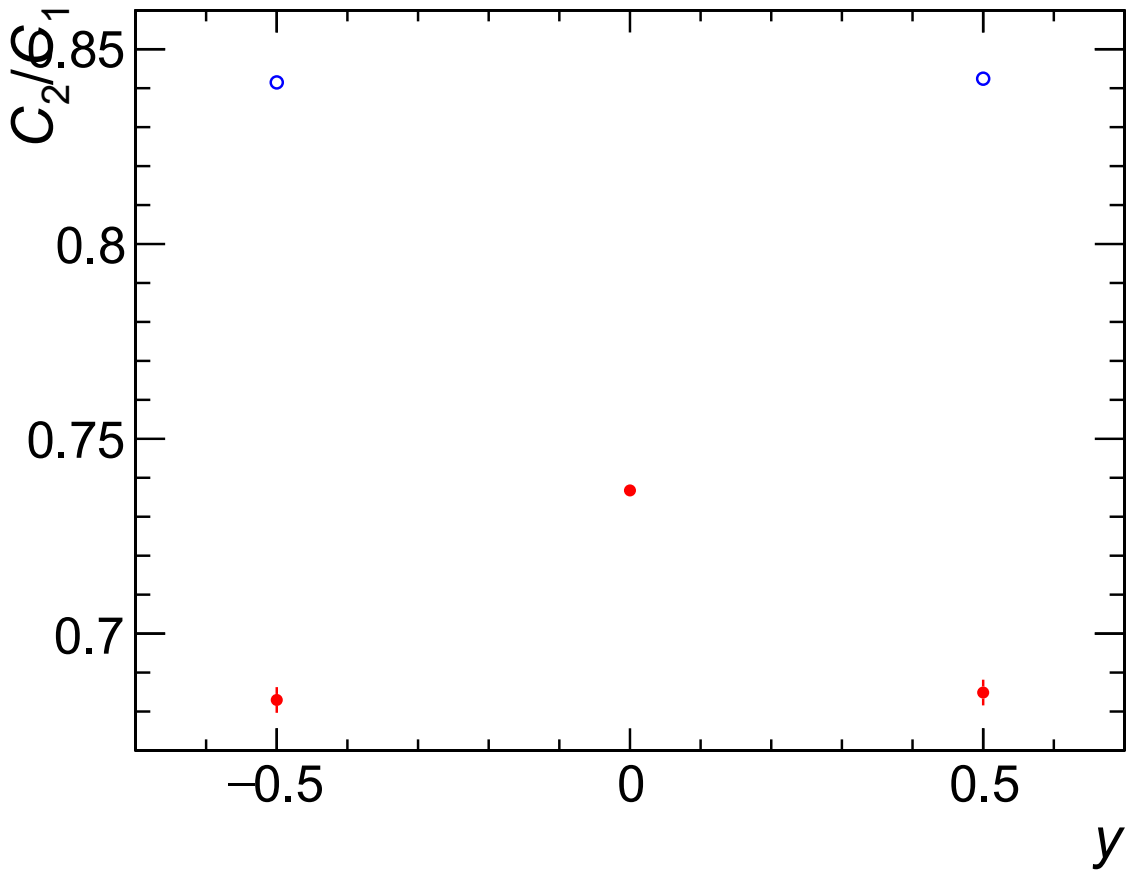

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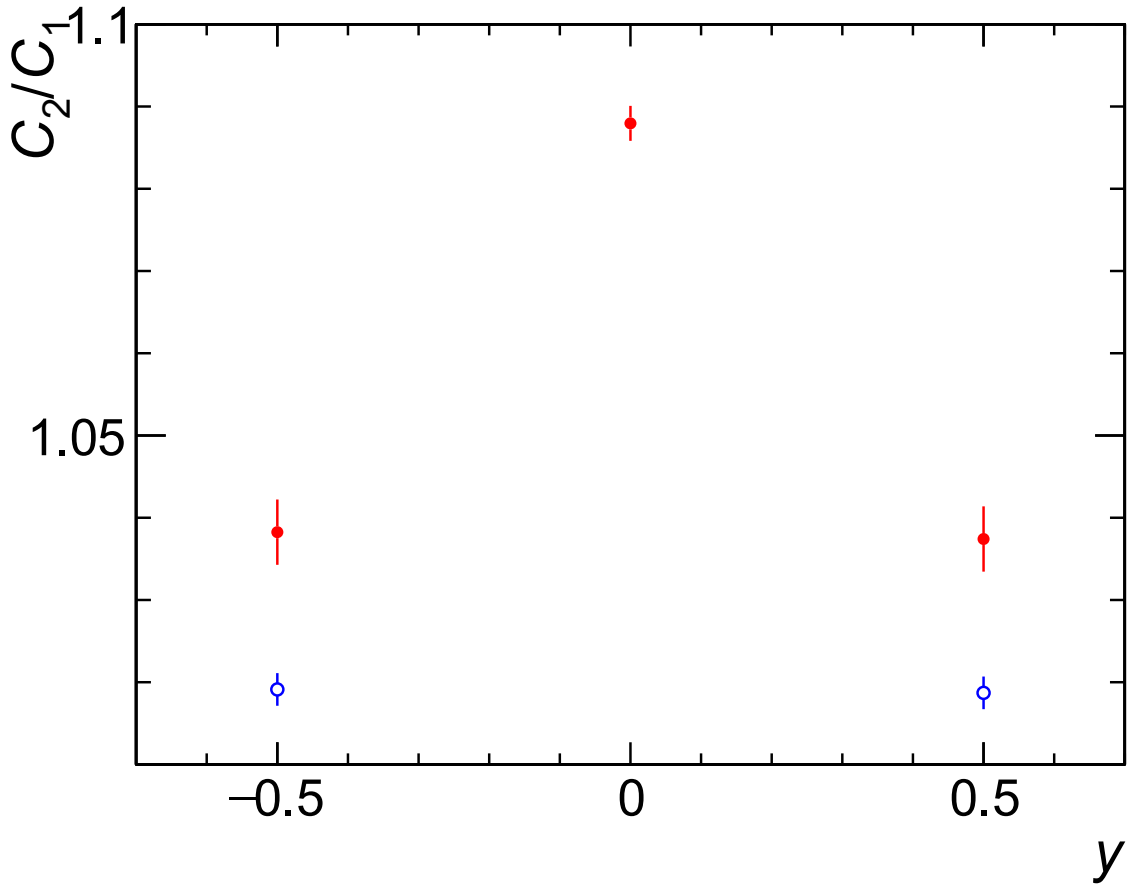
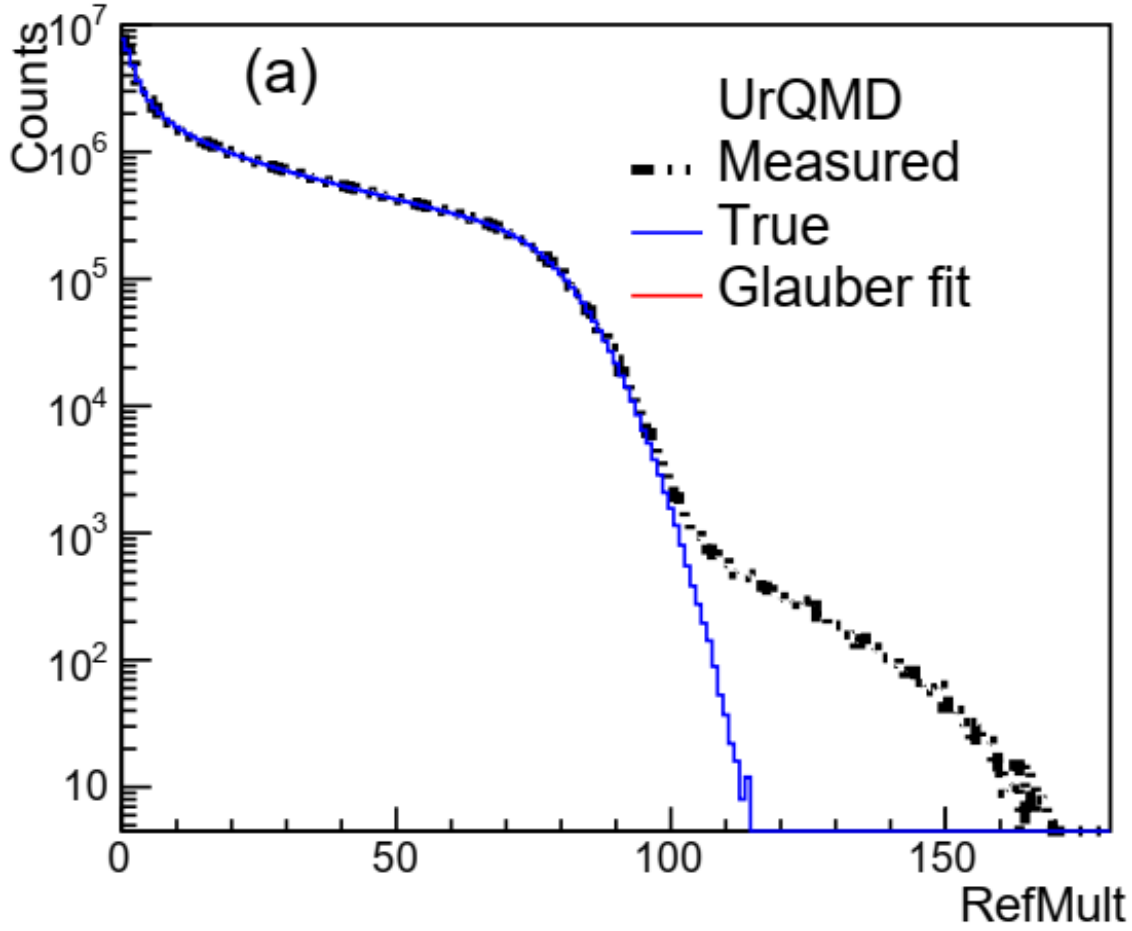
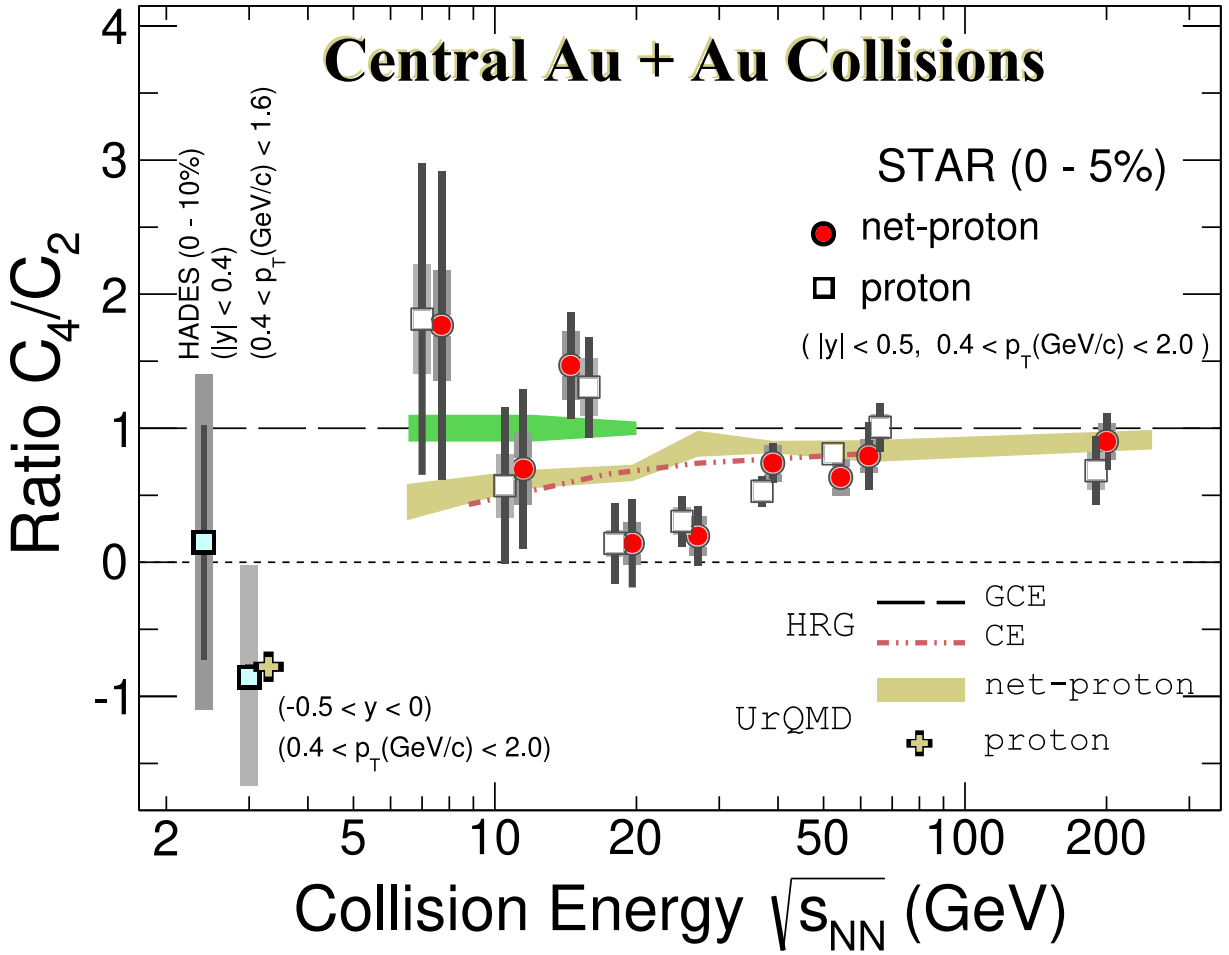


UrQMD results in STAR 3.0 GeV analysis

- ~ 8×10^7 minimum bias events → ~ 10^8 events





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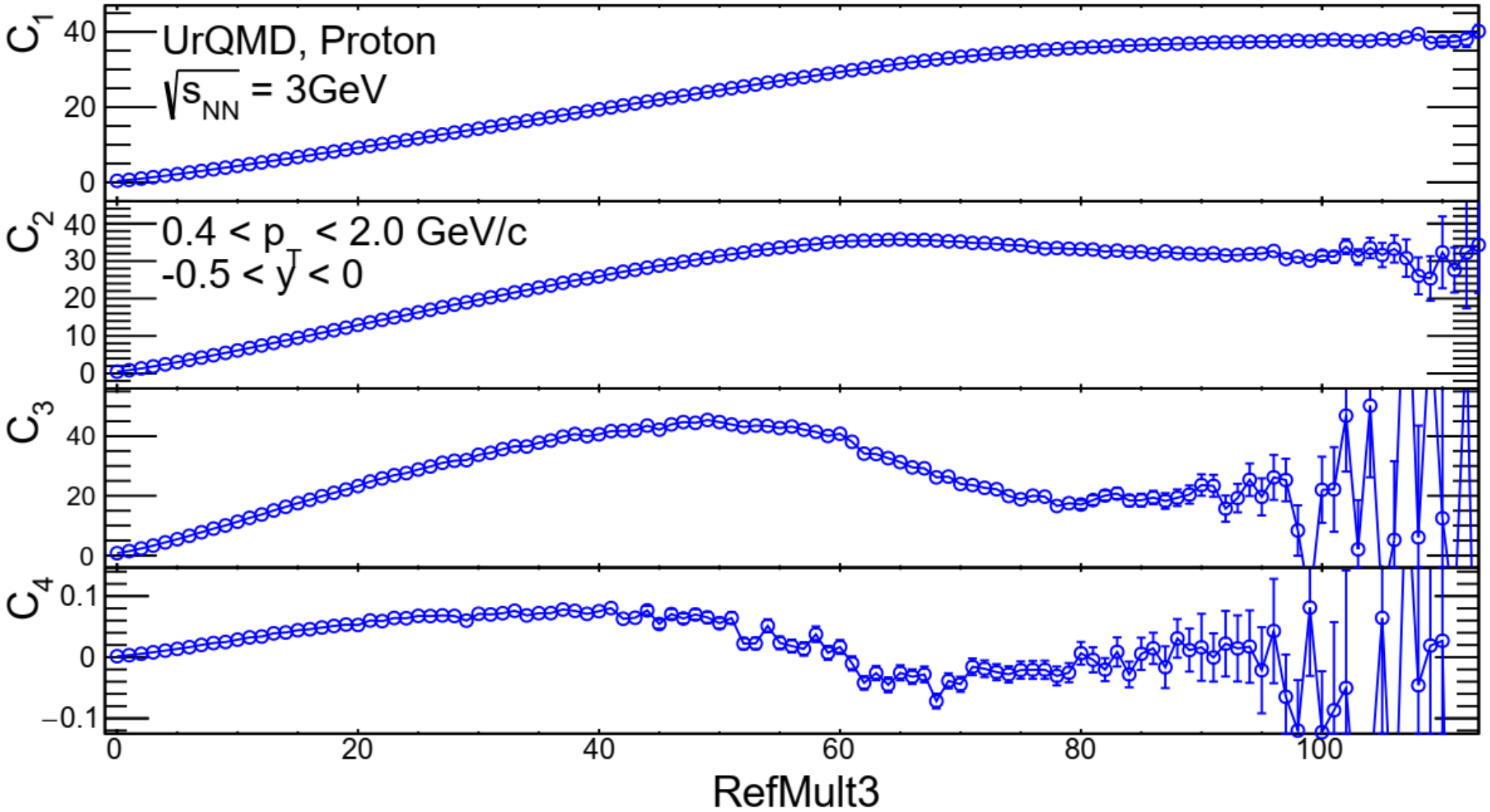
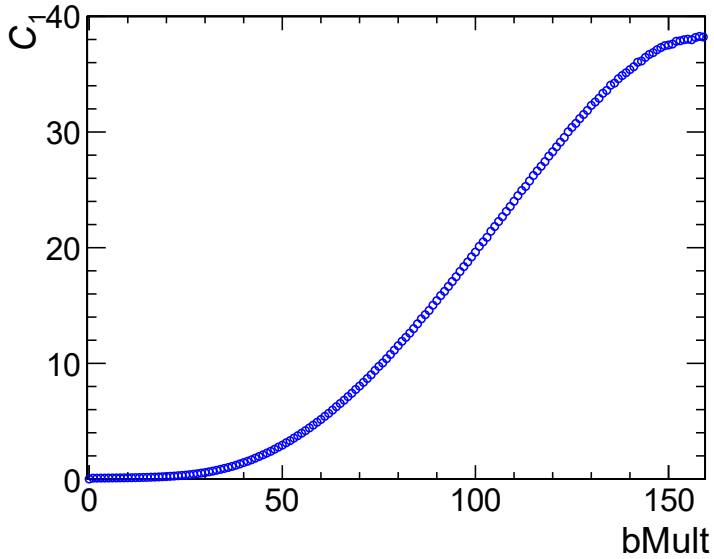
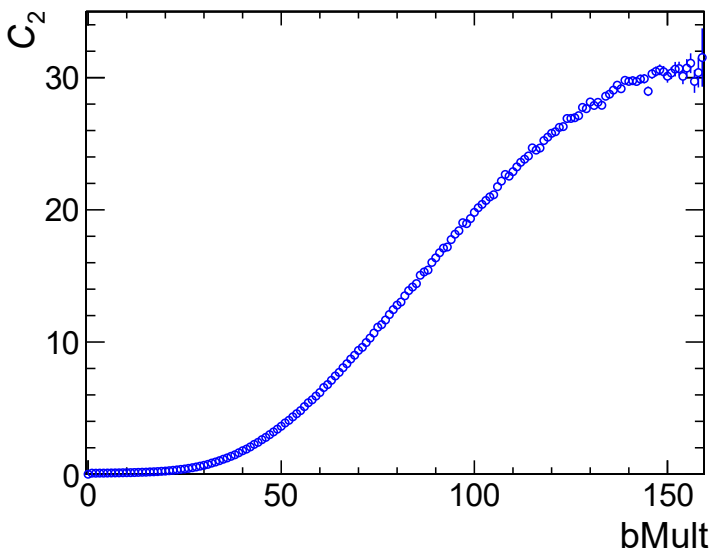
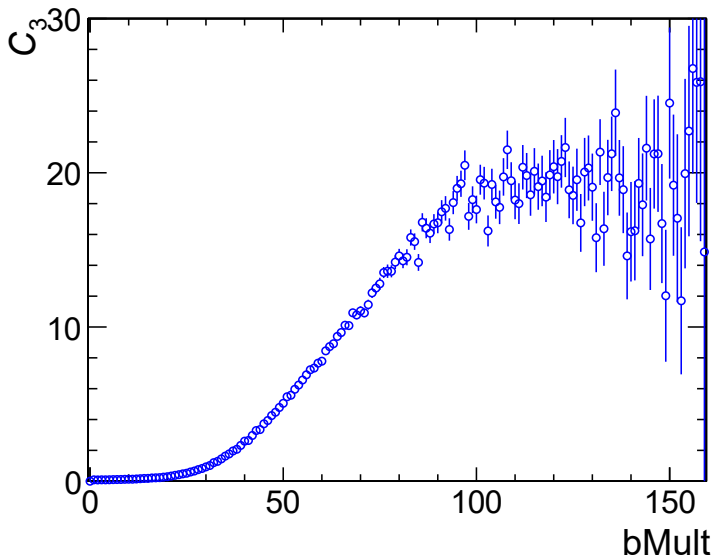


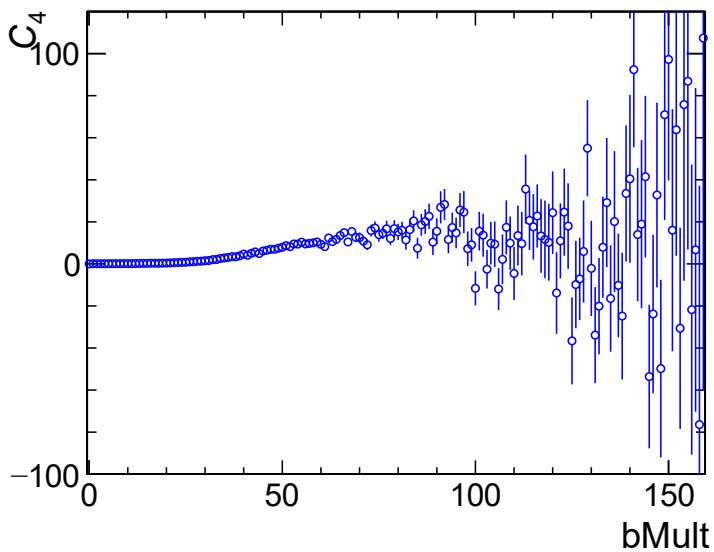
UrQMD results ($-0.5<y<0$)

- bMult = 159−TMath::FloorNint(b/(0.1 fm))

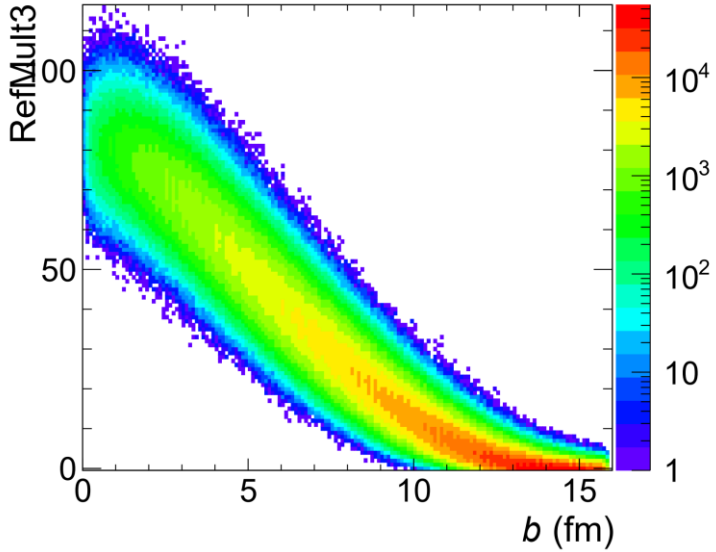


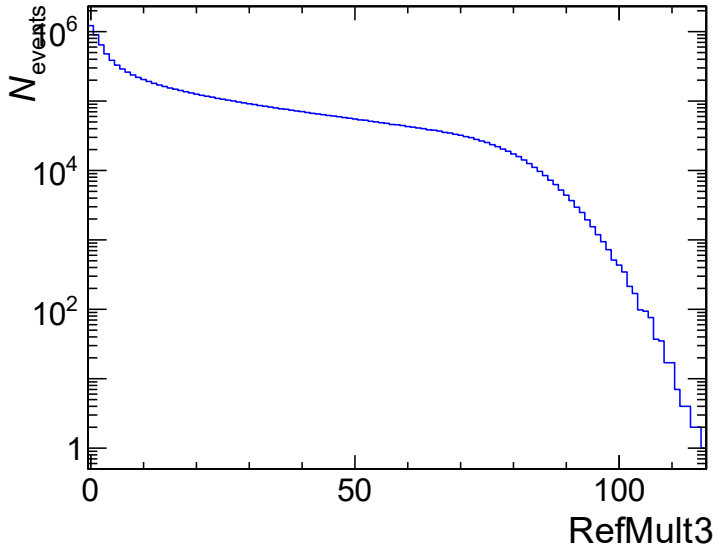


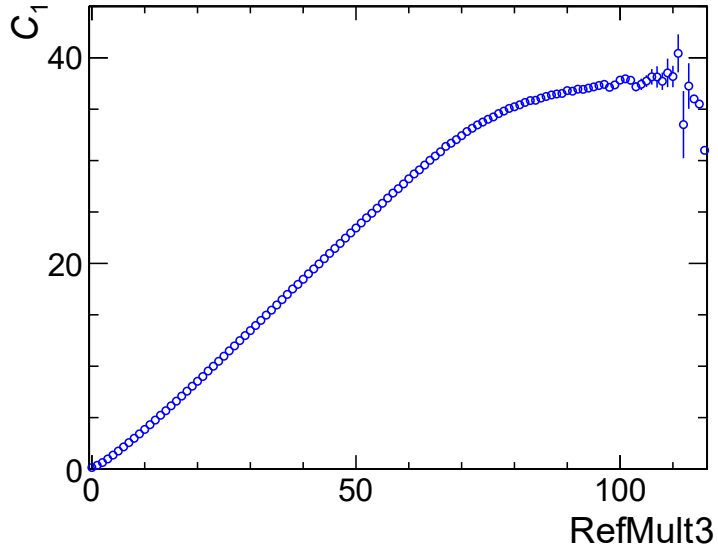


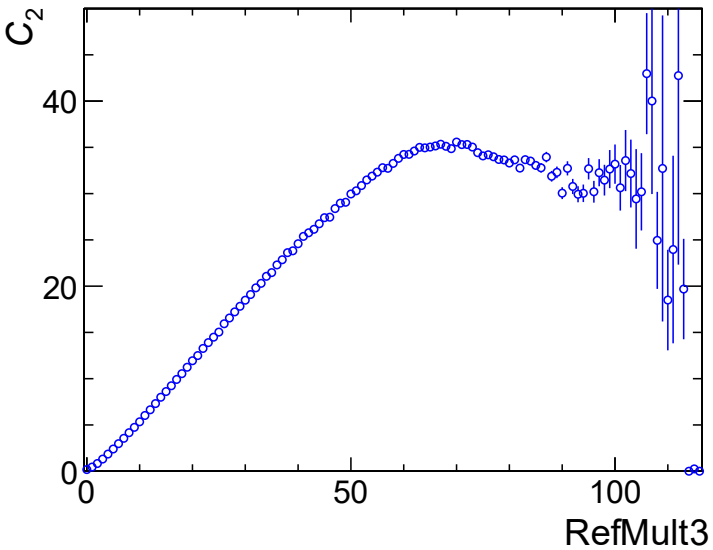


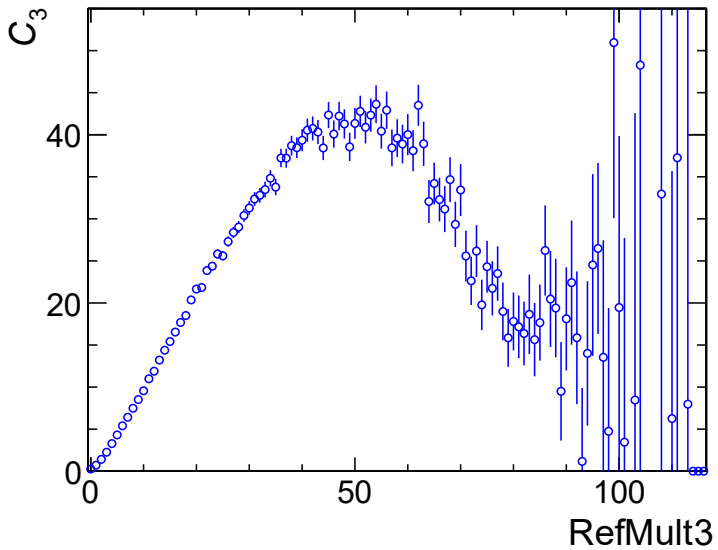
UrQMD results (−0.5<*y*<0)

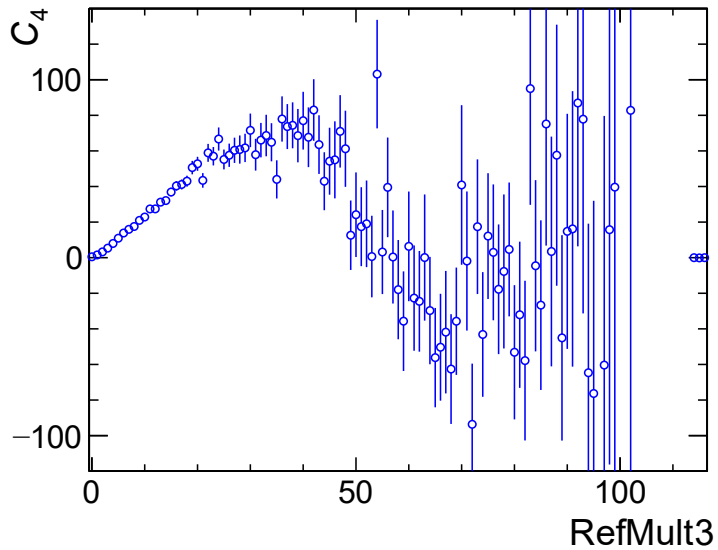












Summary

- Closer to true value after rapidity correction
- Different results between centrality definitions with *b* and RefMult3
- Comparison to STAR UrQMD analysis
  - Similarities
    - Multiplicity peak @ 0 (large *b* out of minimum bias)
    - RefMult3 maximum ~< 120 (similar RefMult3 definition)
    - RefMult3 dependence of cumulants (different shape of *b* dependence)
  - Differences
    - C_4/C_2 ($-0.5<y<0$) ~ −0.5 (~ −0.75 in STAR paper figure)
    - C_4/C_2 ($|y| < 0.5$) ~ −5 (~ −4 in STAR paper text)