MANTRA - BES III

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Outline

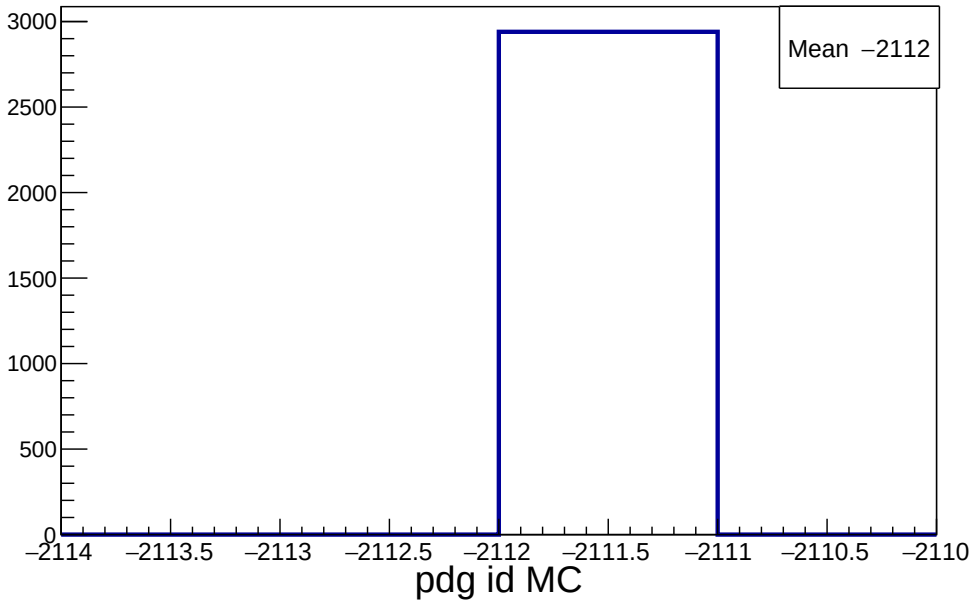
Previous meeting : University of Torino

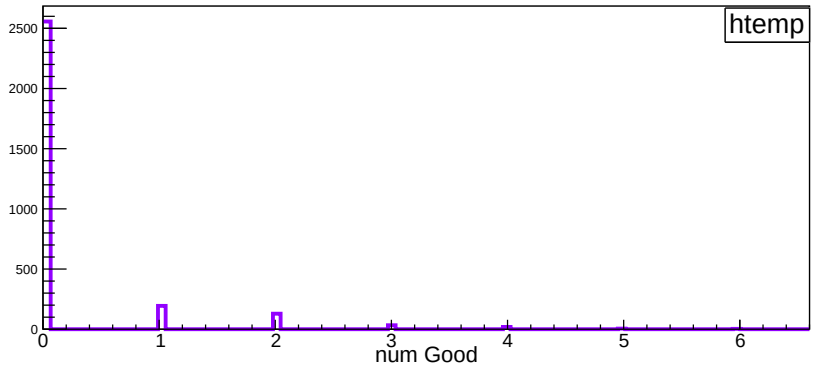
- Use an $\bar{n}$ gun to study the response of the EM calorimeter and TOF response for different momenta: 0.5, 0.75, 1.0 GeV/c.
- Check all available variable information such as shower energy, shape, position, center, time, lateral momenta for EMC and TOF.
- Compare these for MC with real data.
- Perform the same analysis using γ gun and compare the results with $\bar{n}$ simulation.
- $\bar{n}$ are slower than γ delays in TOF/EMC might be helpful in distinguishing.
- Finally, compare MC and real data for J/psi events that decay into $p\bar{n}\pi^-$, and evaluate how the MC matches the actual real data.

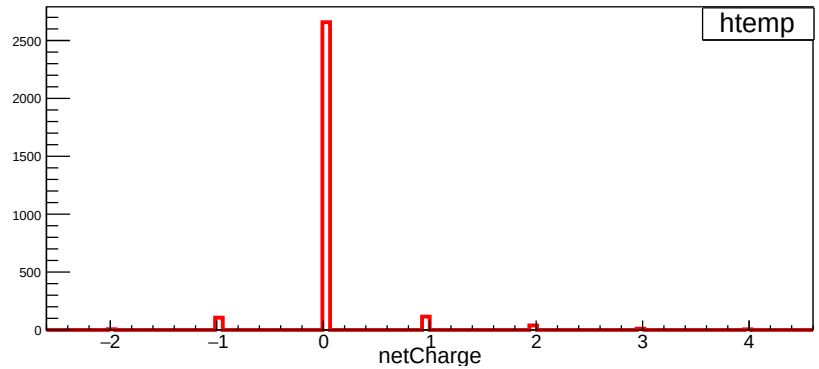
$\bar{n}$ particle gun MC simulation

Simulated 3000 $\bar{n}$ s at momenta of 0.25, 0.5, 1.0, 1.5, and 2.0 GeV/c.

Name of the selection cut	Range
No cut is applied	
No cut on Interaction point	
No cut on $cos\theta_{MDCtrack}$	



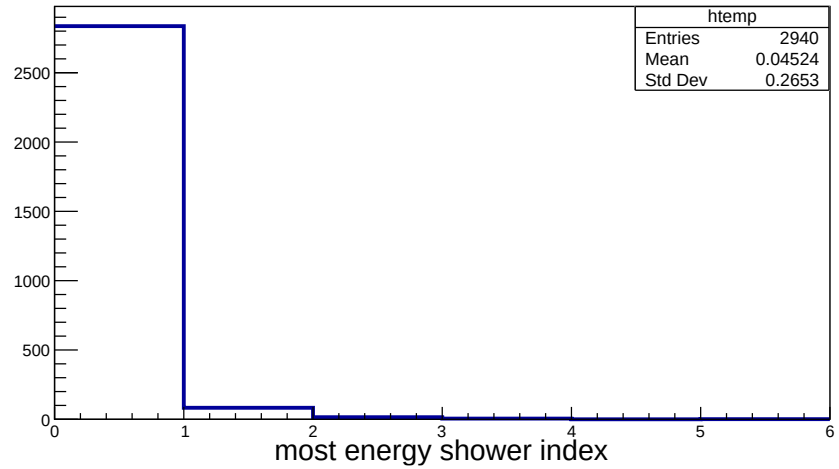


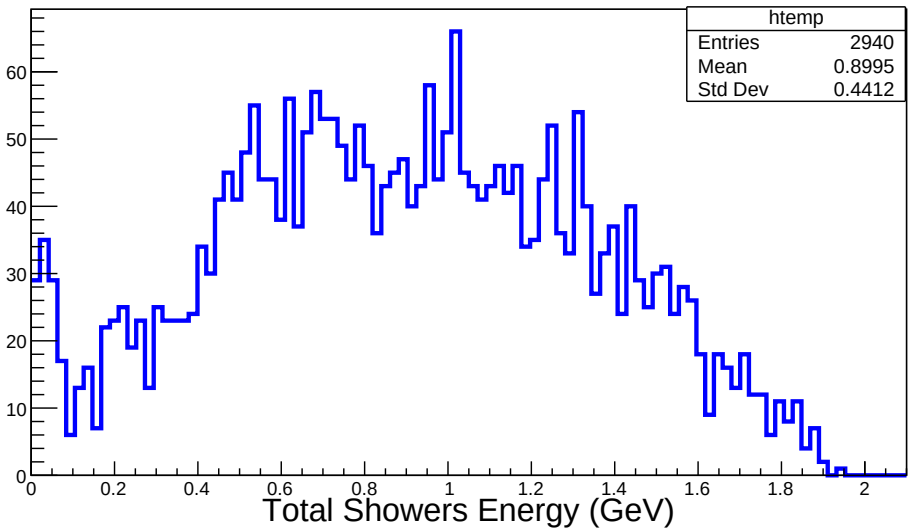


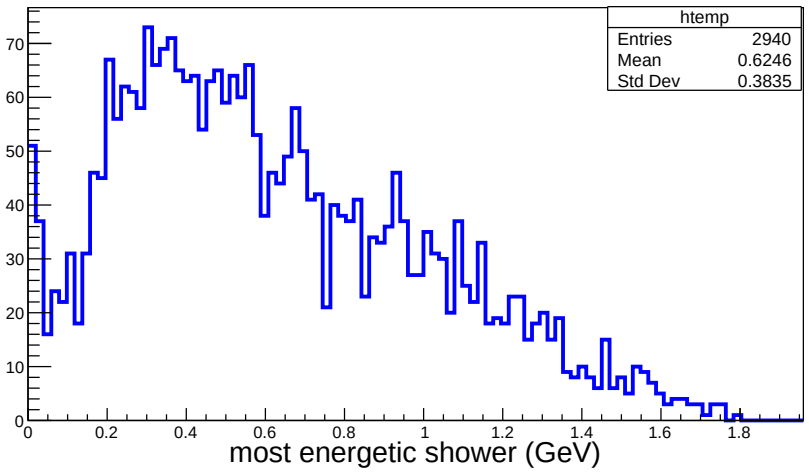
Above plots are for $\bar{n}$ at the momentum 0.5 GeV/c.

$\bar{n}$ particle gun MC simulation (cont)

Name of the selection cut	Range
emc track timing cut is applied	0-14 ns
shower size	1 to 15



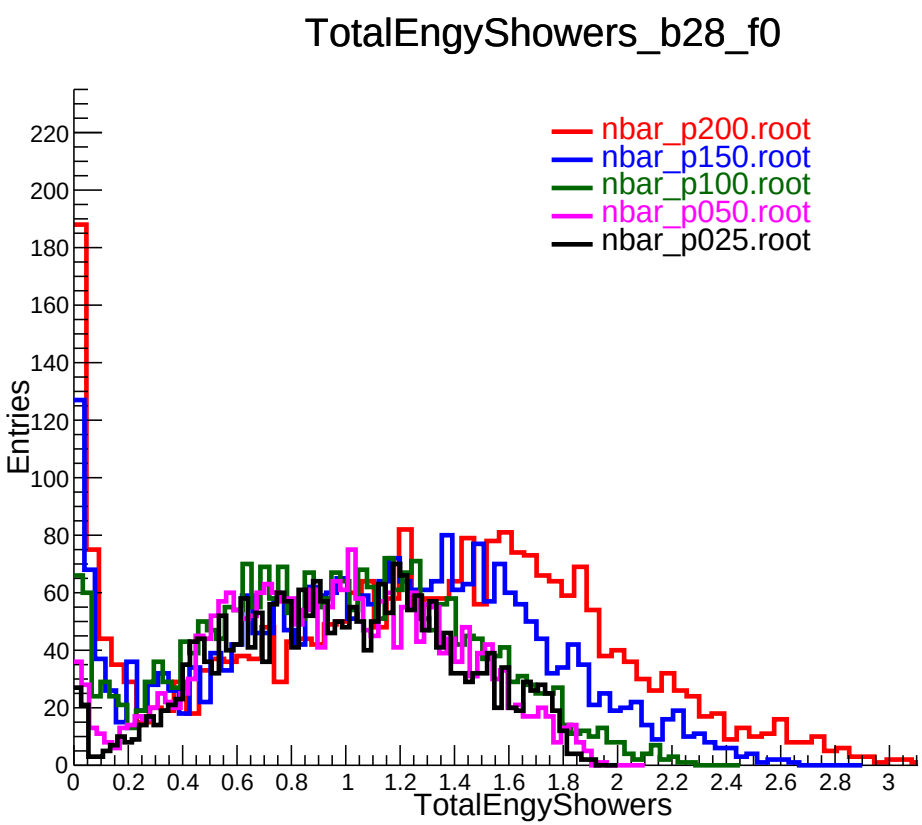


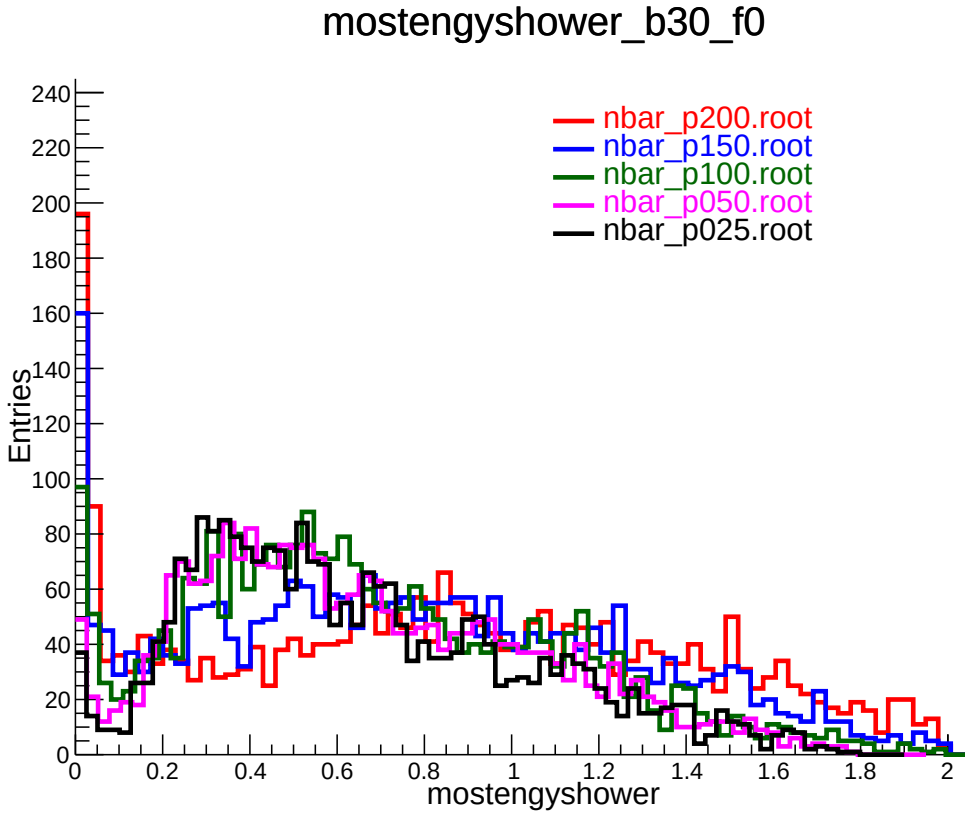


Above plots are for $\bar{n}$ at the momentum 0.5 GeV/c.

$\bar{n}$ particle gun MC simulation (cont)

E_{shower} comparison for p values of 0.25, 0.5, 1.0, 1.5, and 2.0 GeV/c.

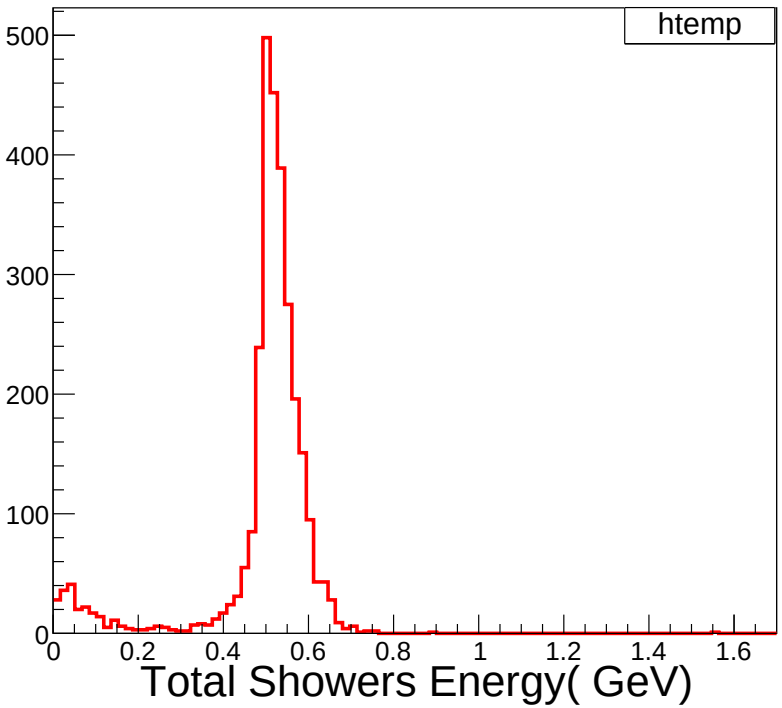


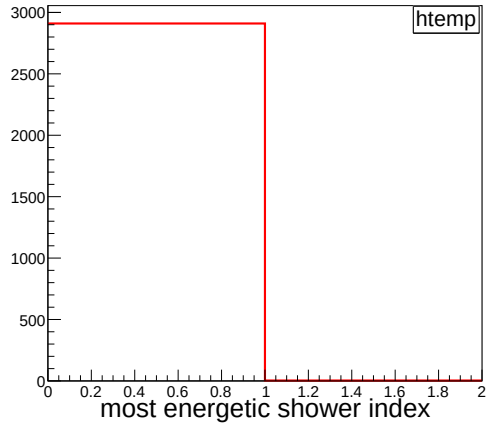


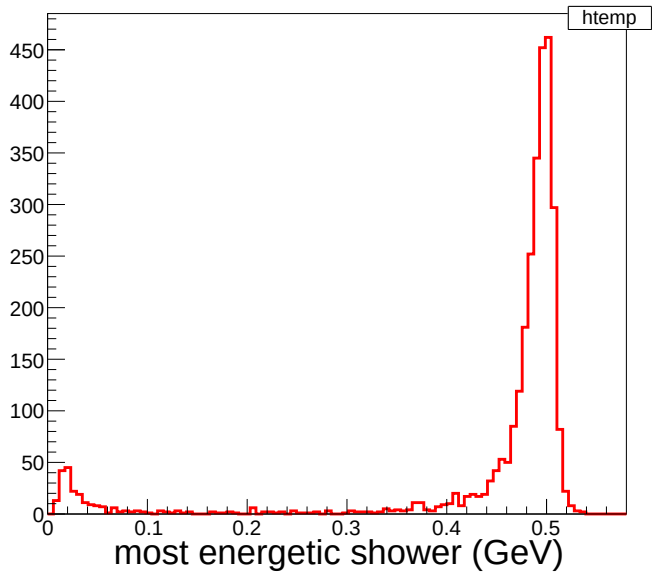
$p = 2.0 GeV/c$. cluster energy is flat and for lower p values energies are centered around a value (too early to say).

γ particle gun MC simulation

Name of the selection cut	Range
emc track timing cut is applied	0-14 ns
shower size	1 to 15



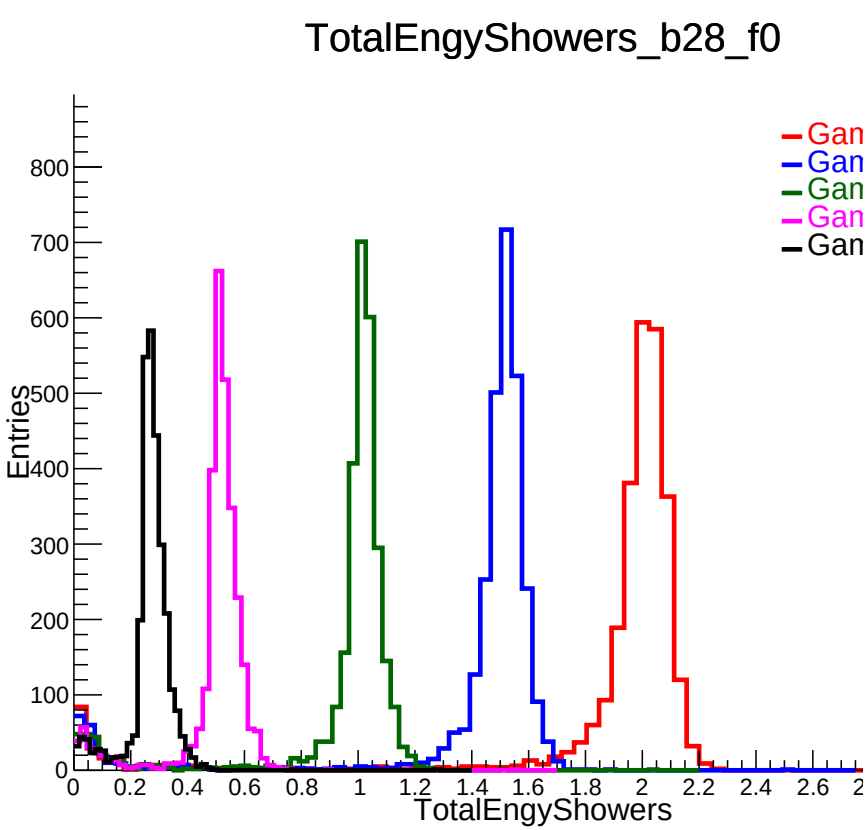


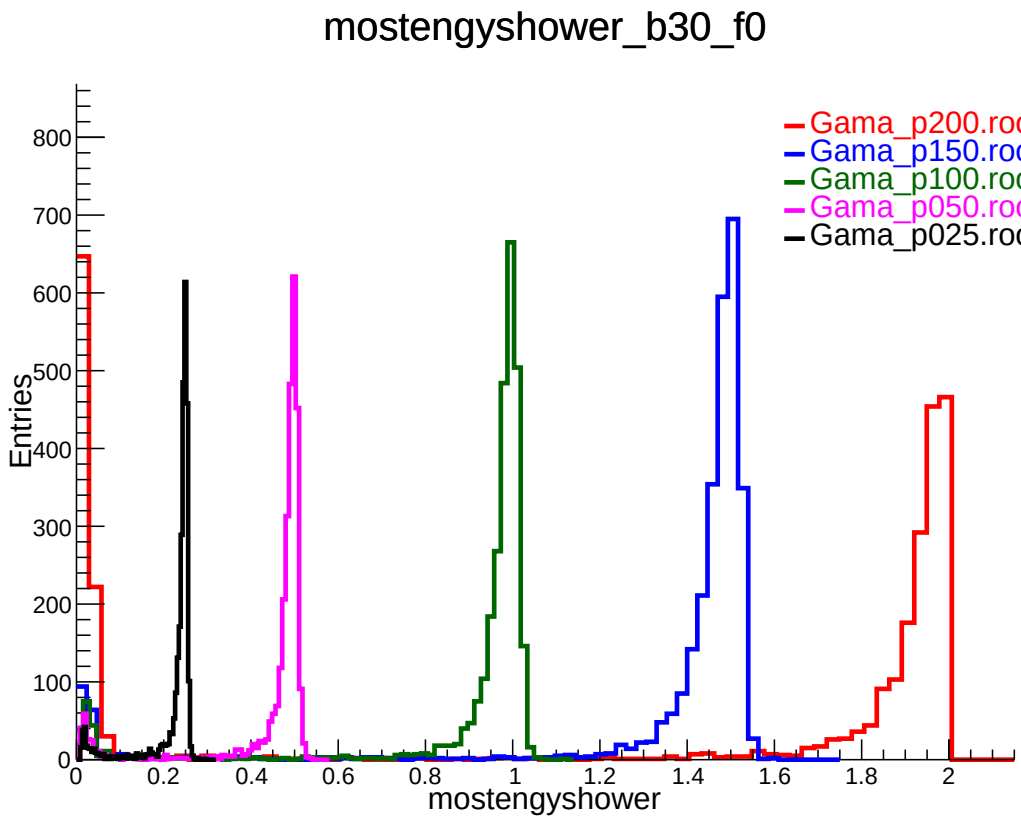


γ at the momentum 0.5 GeV/c.

γ particle gun MC simulation (cont)

E_{shower} comparison for p values of 0.25, 0.5, 1.0, 1.5, and 2.0 GeV/c.



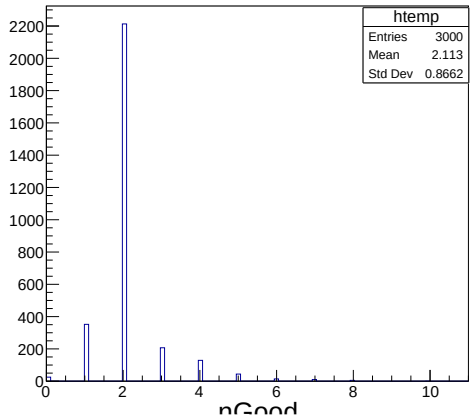


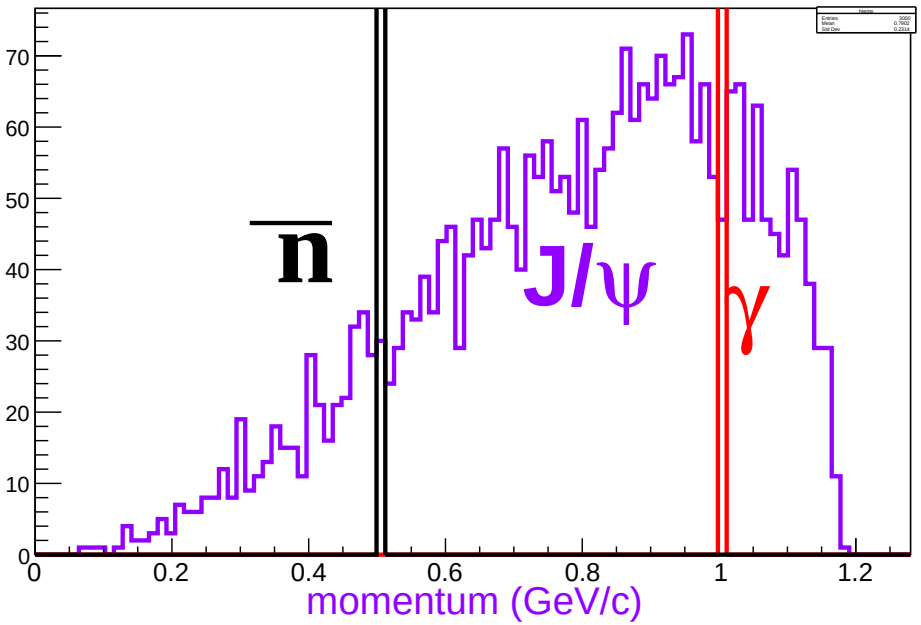
A clear distinction is there in the shower energies.

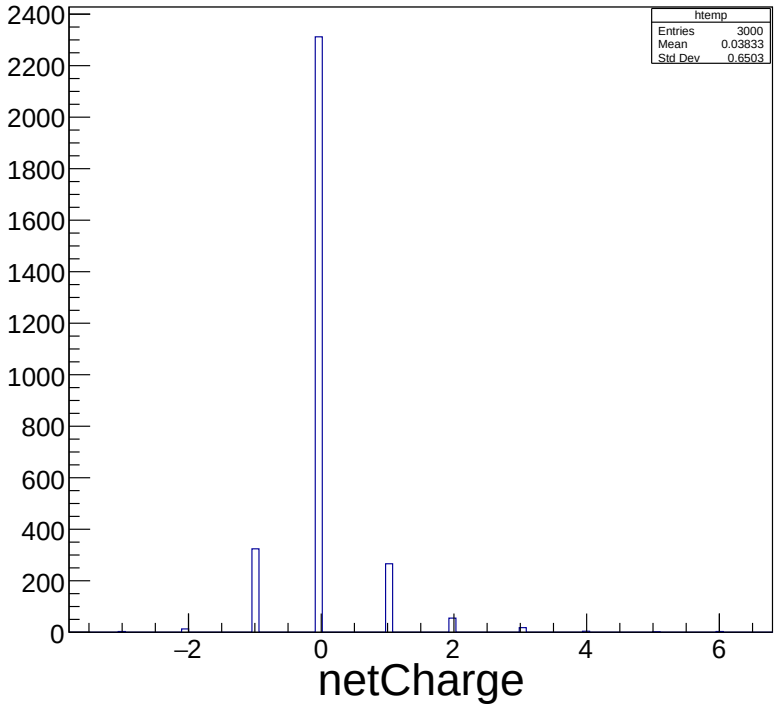
$J/\psi \to p\bar{n}\pi^-$ MC simulation

Simulated 3000 $p\bar{n}\pi^-$ events

Name of the selection cut	Range
No cut is applied	
No cut on Interaction point	
No cut on $cos\theta_{MDCtrack}$	







Summary and Future work

- Future Work:
- Look available variables for MC and Real data for momentum and with a spread.
- Compare the variables for different incident p and different particles.
- Look the same variables distribution in J/ψ decay into $p\bar{n}\pi^-$.
- Estimated time frame : Some where by the end of Feb 2025 or March first Week

Acknowledges the support of several funding agencies and computing facilities: