nHCal Layers-per-Readout Study

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Introduction

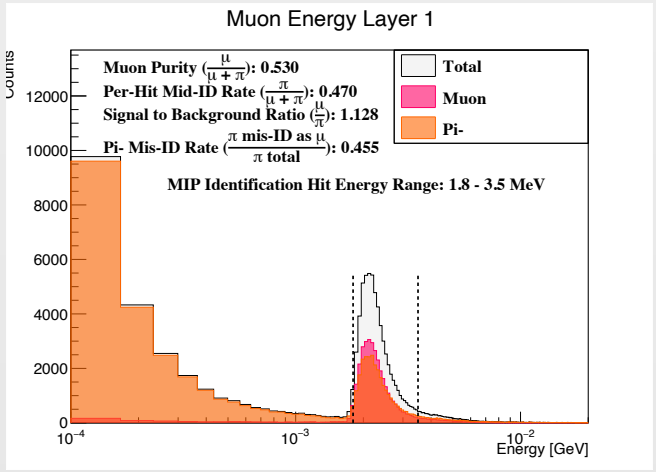
- Using the 20 layer R=0.6 geometry, how well can we discern MIPs (muons) from hadrons (pi-, neutron)?
- How does this change if we read out layers in groups of 2, 4, 5, 10, or all at once?

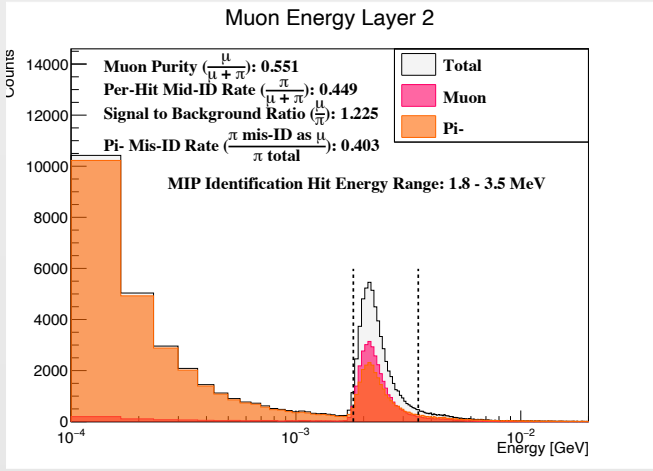
- To do this, study sample of 50,000 events of muons, neutrons, and pi- each at 1GeV kinetic energy.

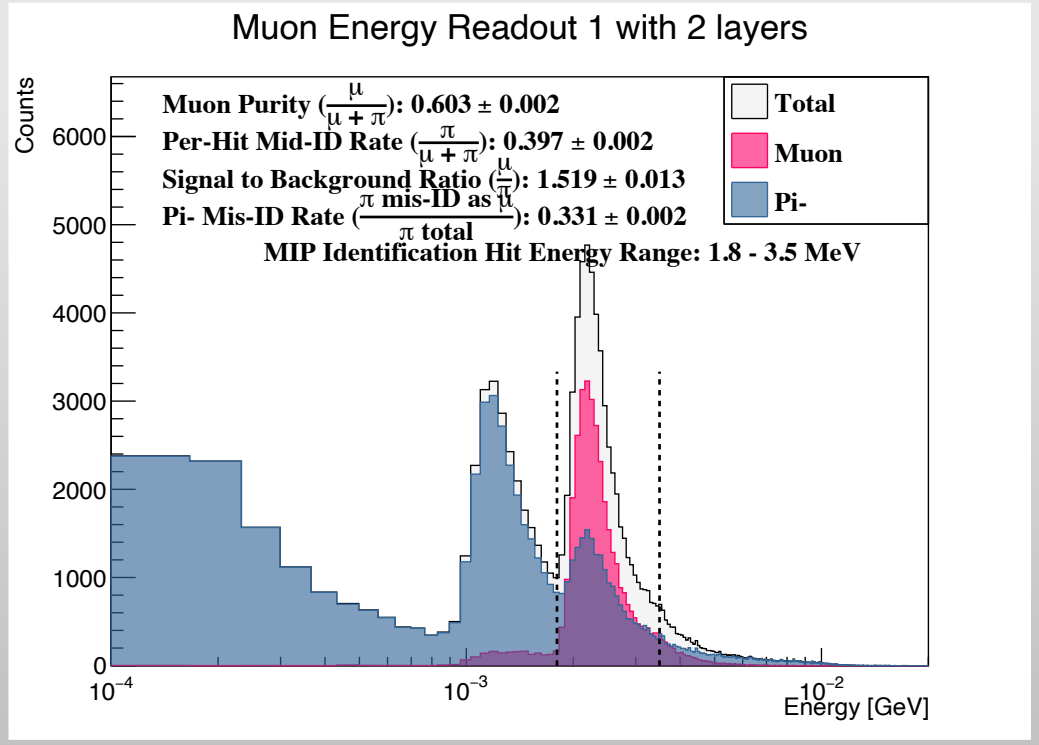
Resampling

- To simulate the grouping of layers, we resample hit energies from the individual layers in the group, histogram the sum of those energies, then scale by the number of hits in the group.

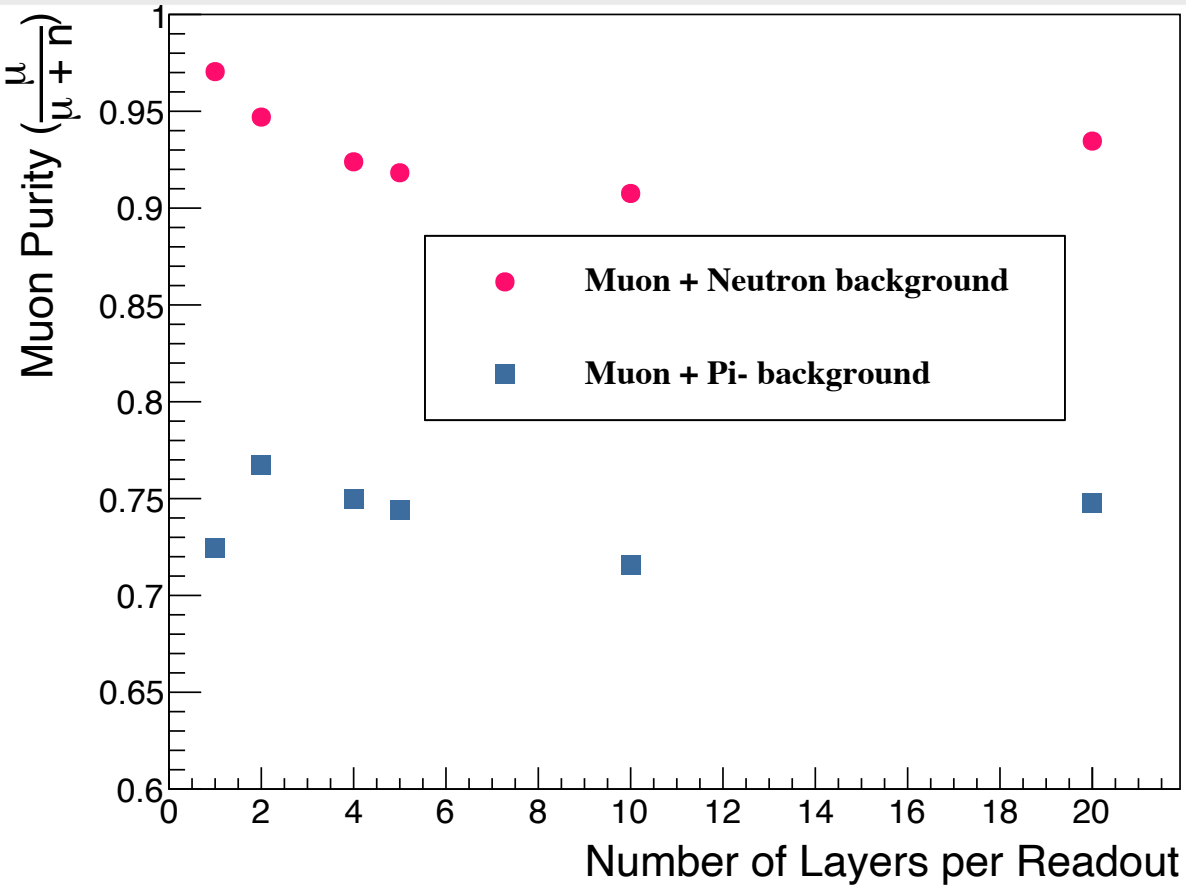
```
npsim --compactFile ../epic/install/share/epic/epic_nhcal.xml \
    -N 50 \
    --enableGun \
    --gun.particle {n/mu-/pi-} \
    --gun.energy 1*GeV \
    --gun.thetaMin 130*deg \
    --gun.thetaMax 177*deg \
    --gun.distribution uniform \
    --outputFile out.root
```



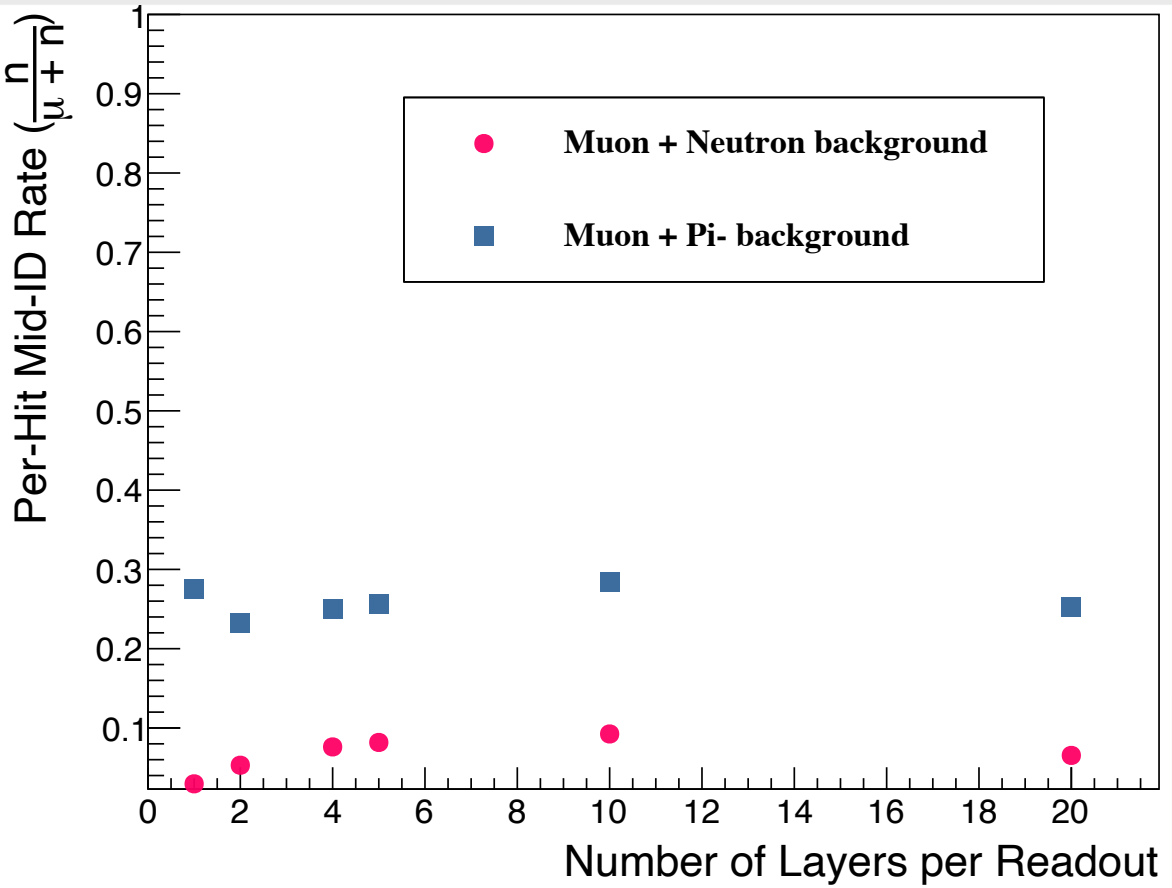




Results

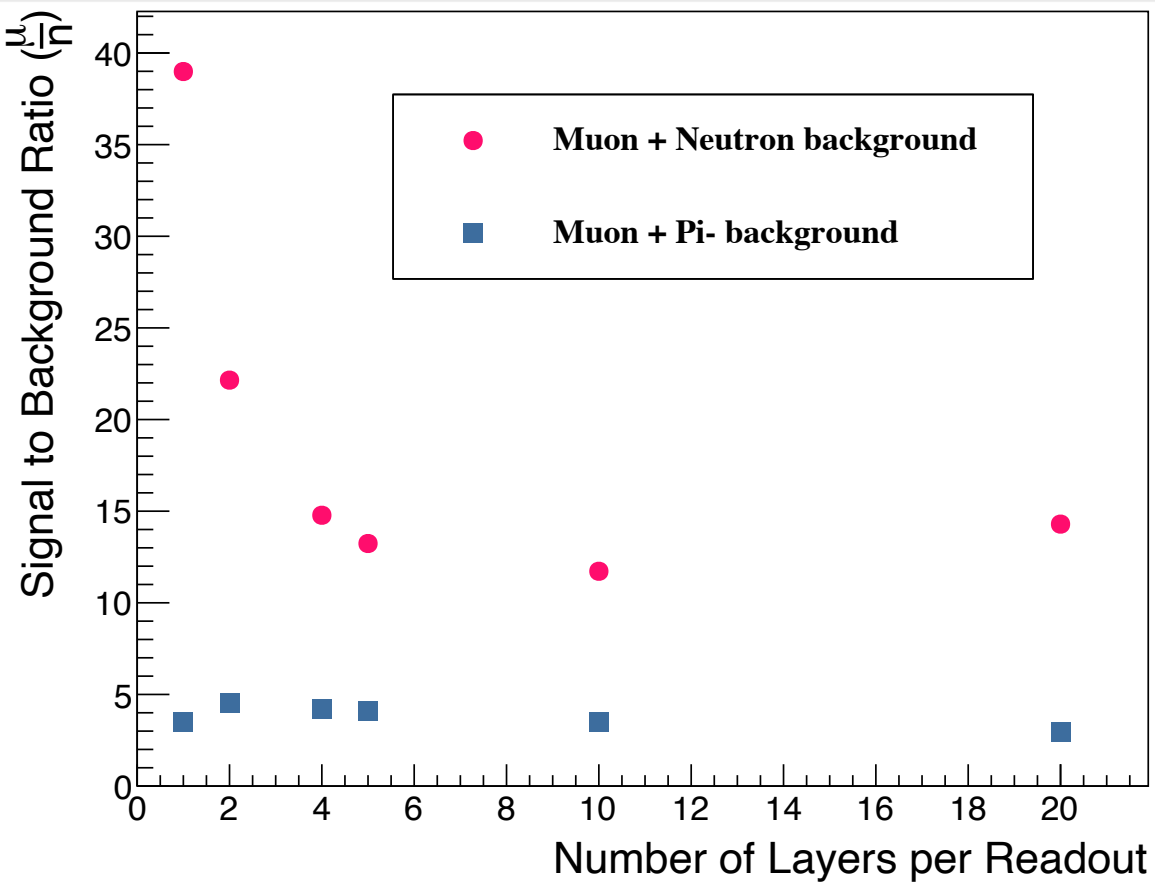


Fraction of muons in the MIP cut

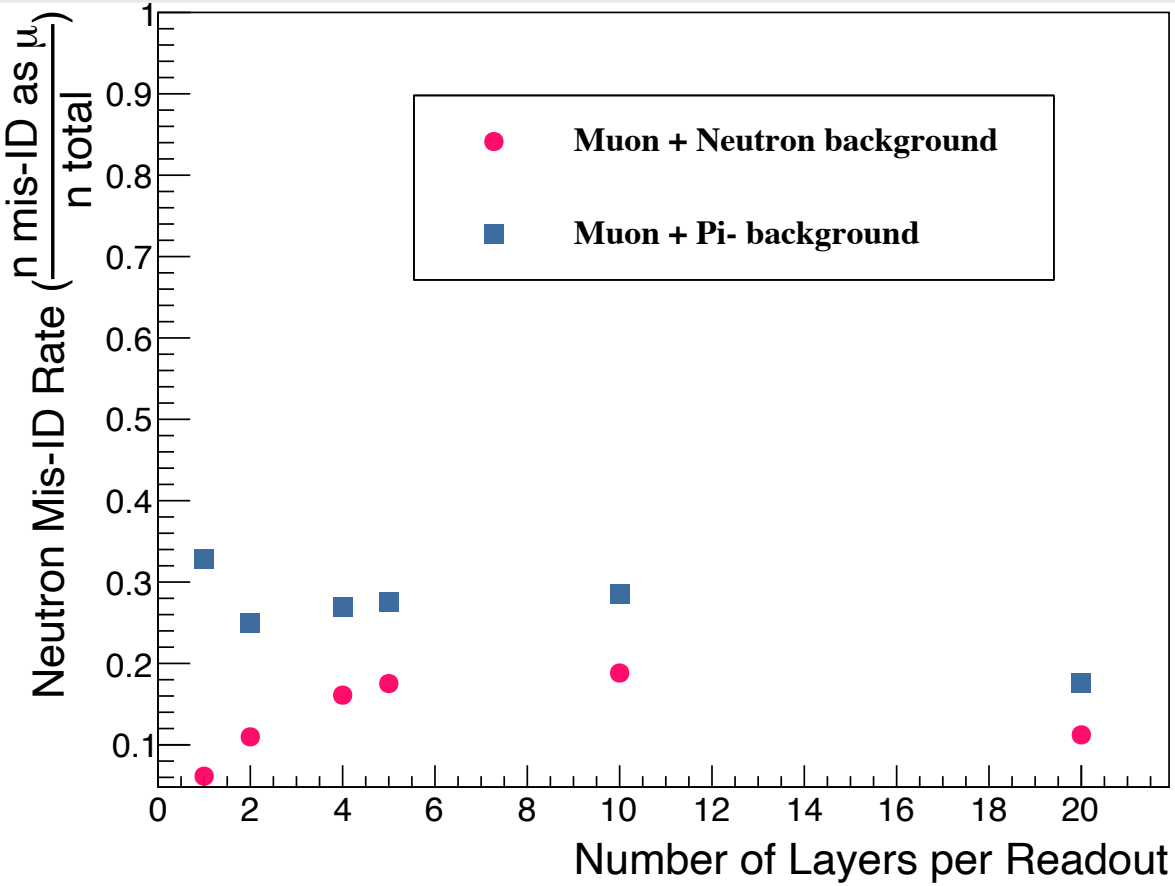


Fraction of neutrons/pions in the MIP cut

Results



Signal to background ratio



Per-hadron misidentification rate