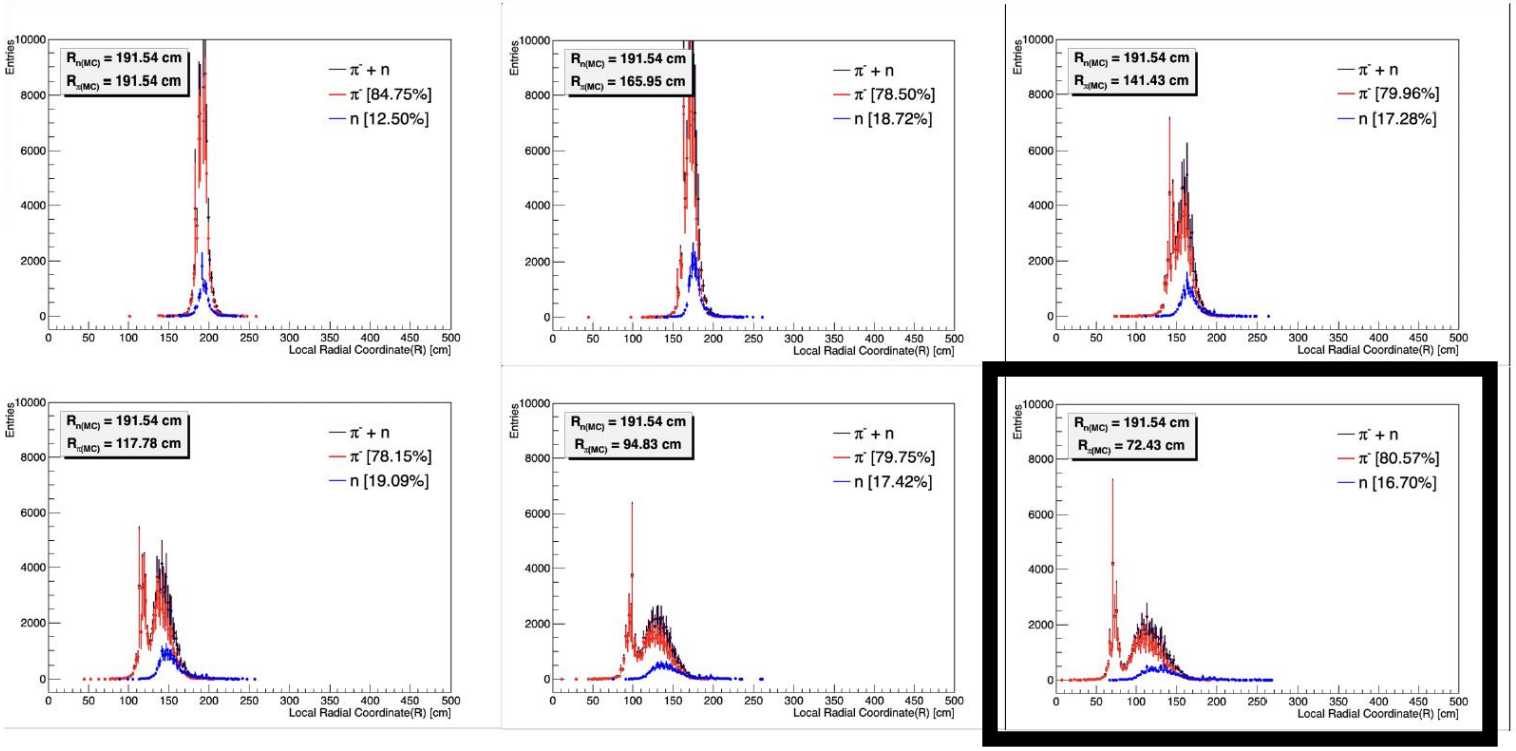
nHCal Updates

23.08.2024

Recap

Cluster Radial Coordinates



Percentages are based on ClusterMCParticle associations

Neutron Clusters start to shift inwards as $(R_n - R_\pi)$ increases

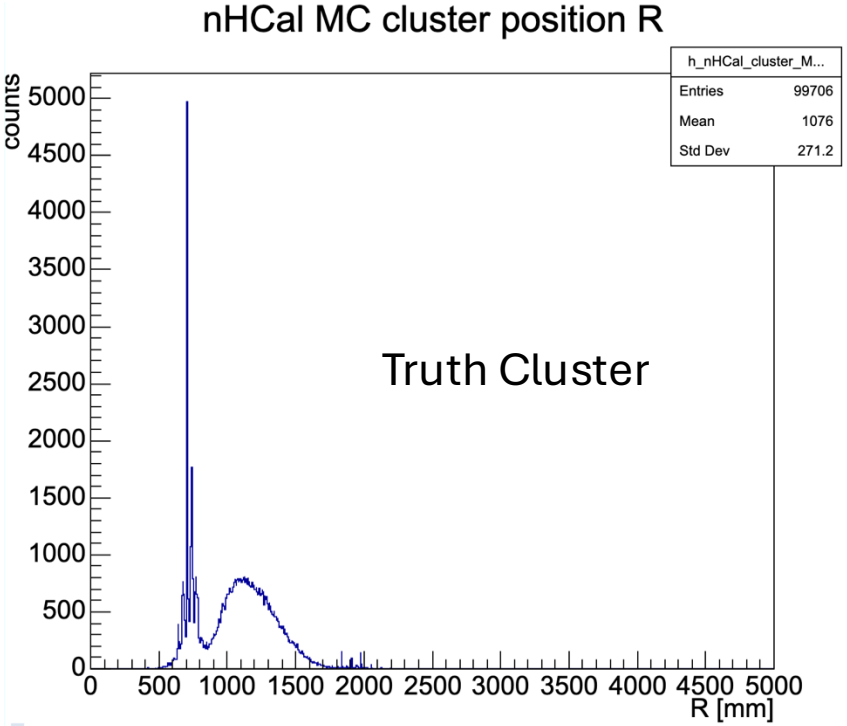
~ 80% of the clusters associated with pions

~ 20% of the clusters associated with neutrons

p = 1 GeV/c

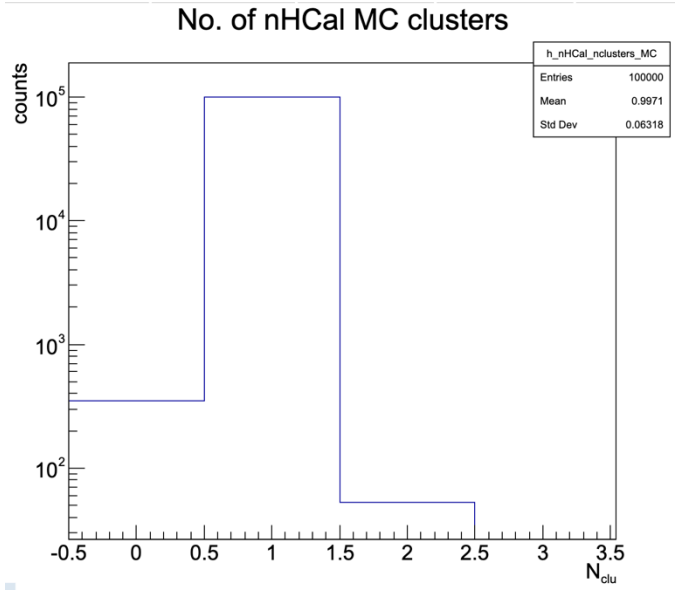
HCal Only geometry

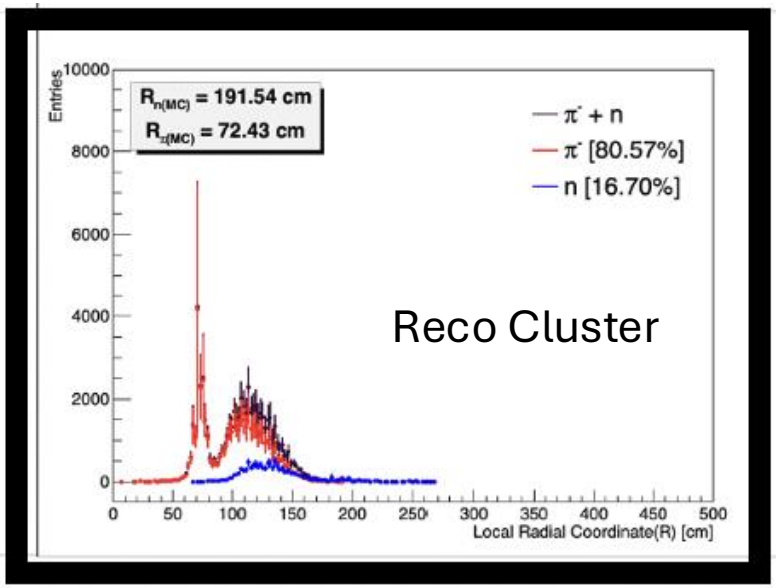
Problems:



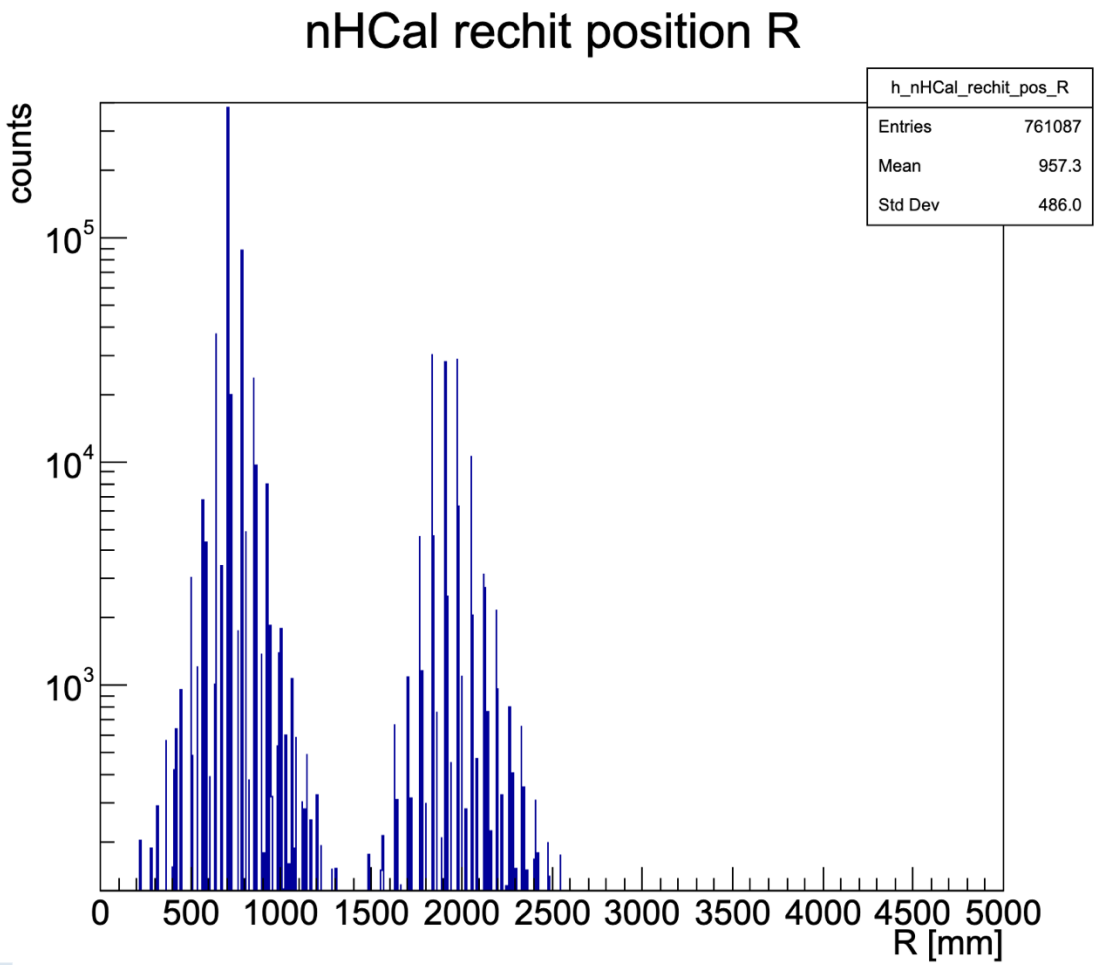
- 100000 events
- Pi- and Neutron in each event

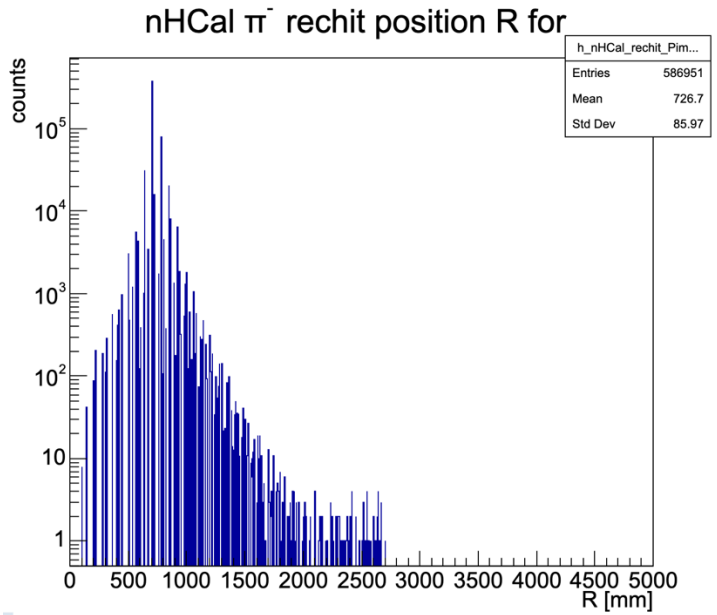
- Expected no. of clusters per event = 2; But > 99% events have 1 cluster.
  - Clusters are getting merged.
- Neutron Clusters are not in expected position (~ 1200 mm instead of 1915.4 mm)

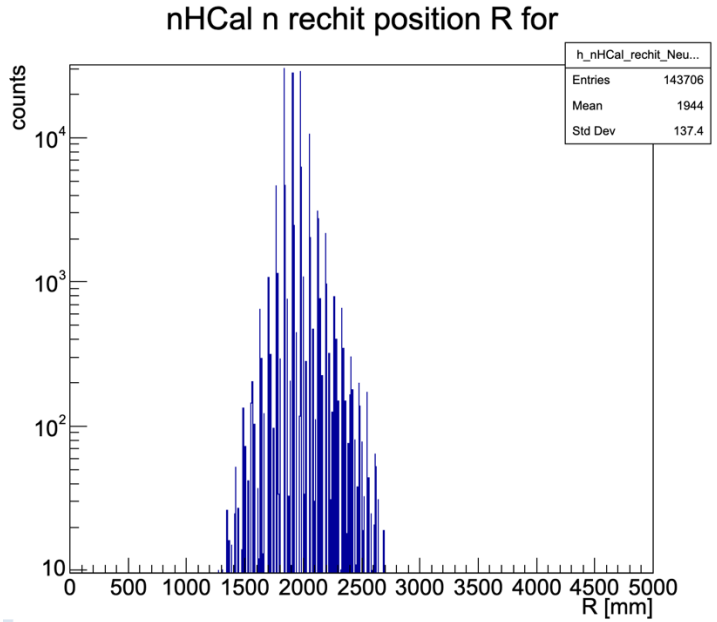




HCal Only geometry

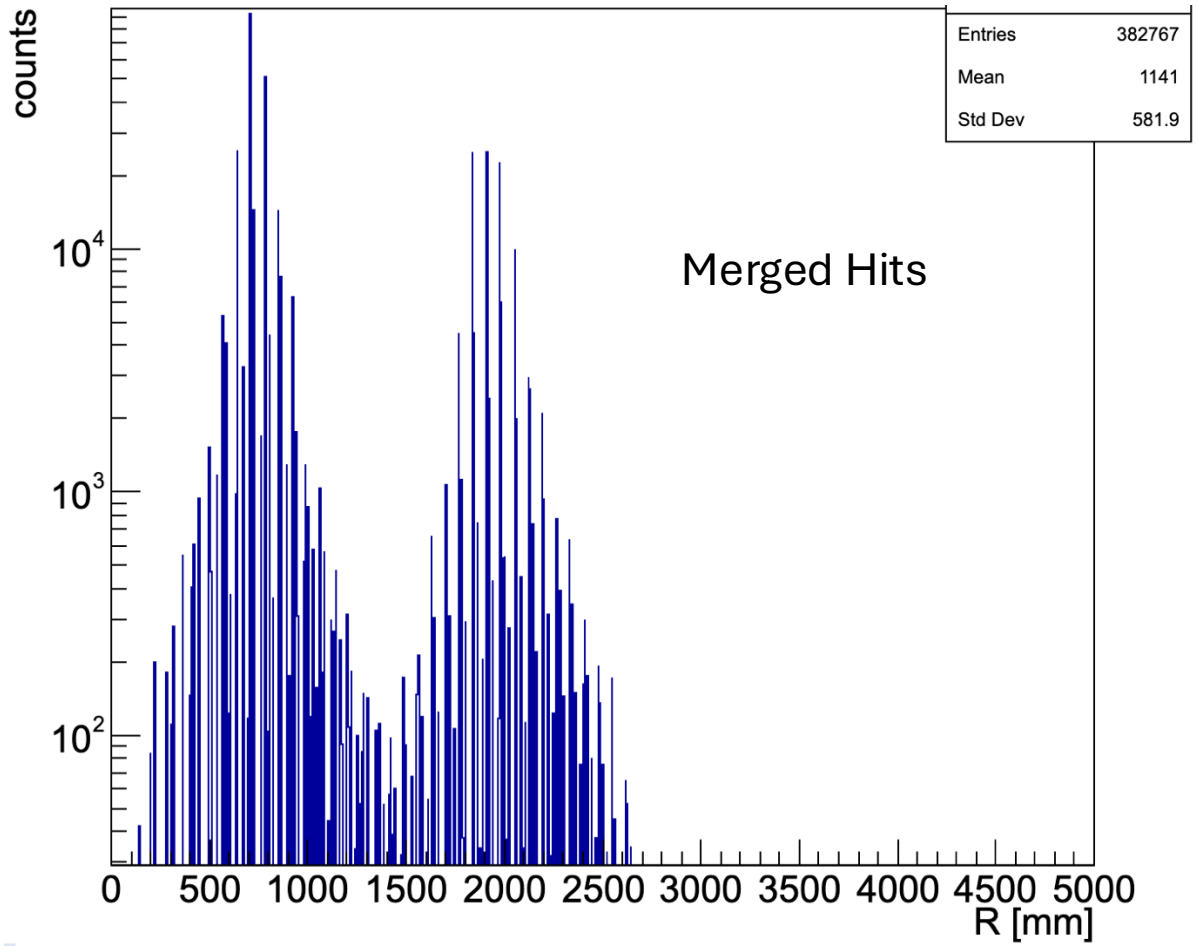


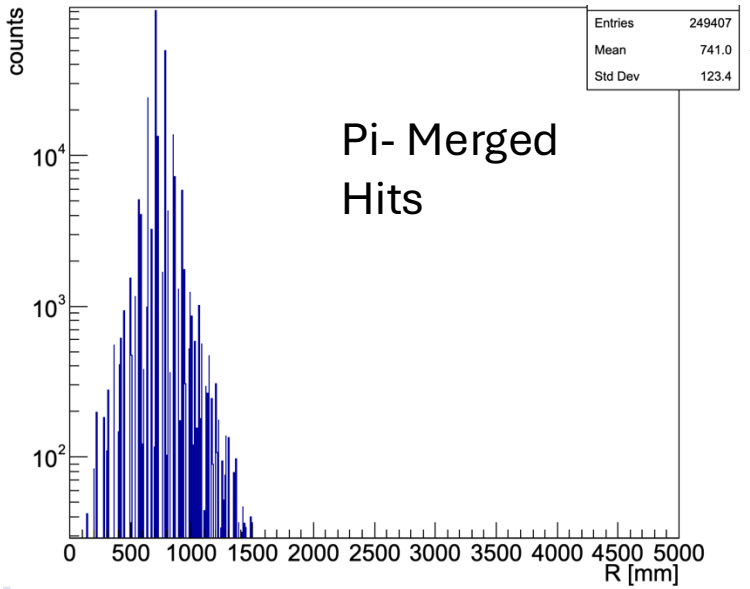


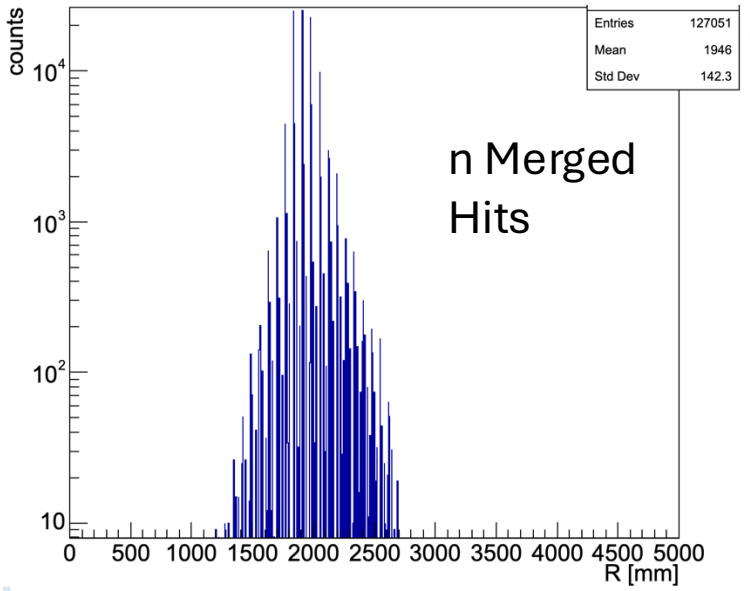


HCal Only geometry

Based on highest energy hit contribution







Mean Values are close to the expected ones

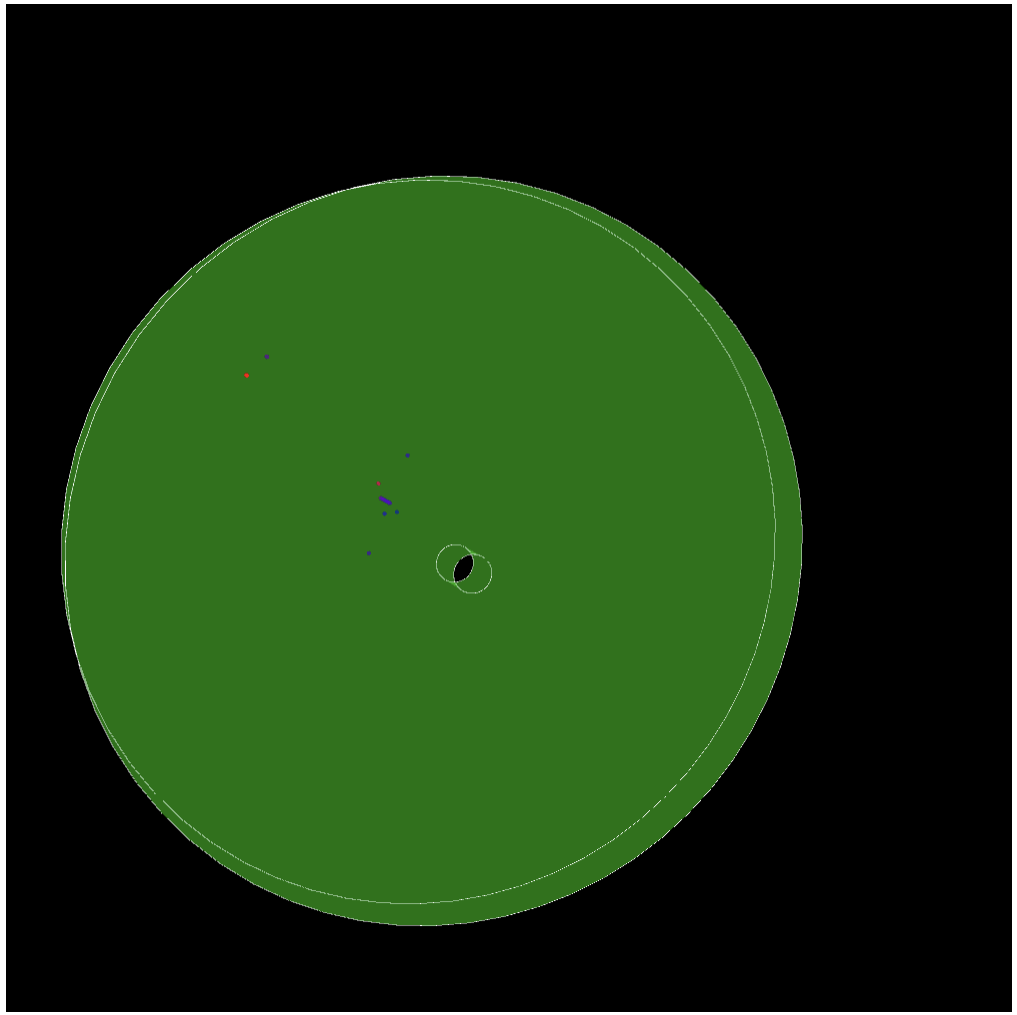
*no of entries of pi- and n do not add up to the original no. of merged hits.

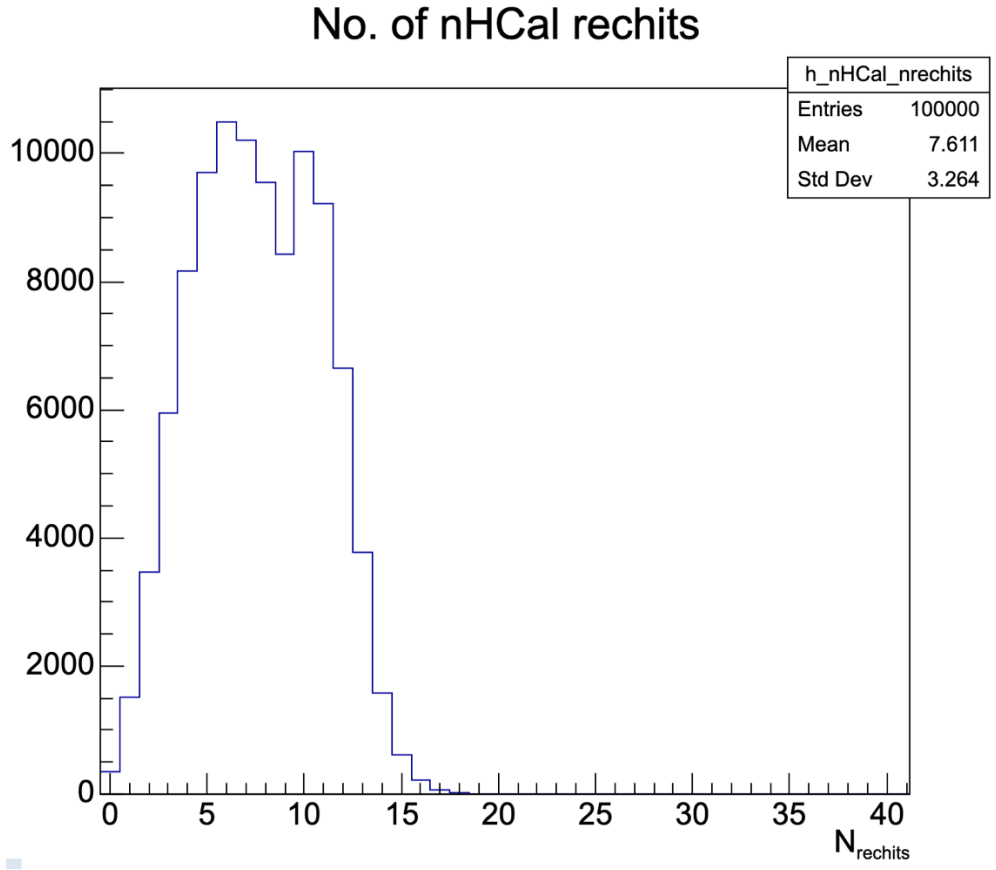
(Not all Merged hits are being mapped to simhits)

HCal Only geometry

Based on highest energy hit contribution

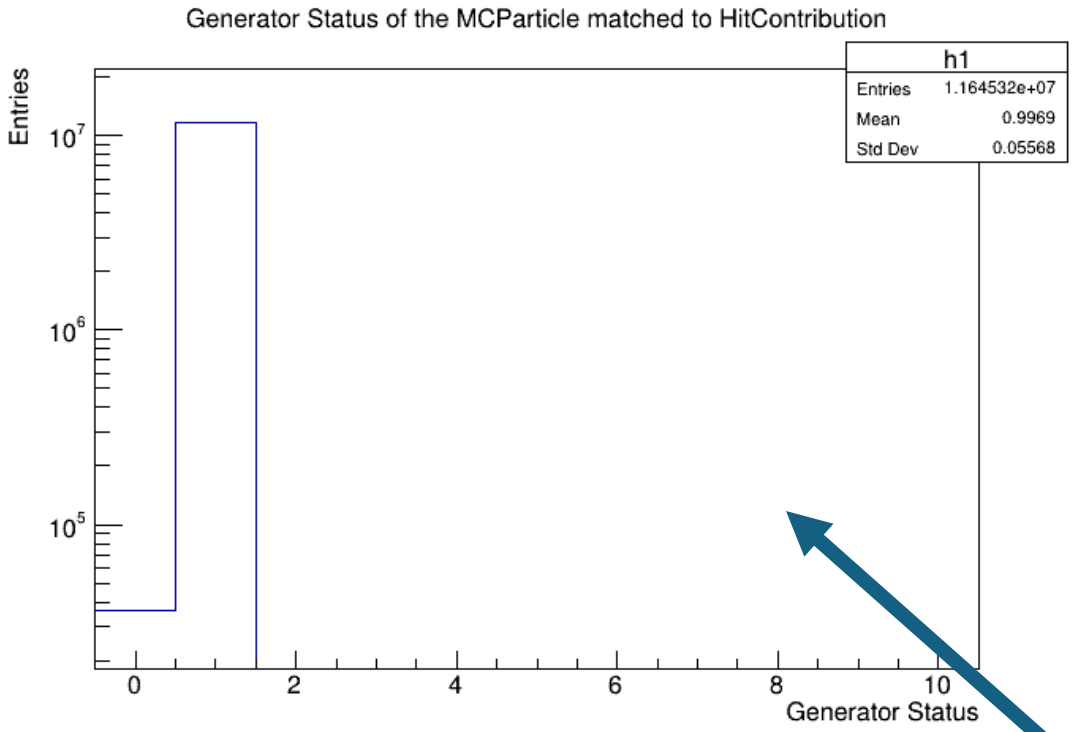
Event Display

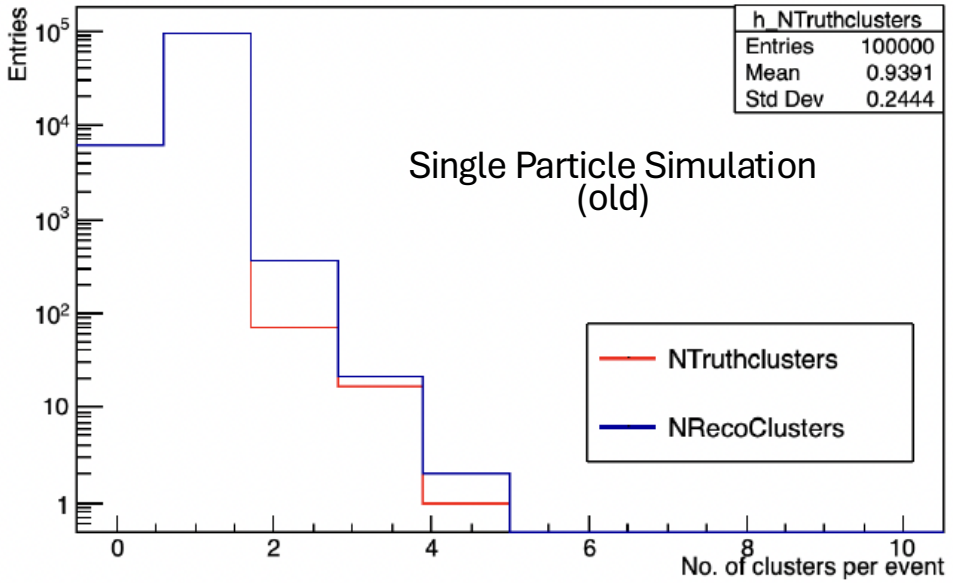




Not many rechits per event;
how to improve the display?

Single Particle Simulation





Cases with > 1 clusters are appearing most likely when the matched MCParticle is a secondary particle (not a generated particle)

```
const auto &trackID = (*mc)[mcIndex].getContributions(0).getParticle().getObjectID().index;
// Create a new protocluster if we don't have one for this trackID
if (protoIndex.count(trackID) == 0) {
clusters->create();
protoIndex[trackID] = clusters->size() - 1;
}
// Add hit to the appropriate protocluster
(*clusters)[protoIndex[trackID]].addToHits(hit);
(*clusters)[protoIndex[trackID]].addToWeights(1);
```

Code Snippet from EICRecon Truth Clustering Algorithm

HCal Only geometry