

UE Data Update

Ben Kimelman

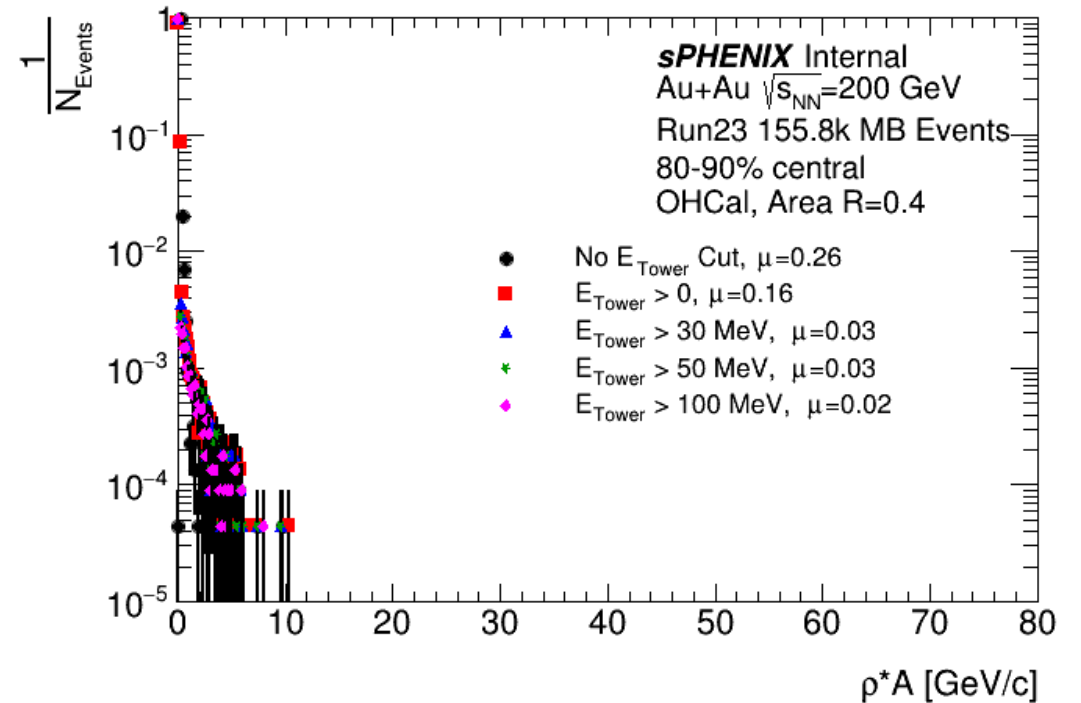
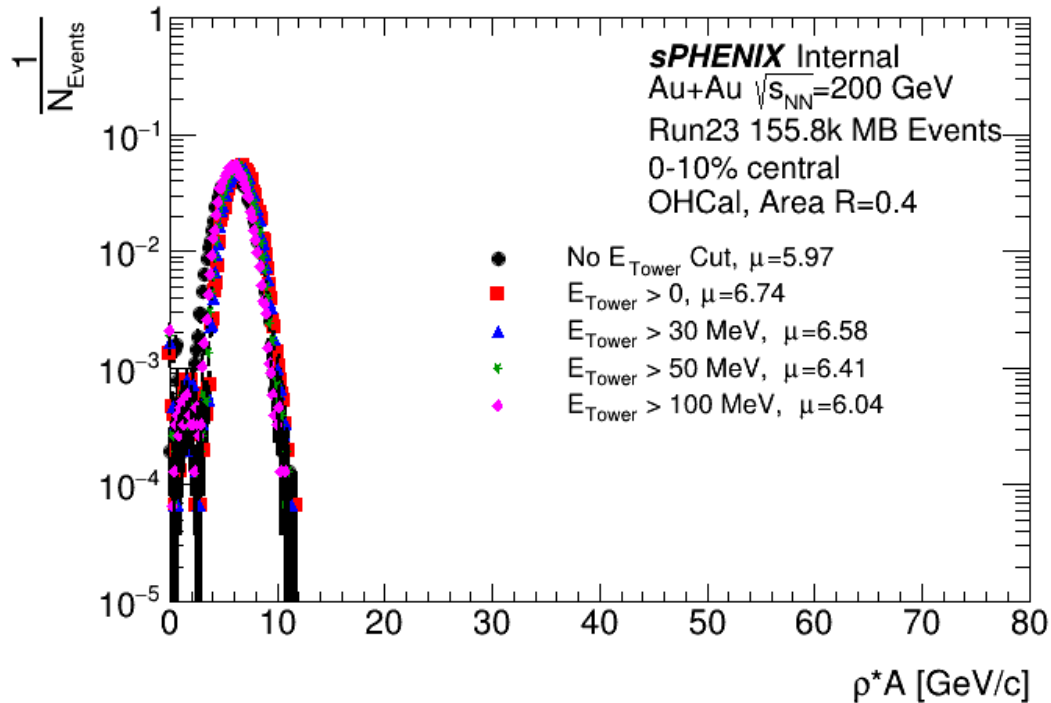
Vanderbilt University

February 6th, 2024

Questions from Calo Calibrations Meeting

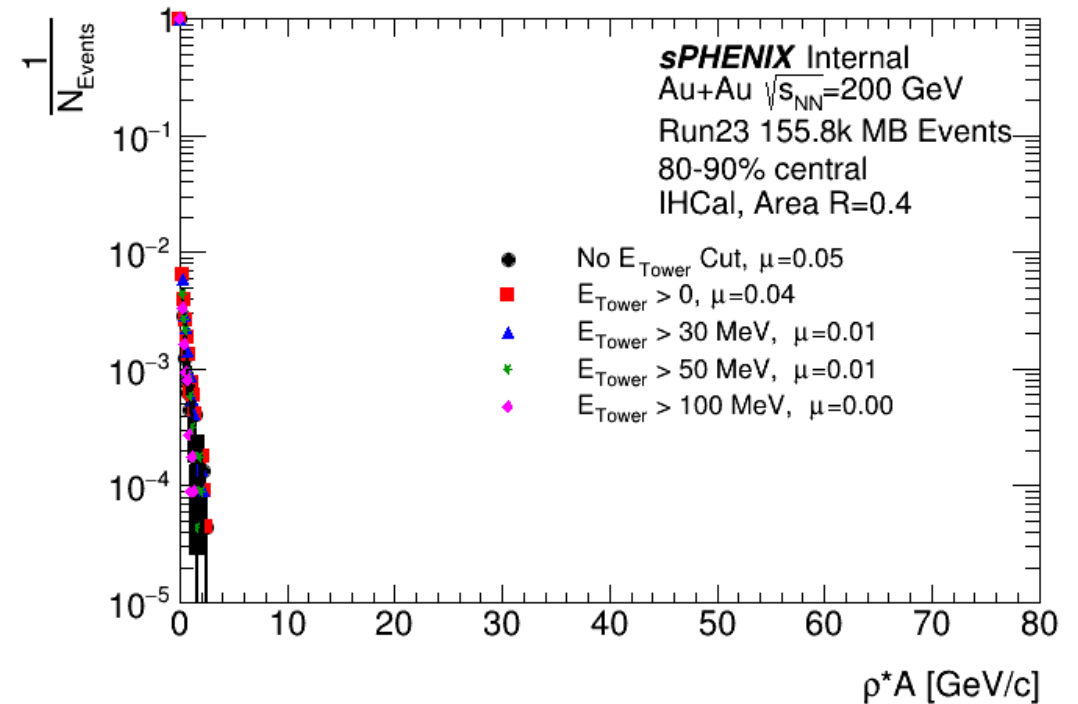
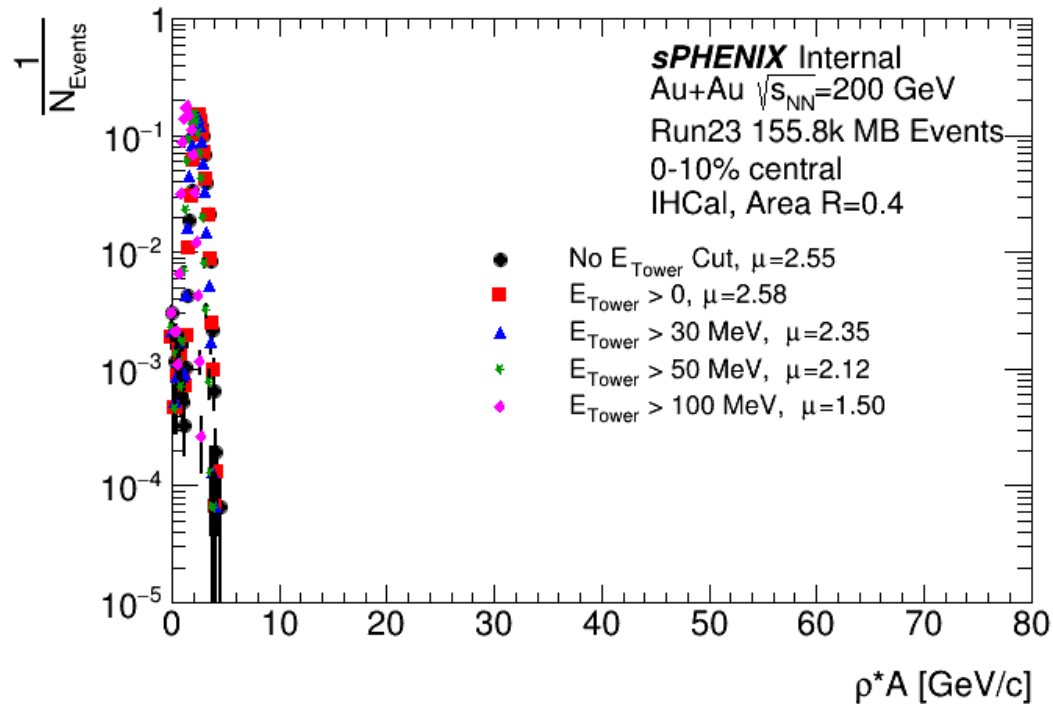
1. What happens to ρ^*A with different tower energy cuts?
2. What if we only apply cuts to the CEMC and not the HCals?
3. How many towers do we find on average in the ρ calculations?

OHCAL with Different Tower Thresholds



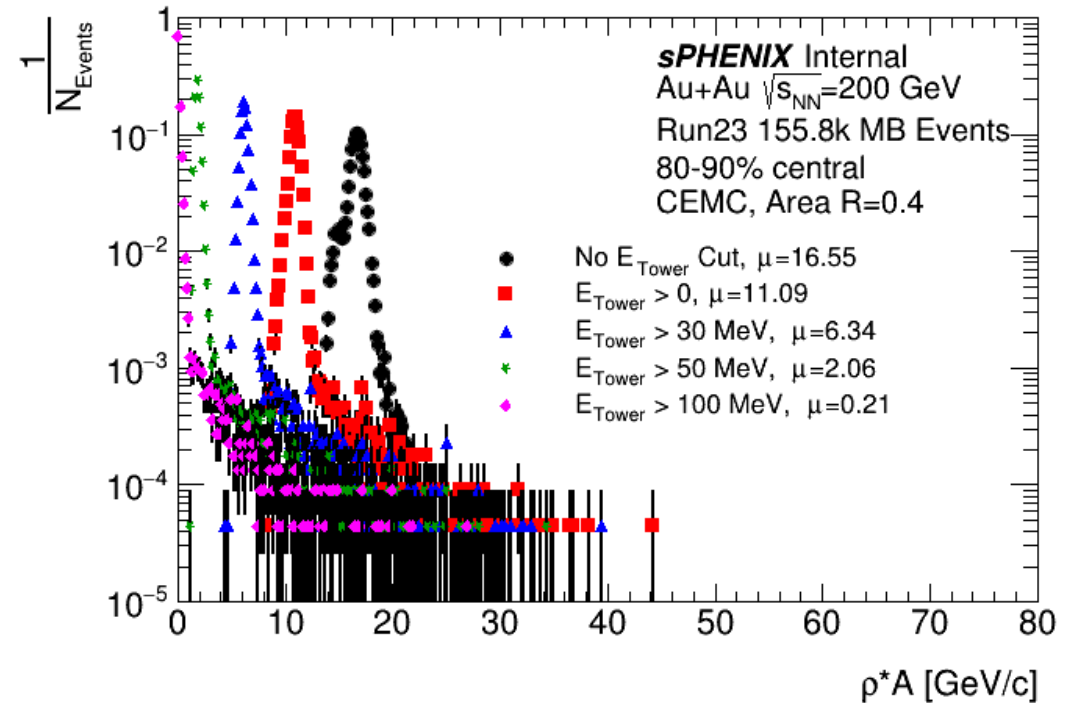
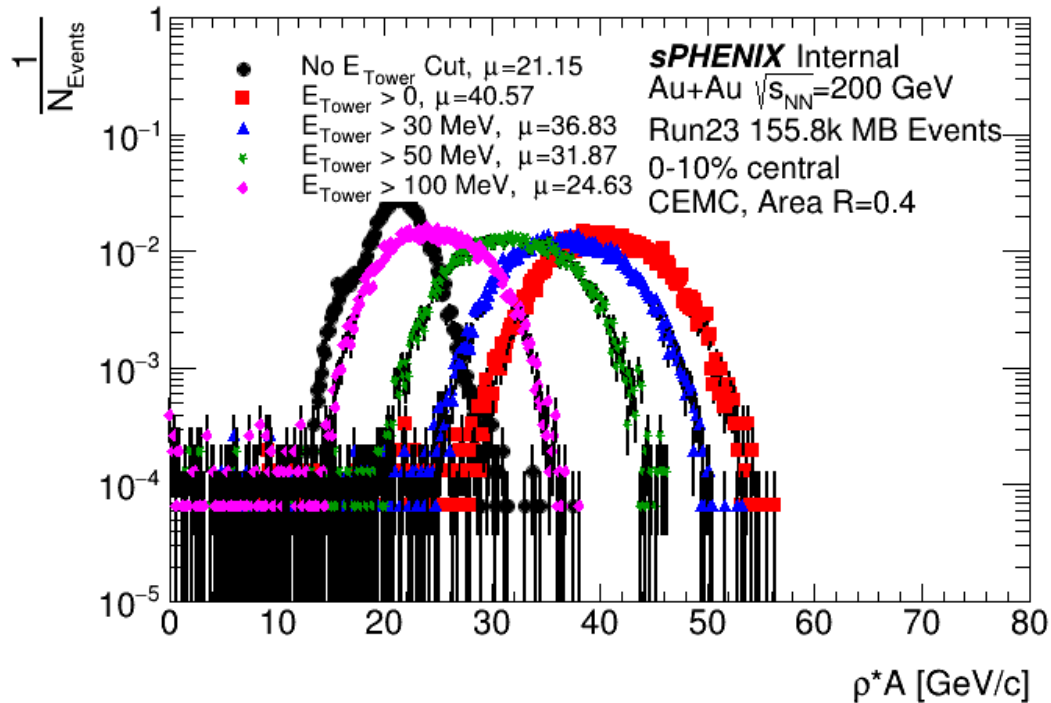
Essentially no change, threshold not very important

IHCal with Different Tower Thresholds



Essentially no change, threshold not very important

CEMC with Different Tower Thresholds

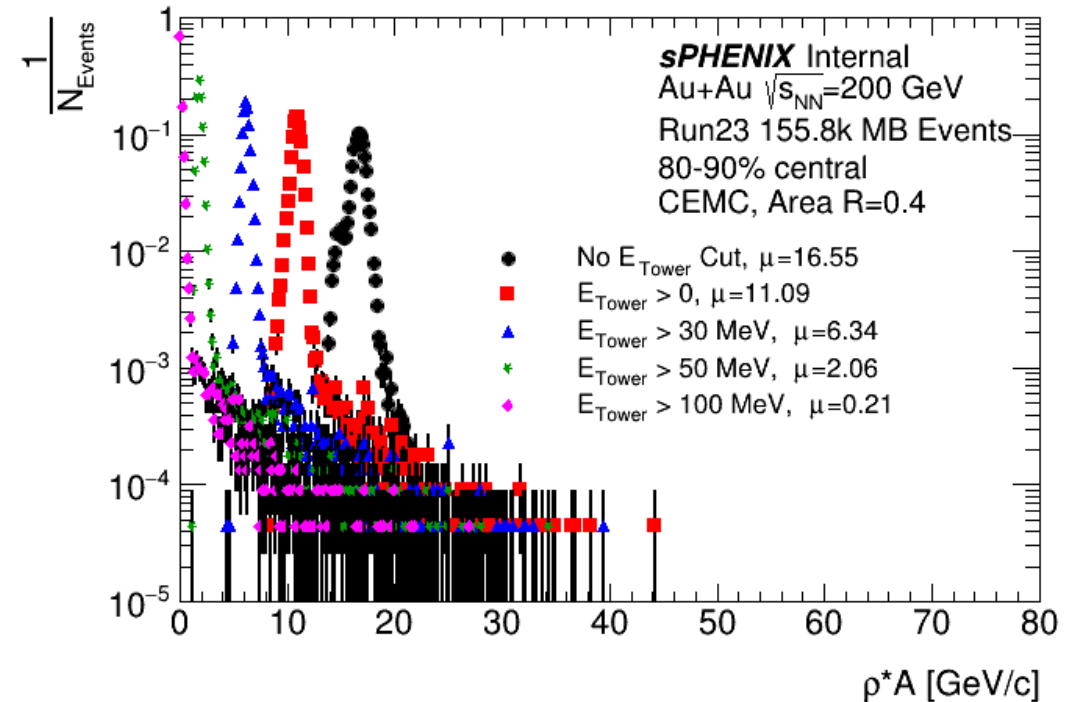
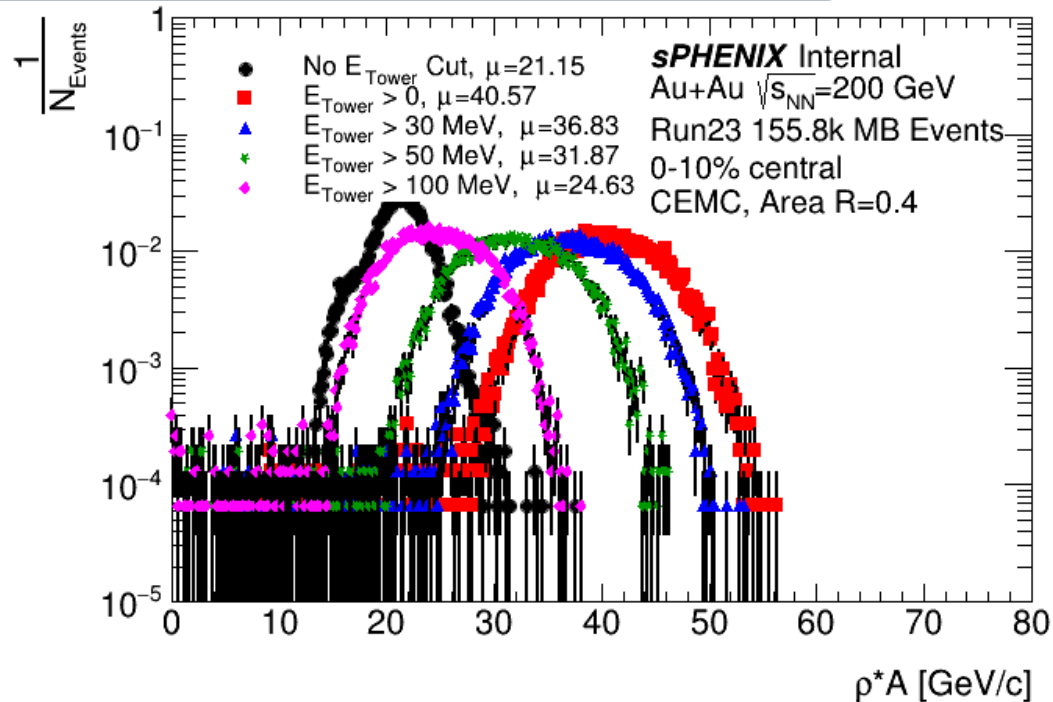


Threshold has large effect on CEMC (discussion of trends on slides 9-11)

CEMC with Different Tower Thresholds

Clear trends in distribution when
changing thresholds

Question 1



Threshold has large effect on CEMC (discussion of trends on slides 9-11)

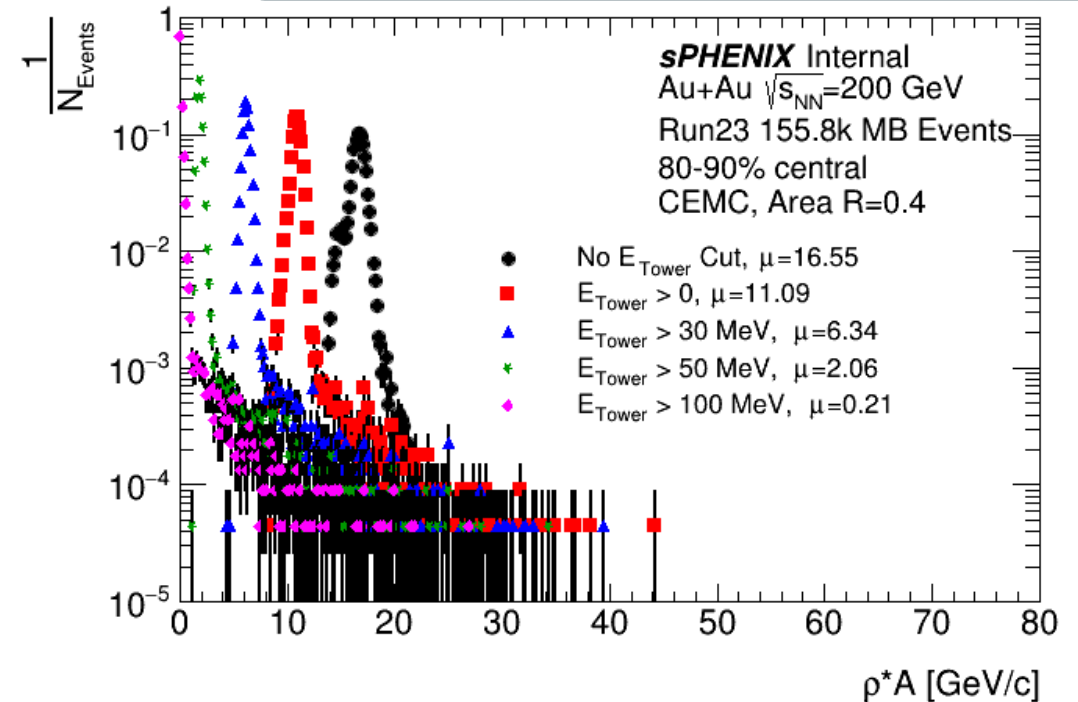
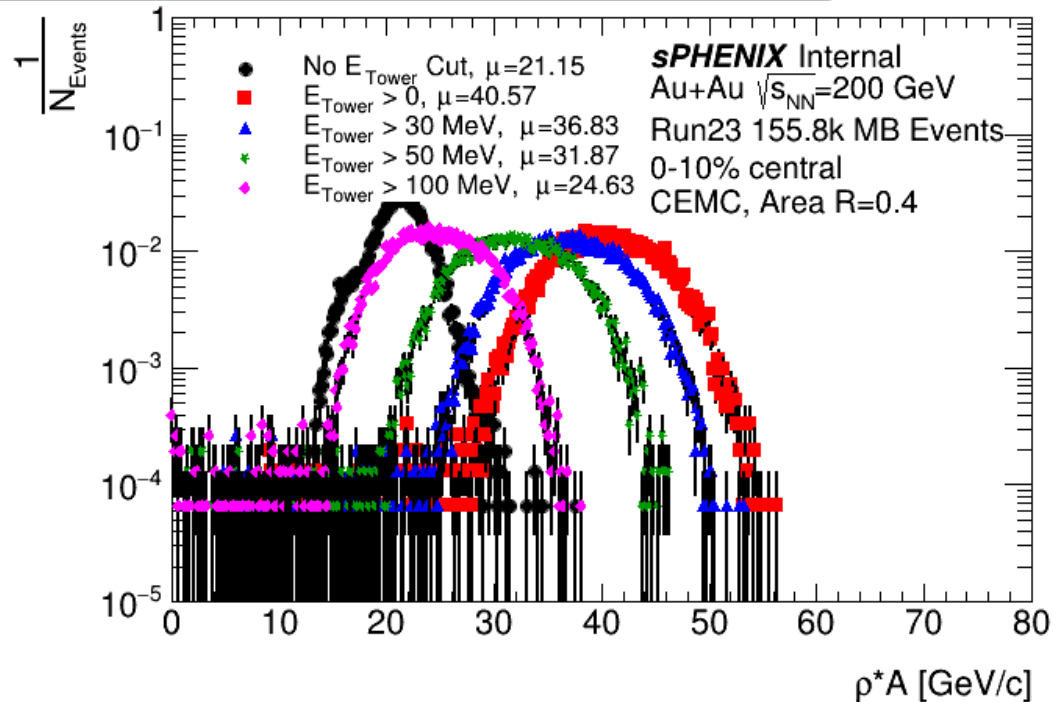
CEMC with Different Tower Thresholds

Clear trends in distribution when changing thresholds

Question 1 

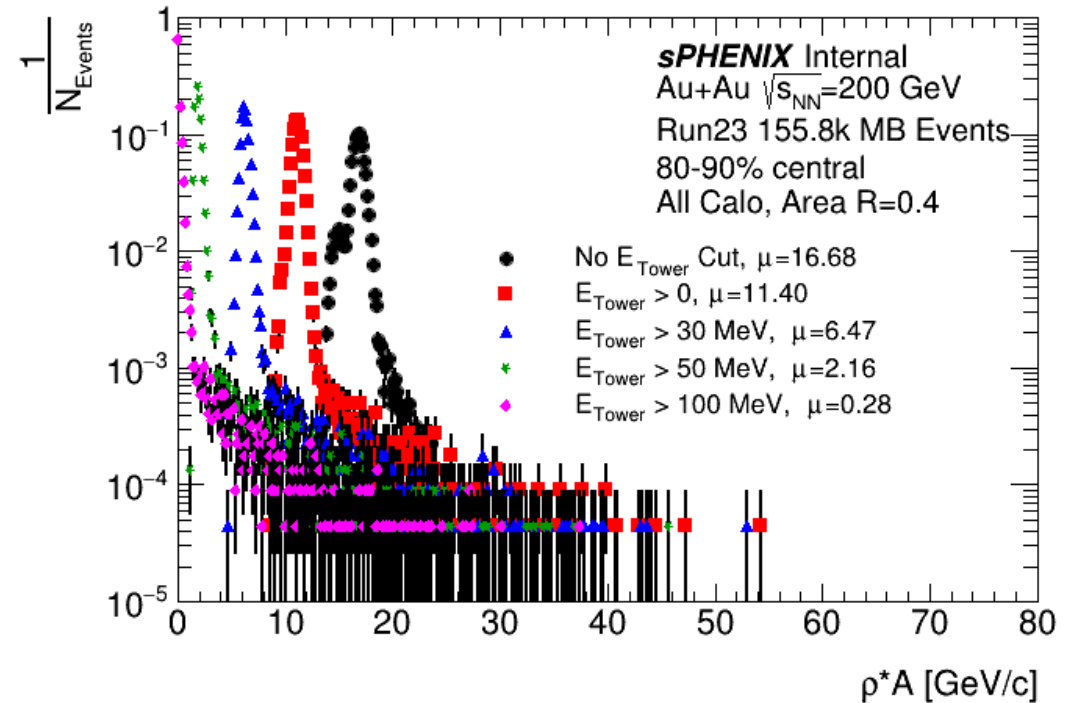
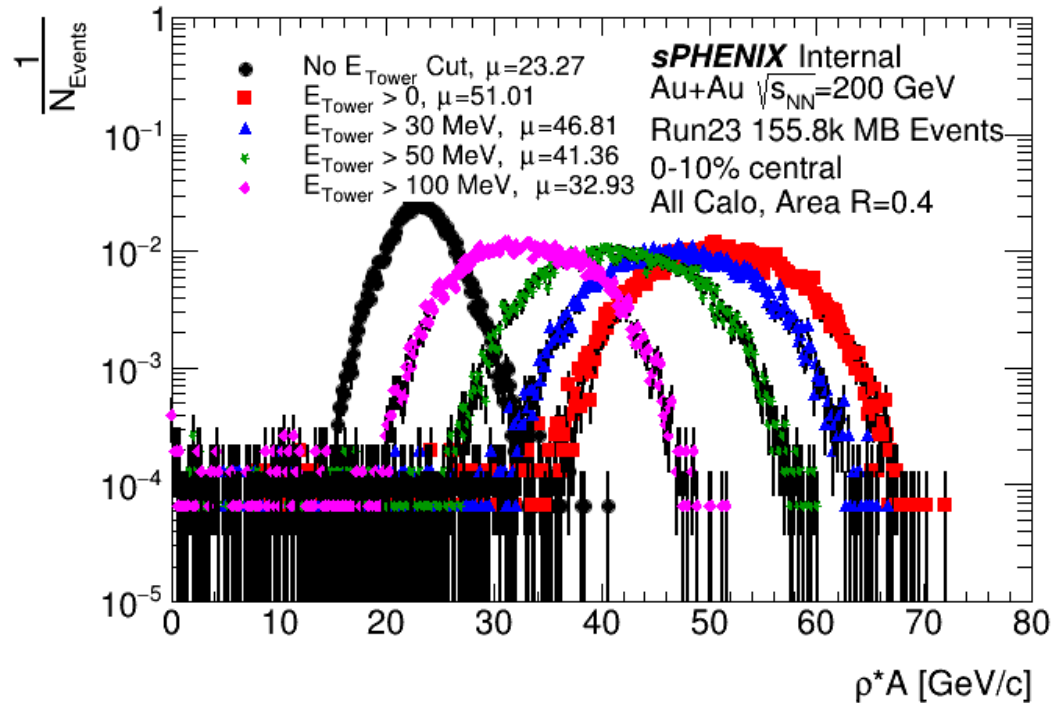
HCals not sensitive to threshold, only CEMC

Question 2 



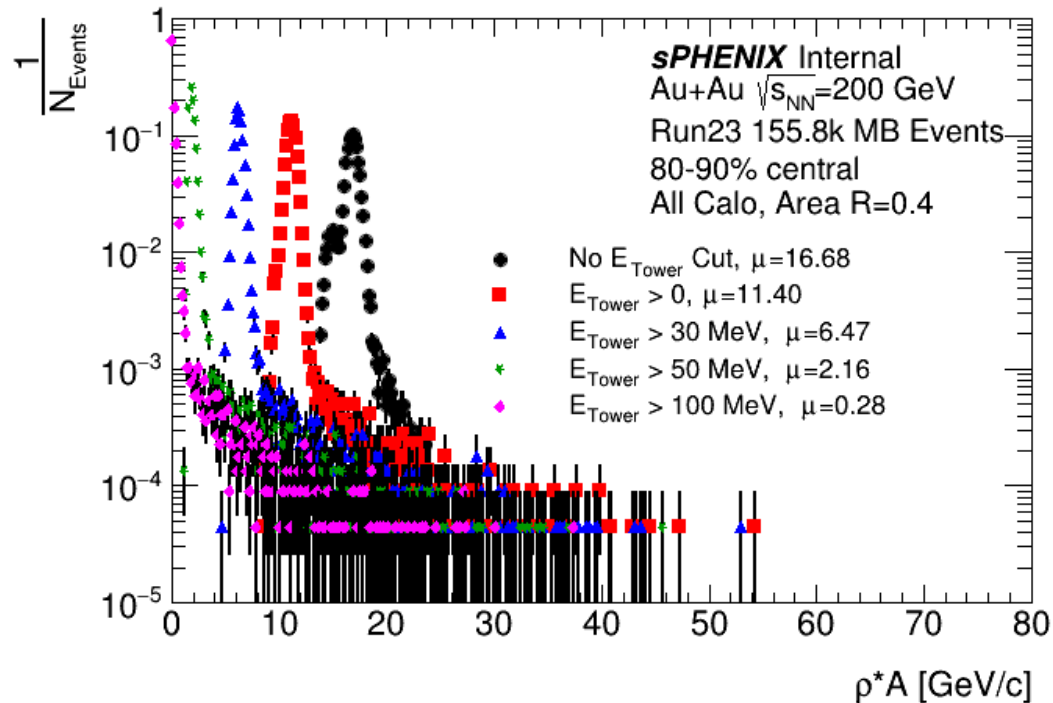
Threshold has large effect on CEMC (discussion of trends on slides 9-11)

All Calos with Different Tower Thresholds



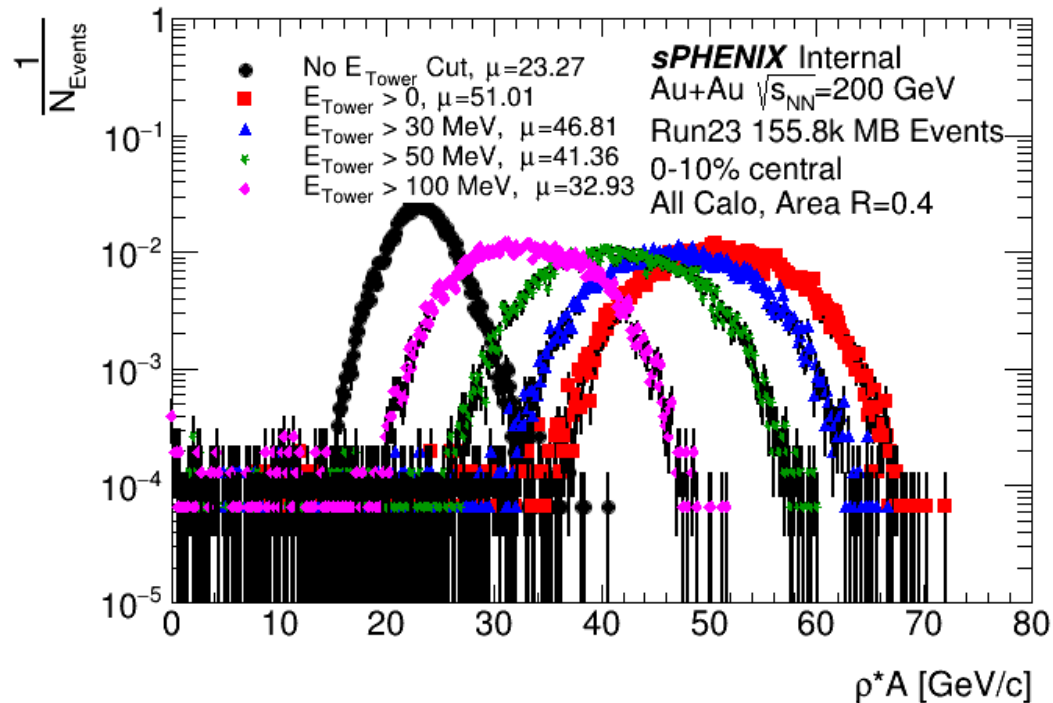
Threshold has large effect on CEMC, which effects total when using all calos

Trends in Peripheral Collisions



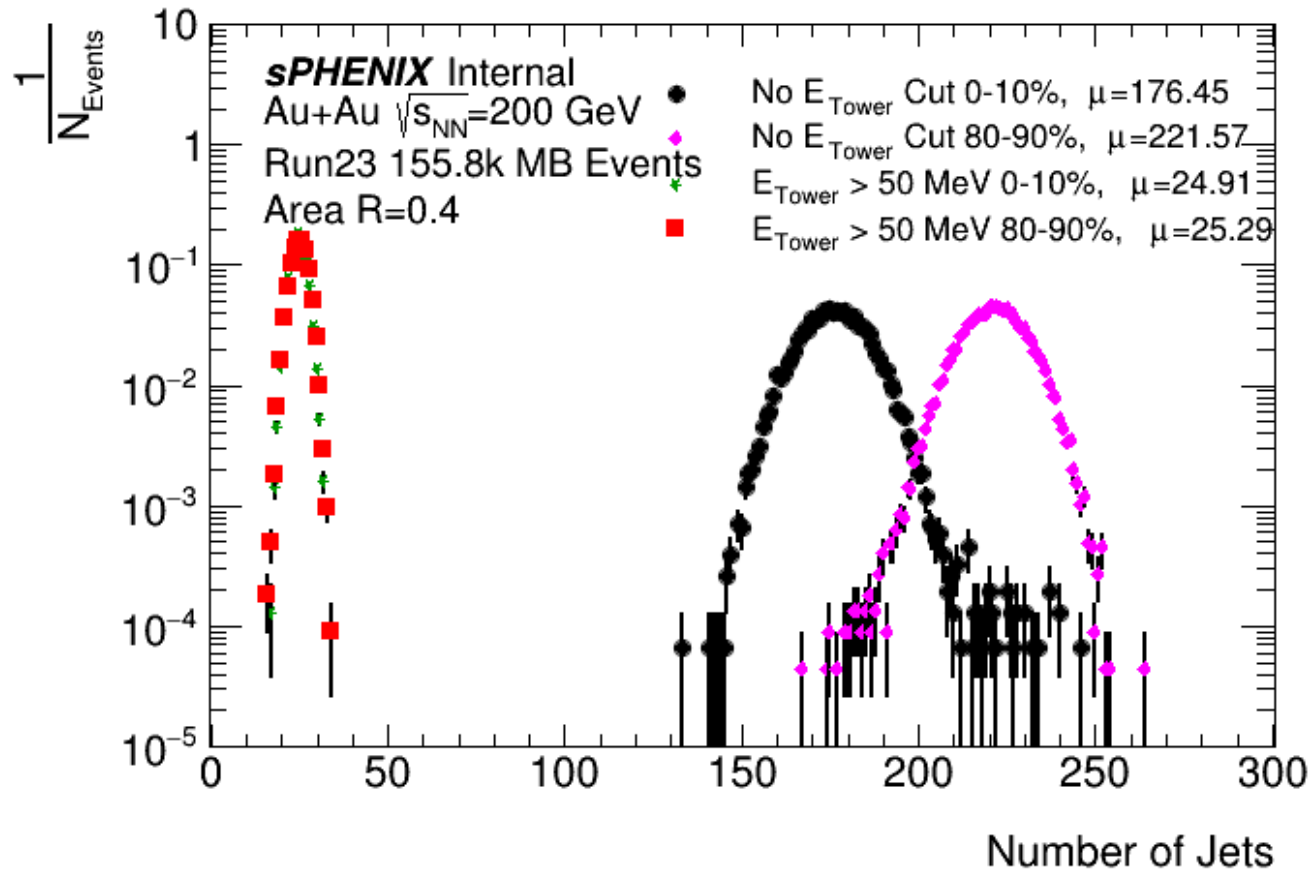
- Low occupancy in peripheral collisions, so many towers are empty/noise (positive & negative)
- Negative towers increase ρ since they have positive p_T
- $E > 0$ cut removes increase due to negative towers, but not positive towers
- Other cuts remove larger contribution from positive noise

Trends in Central Collisions



- Central events have higher occupancy, so number of towers with only noise will be smaller
- Jets with only noise will have a low p_T compared to true signal "jets"
- Removing towers with negative energy will create fewer low p_T jets, which will increase ρ
- Higher energy cuts remove more energy from signal, so ρ decreases more

Number of Jets




The explanation for a changing number of jets can be seen here, with the number of jets significantly dropping with a tower energy cut implemented

Many of the jets no longer present after the tower energy cut had very low energy due to them being constructed with mostly positive and negative fluctuations, so these jets would drop ρ significantly

Number of Jet Constituents

Centrality	All Calorimeters	CEMC	IHCAL	OHCAL
0-10%	156.2	139.5	12.1	13.7
80-90%	24.2	24.0	1.9	1.9

Each of the four cases must be run independently, so the actual number of constituents do not add exactly

Mean number of jet constituents
Question 3 

Questions from Calo Calibrations Meeting Answered

1. What happens to $\rho \cdot A$ with different tower energy cuts?
 - Depends on centrality, but trends can be clearly understood
2. What if we only apply cuts to the CEMC and not the HCals?
 - HCals not sensitive to cut, but we propose using the same cut for all calorimeters since it doesn't matter for the HCals
3. How many towers do we find on average in the ρ calculations?
 - Broken down by calorimeter for central and peripheral
 - Majority of towers come from CEMC