Analysis Update

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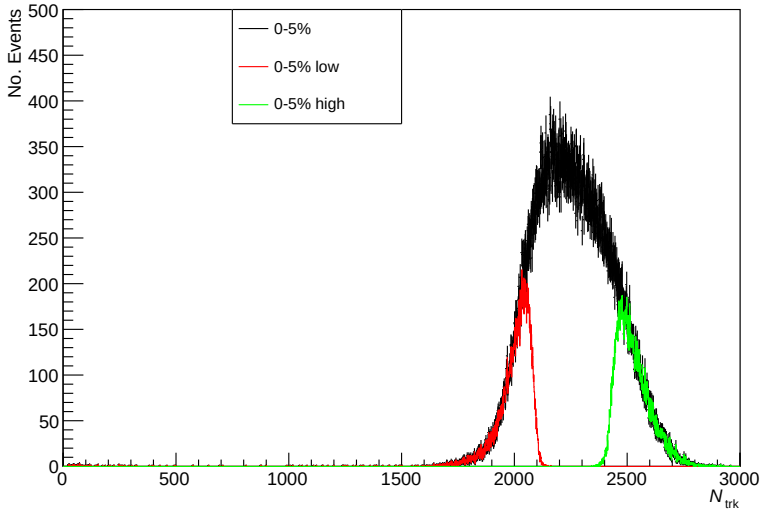
Outline

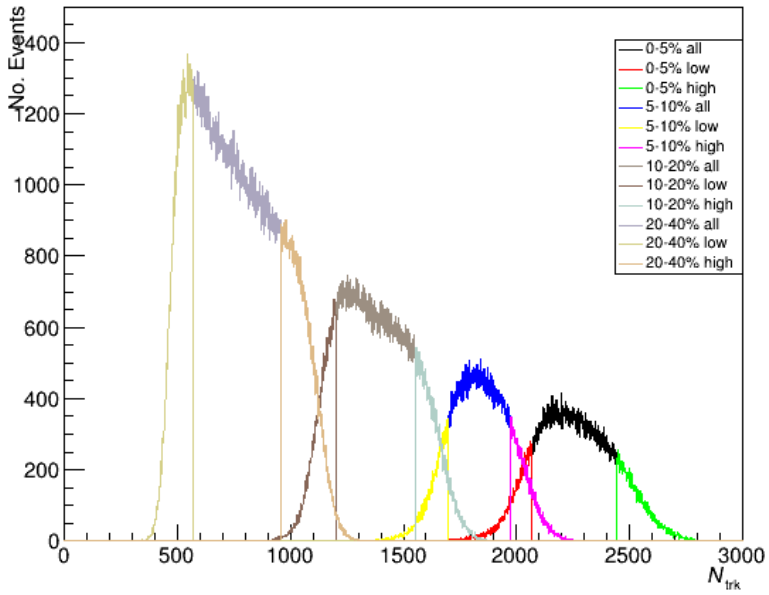
1. Errorbars
2. Multiplicity Results
3. Ratio Results
4. Comments/questions

Changes

- Running the analysis once, obtaining the multiplicities for the whole dataset (no low/high separation), obtaining the means and standard deviations, and then running the analysis again separating low and high.



(a) Before. Notice that the low and high histograms decay smoothly



(b) Now. Notice the sharp decay of the low and high histograms.

Errorbars

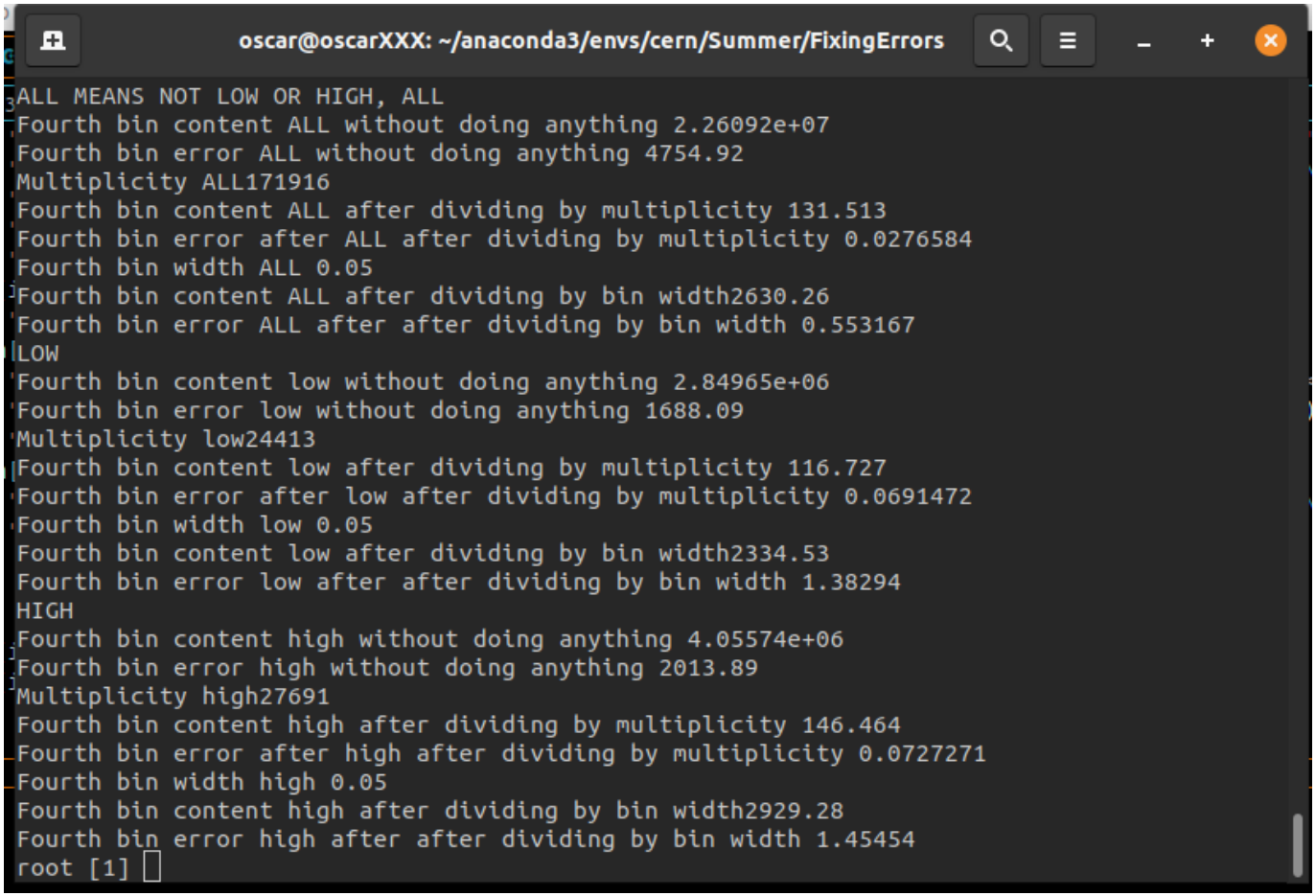
- The errors on the p_T histograms obtained from the analysis are automatically set to $\sqrt{\text{number of entries}}$. This has been manually checked using GetBinError. Since we are interested in the quantity

$$R_{lh,i} = \frac{\left(\frac{1}{N_{ev}} \frac{d^2N}{dp_T d\eta}\right)_{low,i}}{\left(\frac{1}{N_{ev}} \frac{d^2N}{dp_T d\eta}\right)_{high,i}}$$

We should check that the errors are well propagated when dividing the whole diagram by a constant ($N_{ev} \cdot \eta$) and when by dividing each bin count by the bin width.

Errorbars

- This has been manually checked in the original distributions and the low high distributions. Here we include these checks for the 4th bin.



Comments on errorbars

- All the propagation has been done automatically by calling functions like $->$Scale() and $->$Divide.
- Calling h$->$Sumw2() was setting all the errors equal to 0.

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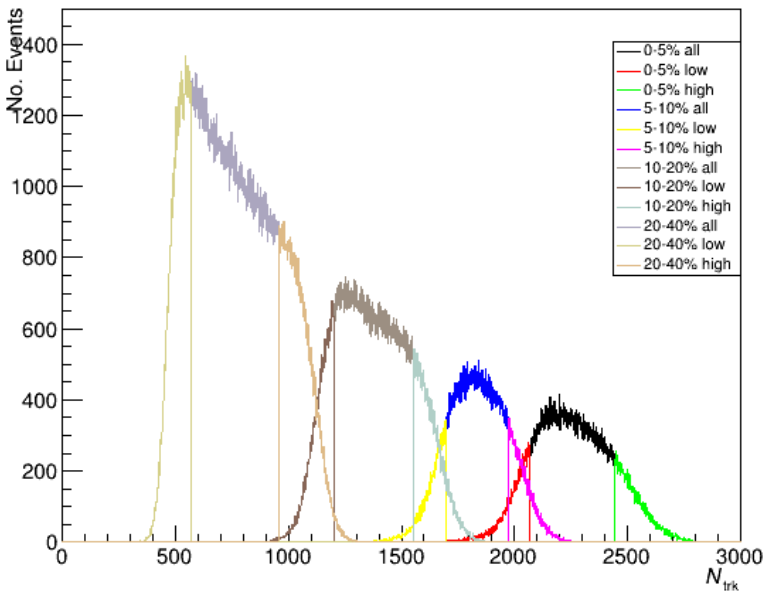
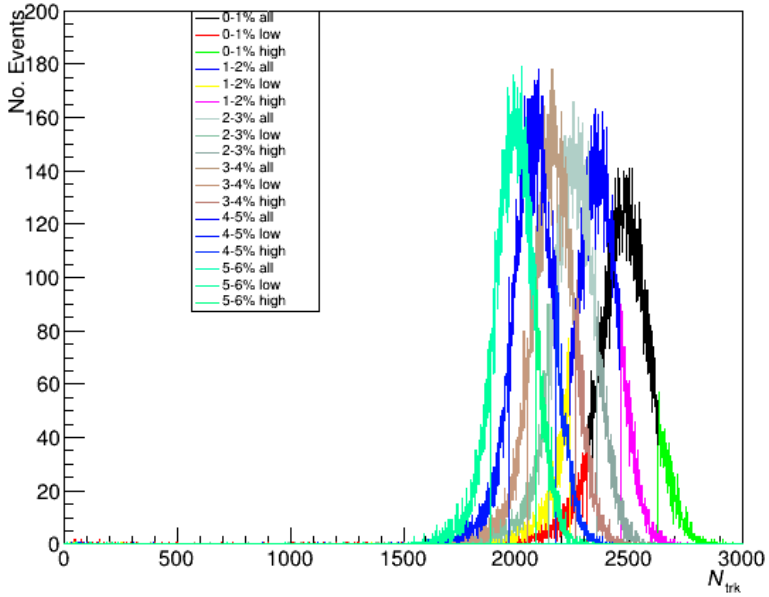
Multiplicity plots



(a) Multiplicity plots for the original centralities



(b) Multiplicity plots for 1% centralities.

Multiplicity plots

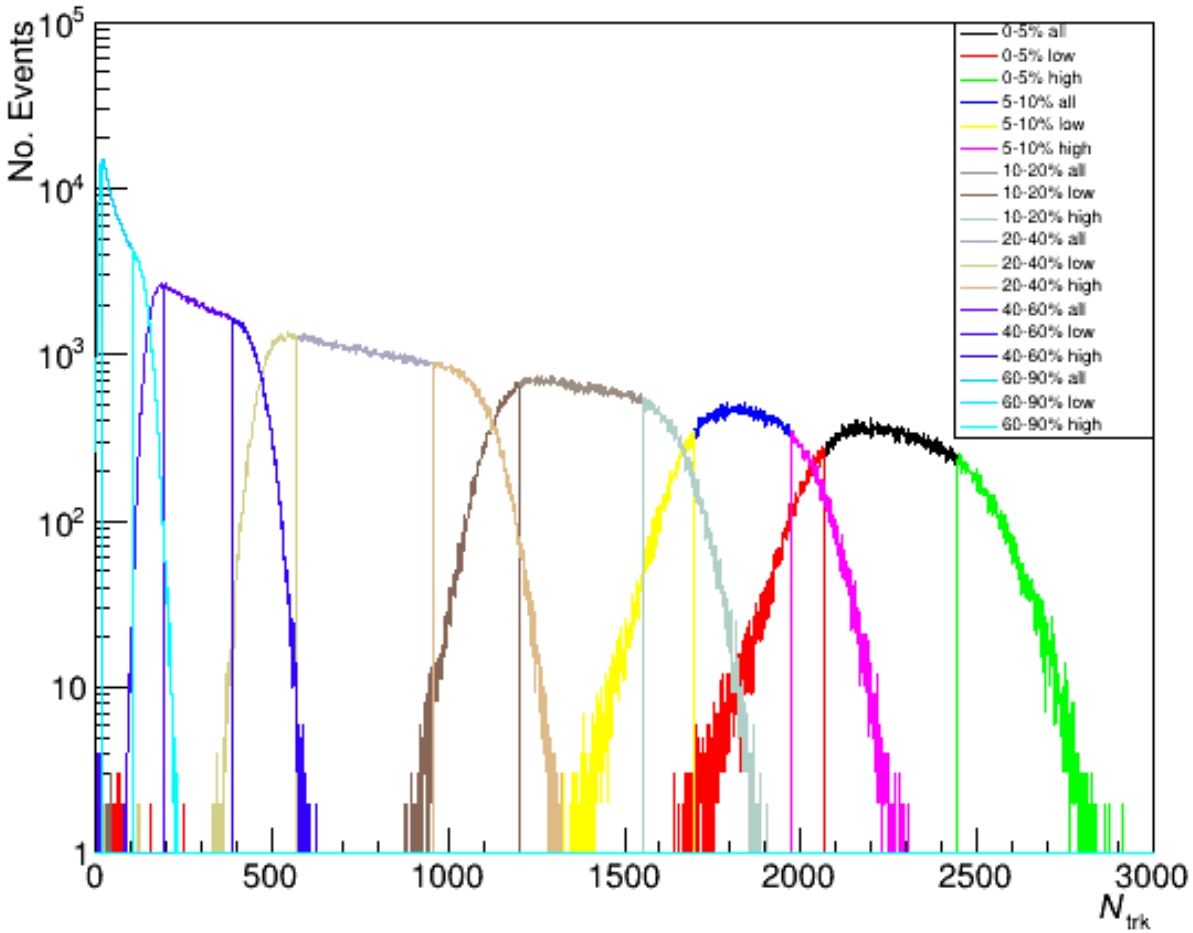


Figure 3: Peripheral collisions have a lot of events!

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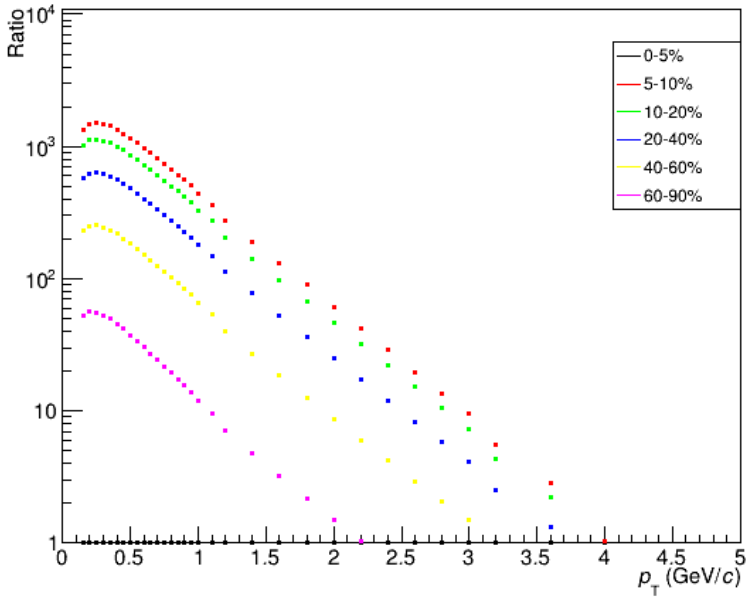
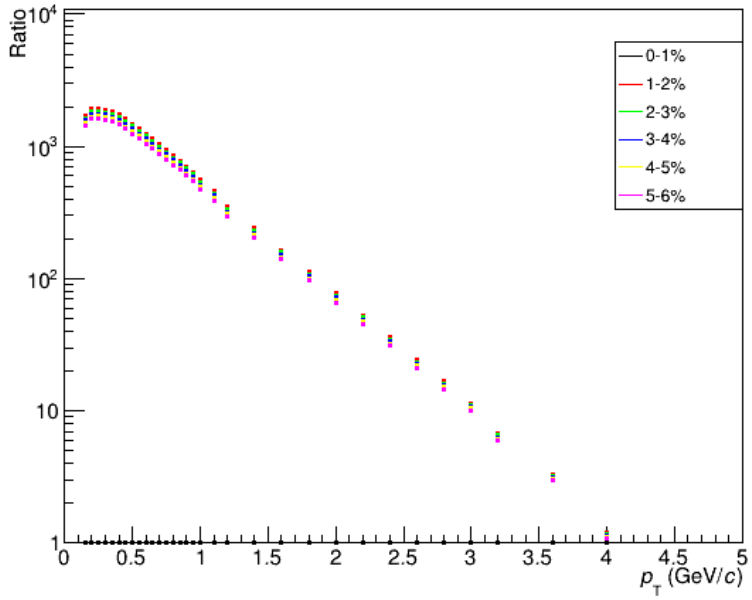
Ratio definitions, R_{aa}^{ij}

- Let i and j be indices that run over the centrality classes. For example $i = 0 \rightarrow 0-5\%$, $i = 1 \rightarrow 5-10\%$... if we have 6 centrality classes or $i = 0 \rightarrow 0-1\%$, $i = 1 \rightarrow 1-2\%$ if we have 100 centrality classes.
- First we will study the ratio R_{aa}^{ij}, where the subindices stand for all/all, we are not separating low and high here.

$$R_{aa}^{ij} = \frac{\left(\frac{1}{N_{ev}} \frac{d^2N}{dp_T d\eta}\right)_i}{\left(\frac{1}{N_{ev}} \frac{d^2N}{dp_T d\eta}\right)_j}$$

- We will study R_{aa}^{i0}, what means that we put the most central collision on the denominator, $0-5\%$ in one case, and $0-1\%$ in the other case.$R_{aa}^{00}=1$, as it should be.

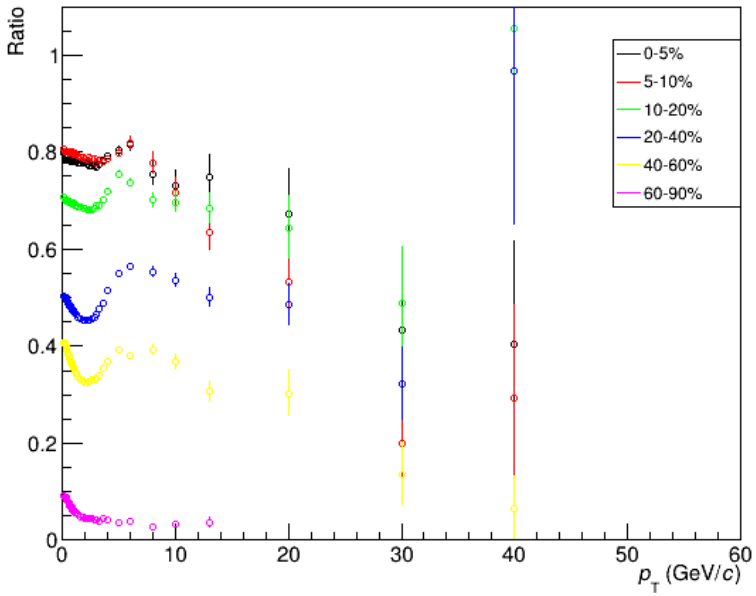


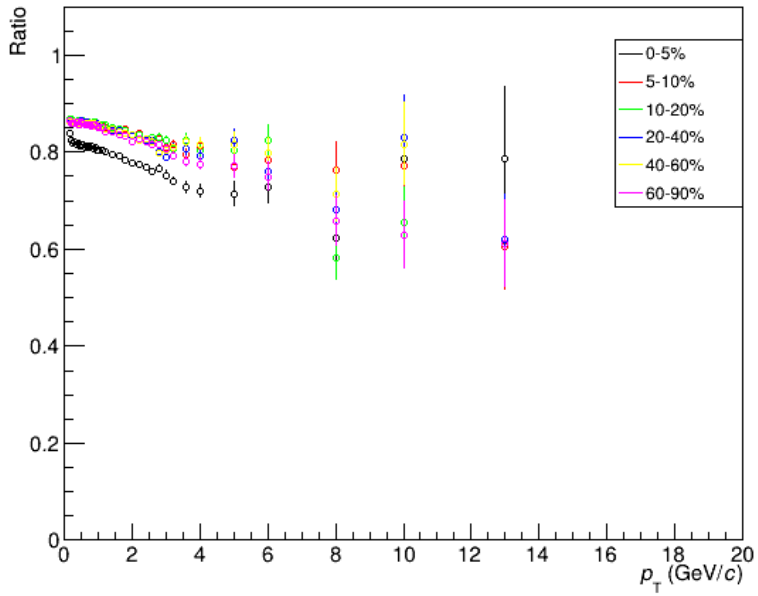


Ratio definitions, R_{lh}

- Now we study the quantity R_{lh} for each centrality class, where means low multiplicity part and h means high multiplicity part.

$$R_{lh} = \frac{\left(\frac{1}{N_{ev}}\frac{d^2N}{dp_T d\eta}\right)_{low}}{\left(\frac{1}{N_{ev}}\frac{d^2N}{dp_T d\eta}\right)_{high}}$$





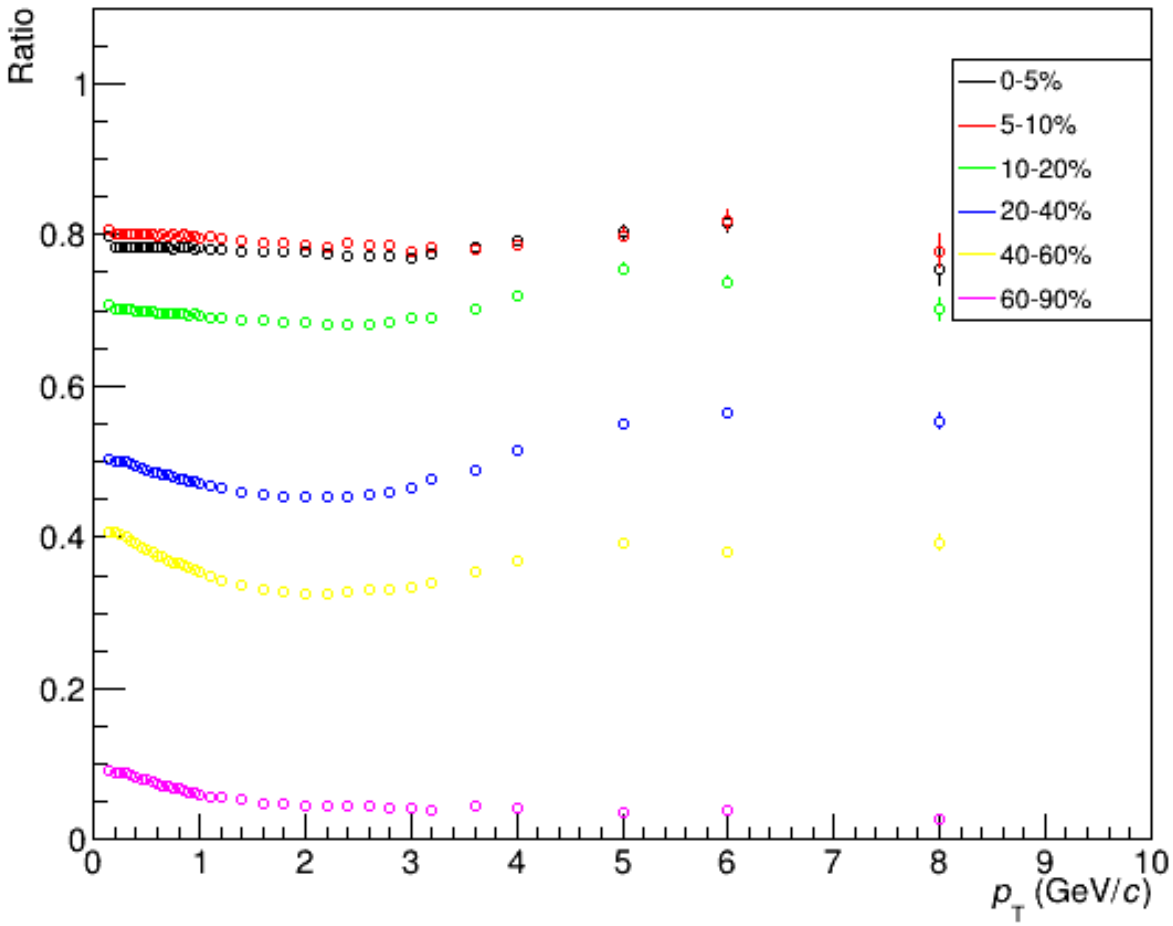
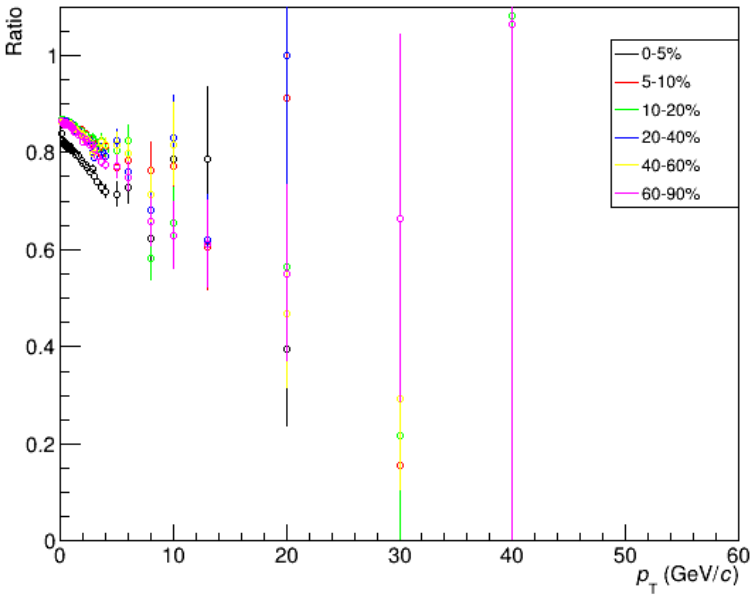


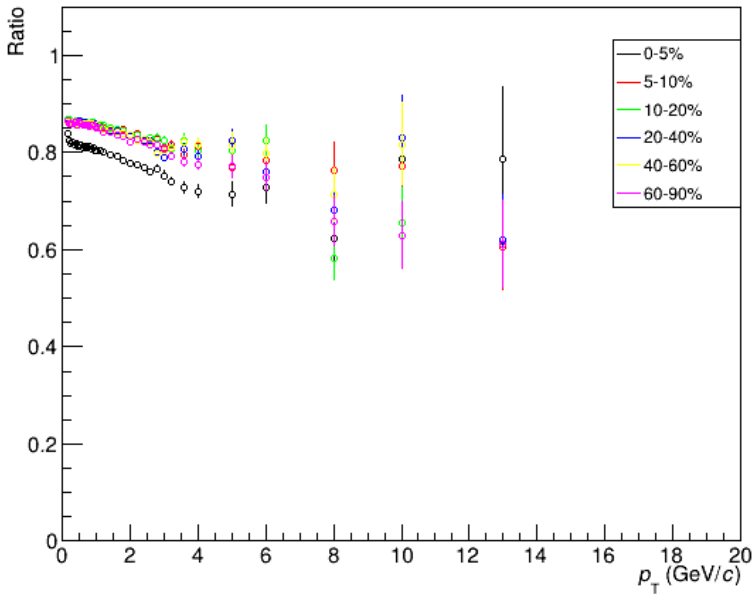
Figure 6: Same plot as before until 10 GeV

R_{lh} for 1% centrality classes

- We plot exactly the same but for 1% centrality classes.

$$R_{lh} = \frac{\left(\frac{1}{N_{ev}}\frac{d^2N}{dp_T d\eta}\right)_{low}}{\left(\frac{1}{N_{ev}}\frac{d^2N}{dp_T d\eta}\right)_{high}}$$





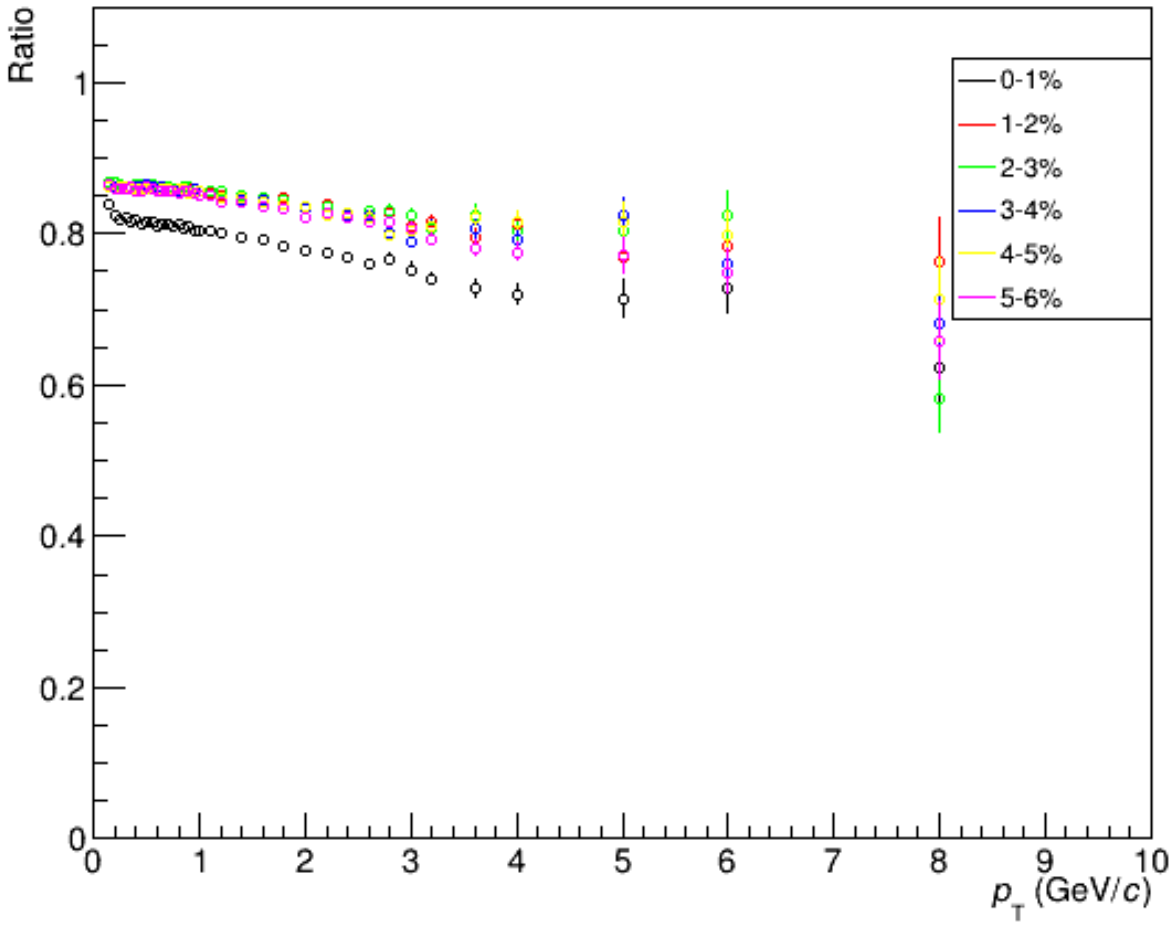


Figure 8: Same plot as before until 10 GeV

Ratio definitions, R^{ij}_{hh}

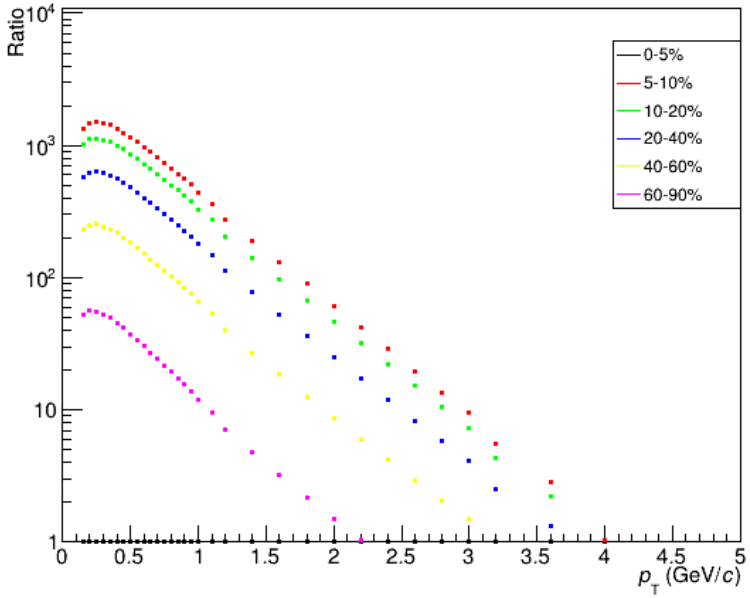
- As suggested by Guy, we also study the quantity R^{ij}_{hh}, where i and j are indices that refer to the centrality class as before and hh means high/high

$$R^{ij}_{hh} = \frac{\left(\frac{1}{N_{ev}}\frac{d^2N}{dp_T d\eta}\right)_{i,high}}{\left(\frac{1}{N_{ev}}\frac{d^2N}{dp_T d\eta}\right)_{j,high}}$$

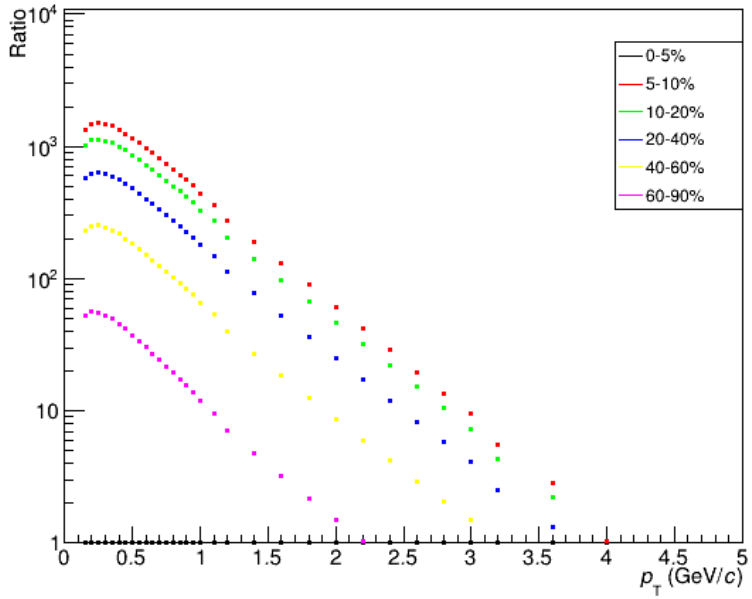
- As before, we will be putting the most central collision in the denominator, therefore we will study R^{i0}_{hh}

R_{hh}^{i0} for the original centrality classes

- The plot on the left corresponds to R_{aa}^{i0}, it was shown in previous slides but it's also displayed here to do the comparison.



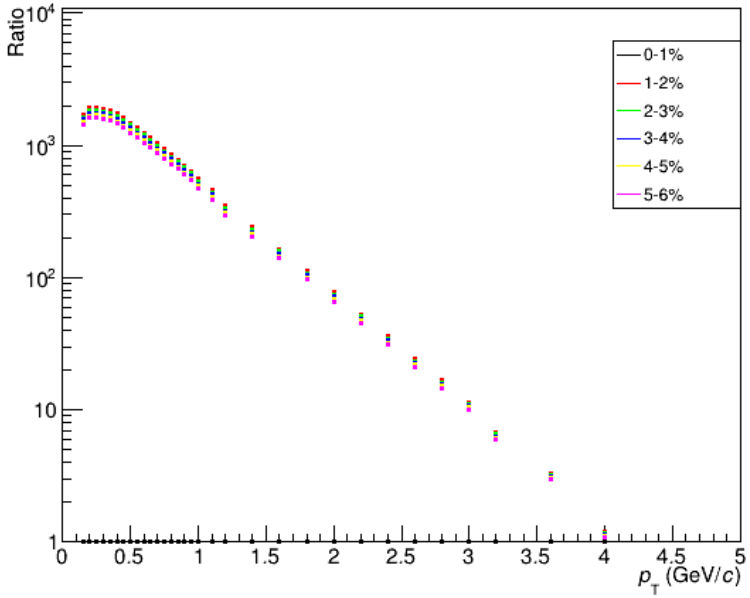
(a) R_{aa}^{i0}, meaning that we don't separate high and low multiplicity parts, we keep all the centrality class.



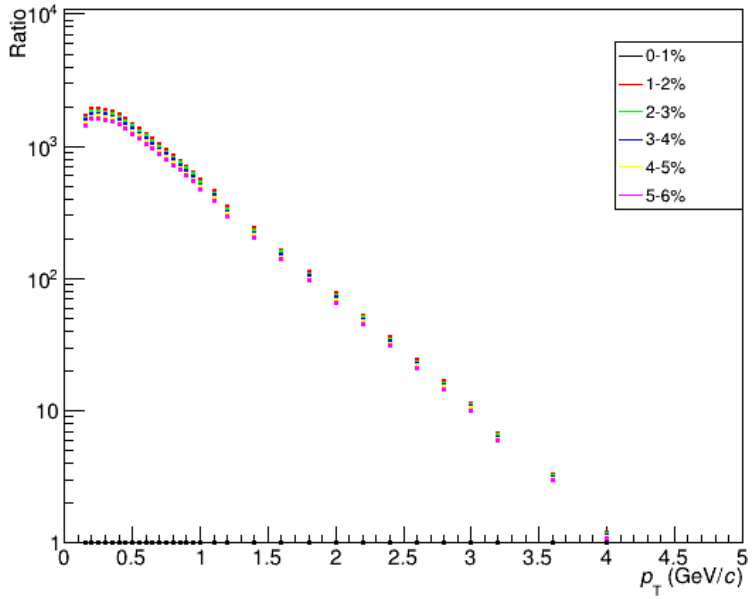
(b) Same plot as in the left, but only keeping the high centrality parts of the centrality class.

R_{hh}^{i0} for 1% classes

- The plot on the left corresponds to R_{aa}^{i0}, it was shown in previous slides but it's also displayed here to do the comparison.



(a) R_{aa}^{i0}, meaning that we don't separate high and low multiplicity parts, we keep all the centrality class.



(b) Same plot as in the left, but only keeping the high centrality parts of the centrality class.

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Comments/questions

- I'm not getting a lot of information from the 1% plots, how could we extract things from there?
- I want to write my report this weekend, do you have suggestions for the structure?