

Particle ID in ProtoDUNE

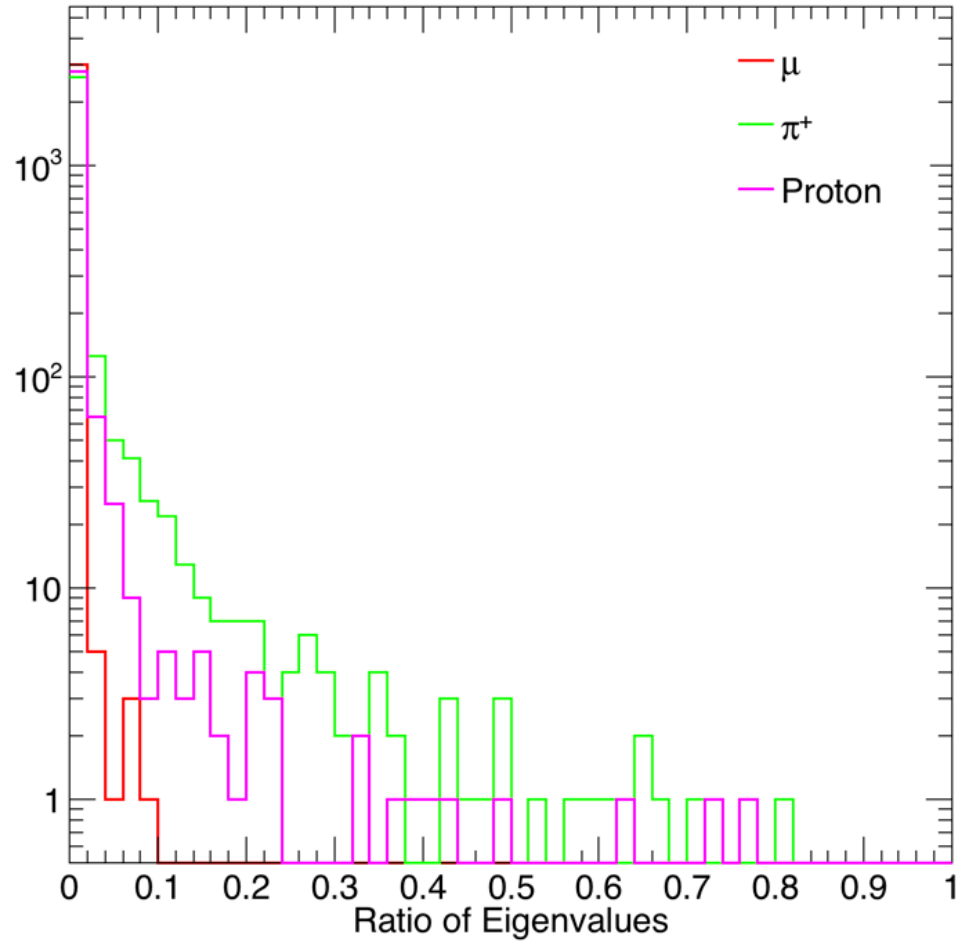
James Pillow, Nick Grant

22/02/2017

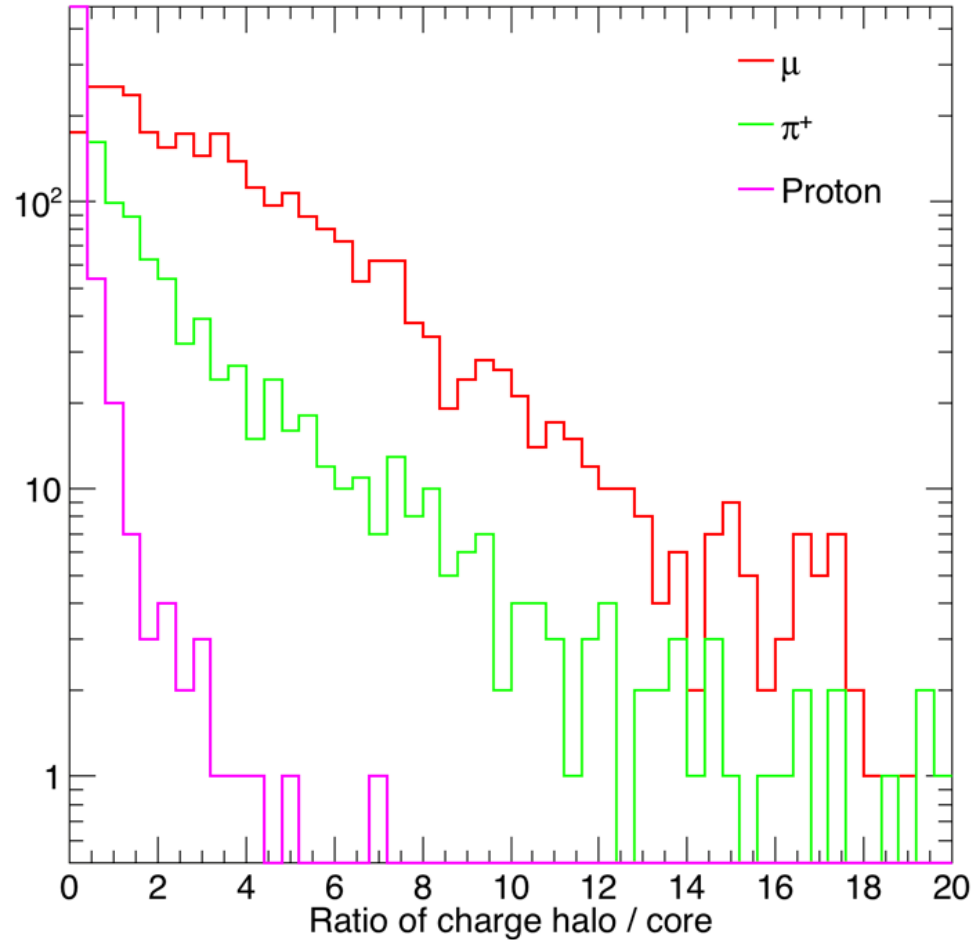
Method

- Using larsoft v06_22_00
- Generated muons, protons, and pions:
 - gen_protoDune_mono.fcl
 - protoDune_g4_3ms.fcl
 - protoDune_detsim.fcl
 - protoDune_reco_3ms.fcl
- Particles generated at 1GeV with no spread
 - Also generated some at 3 ± 1 GeV

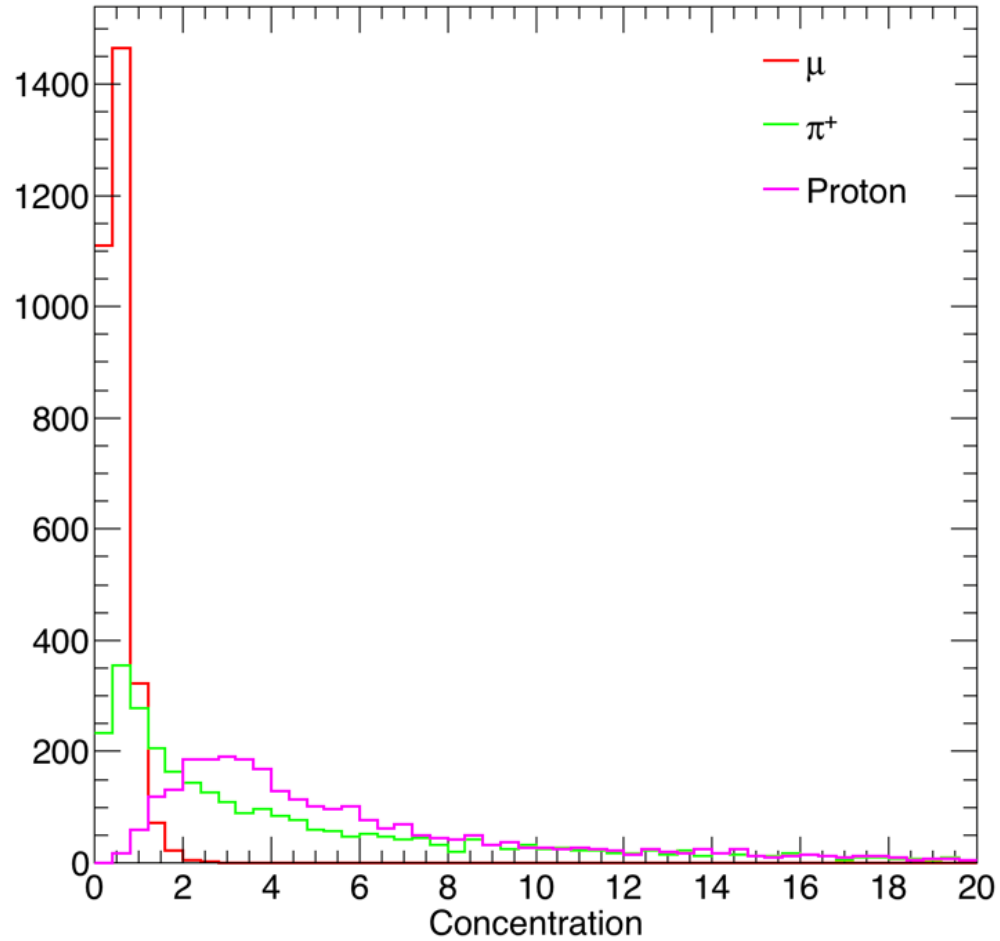
Ratio of Eigenvalues



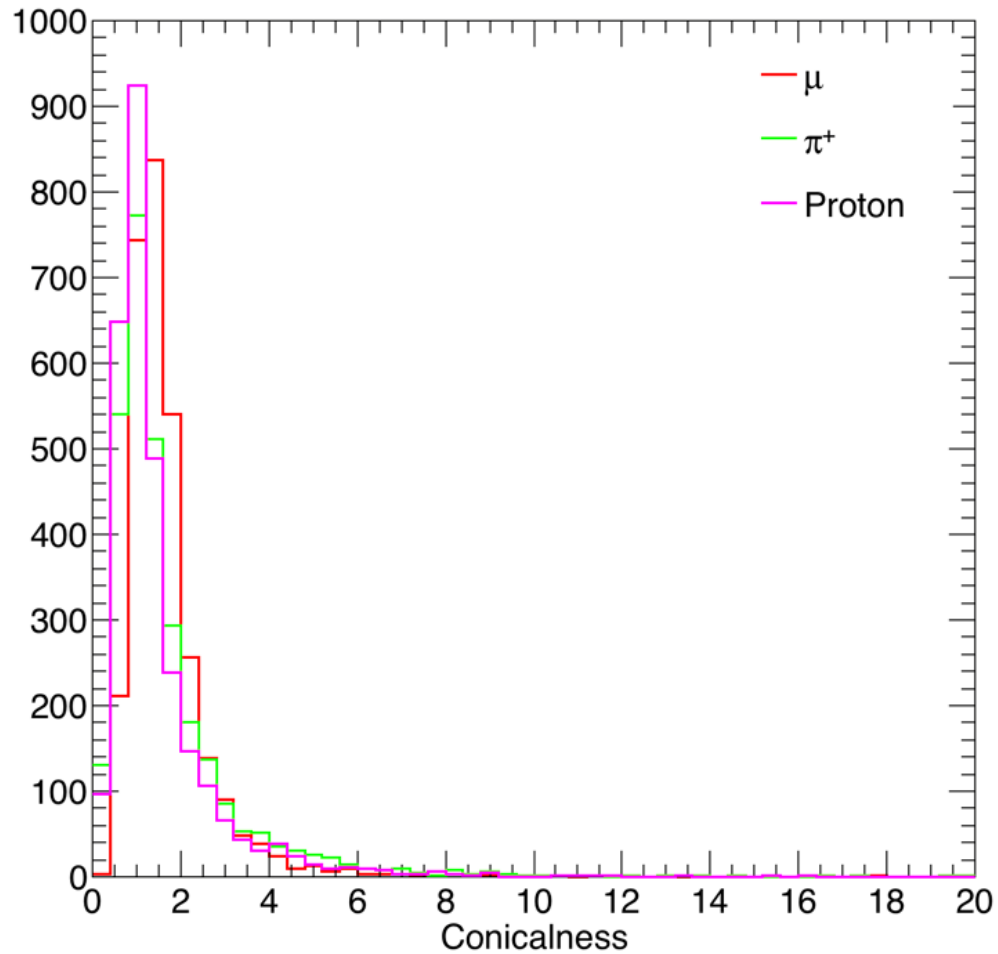
Ratio of Charge Halo / Core



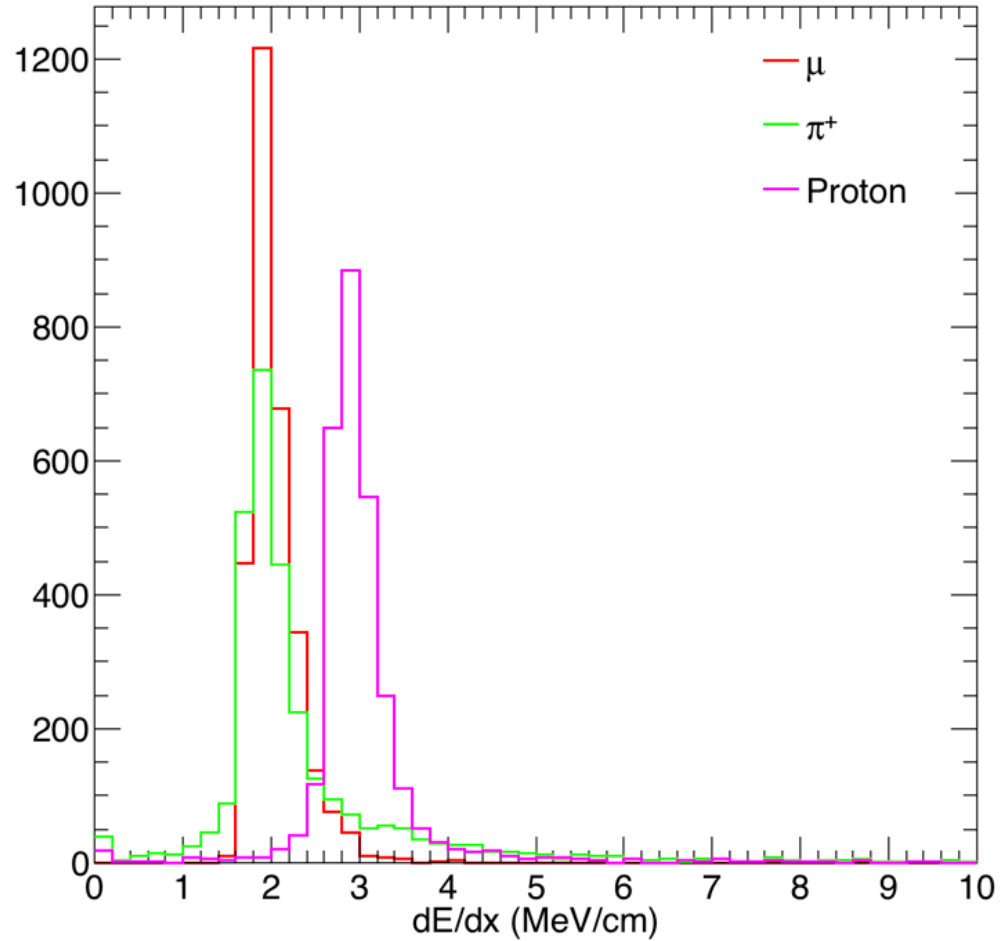
Concentration



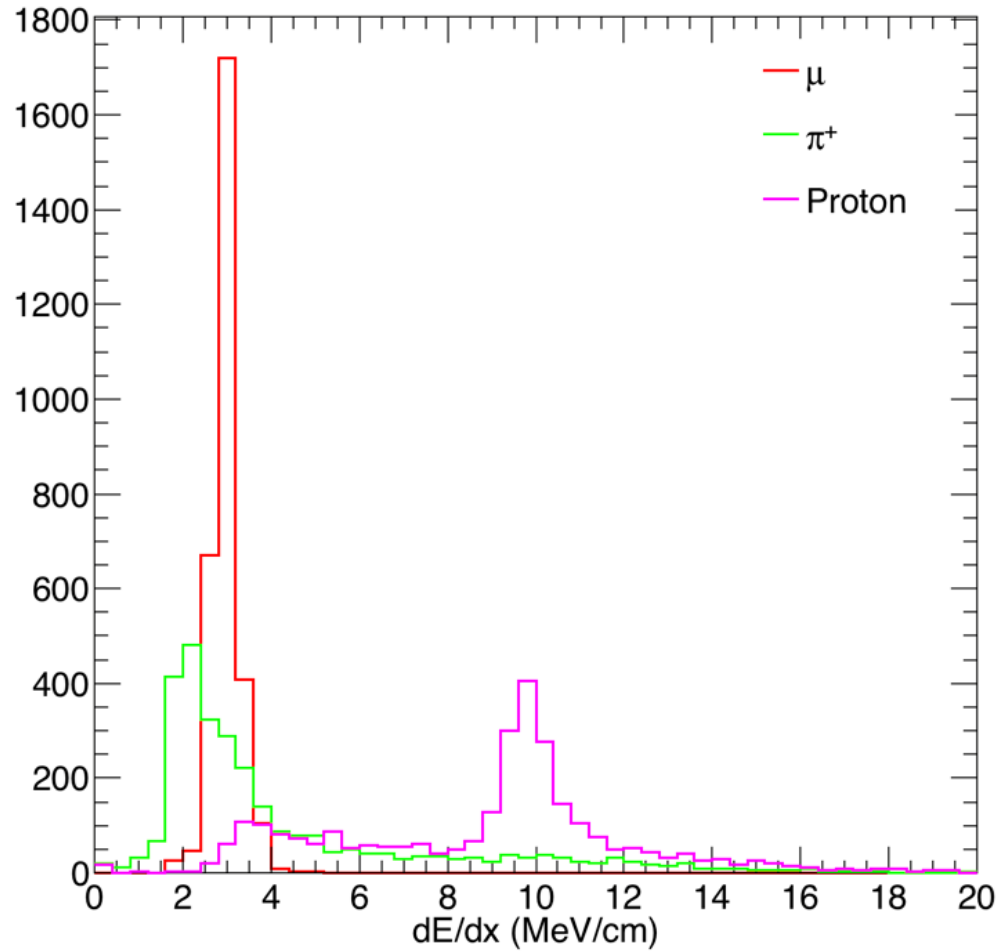
Conicalness



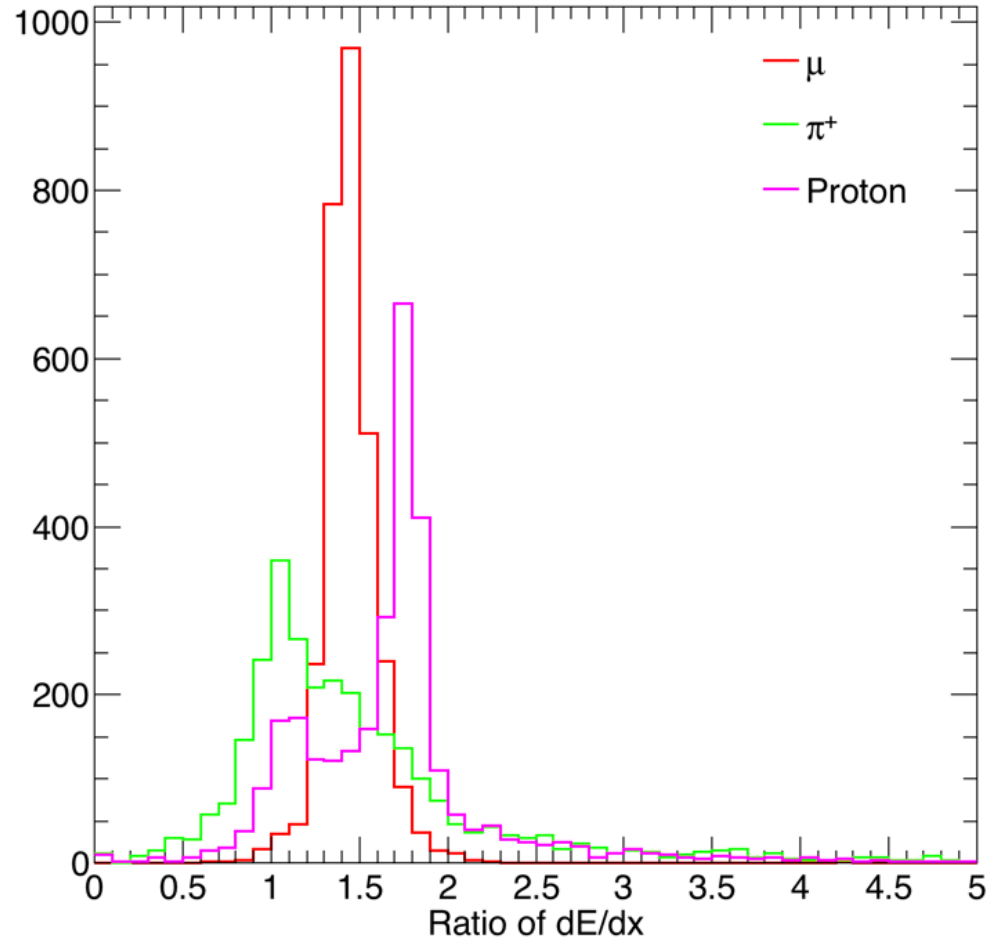
dE/dx (First 5%)



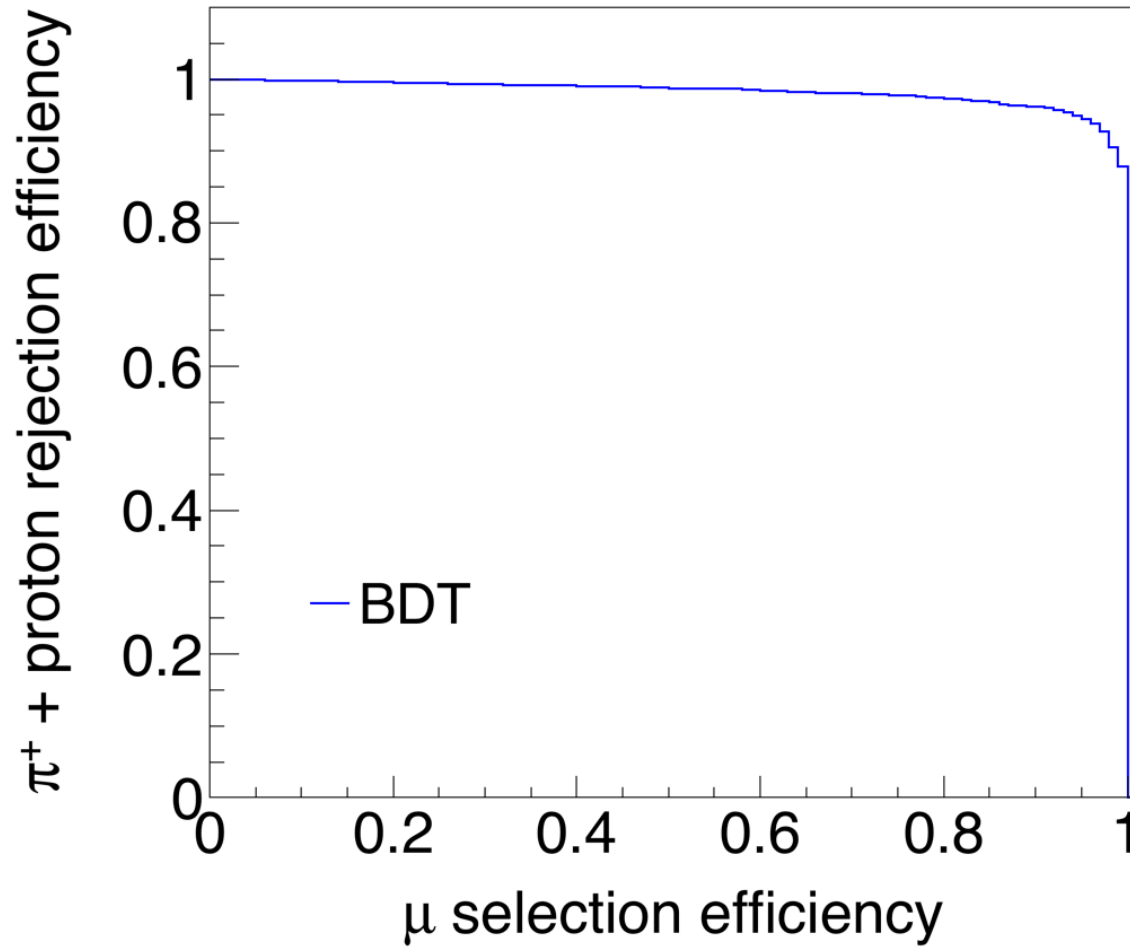
dE/dx (Last 10%)



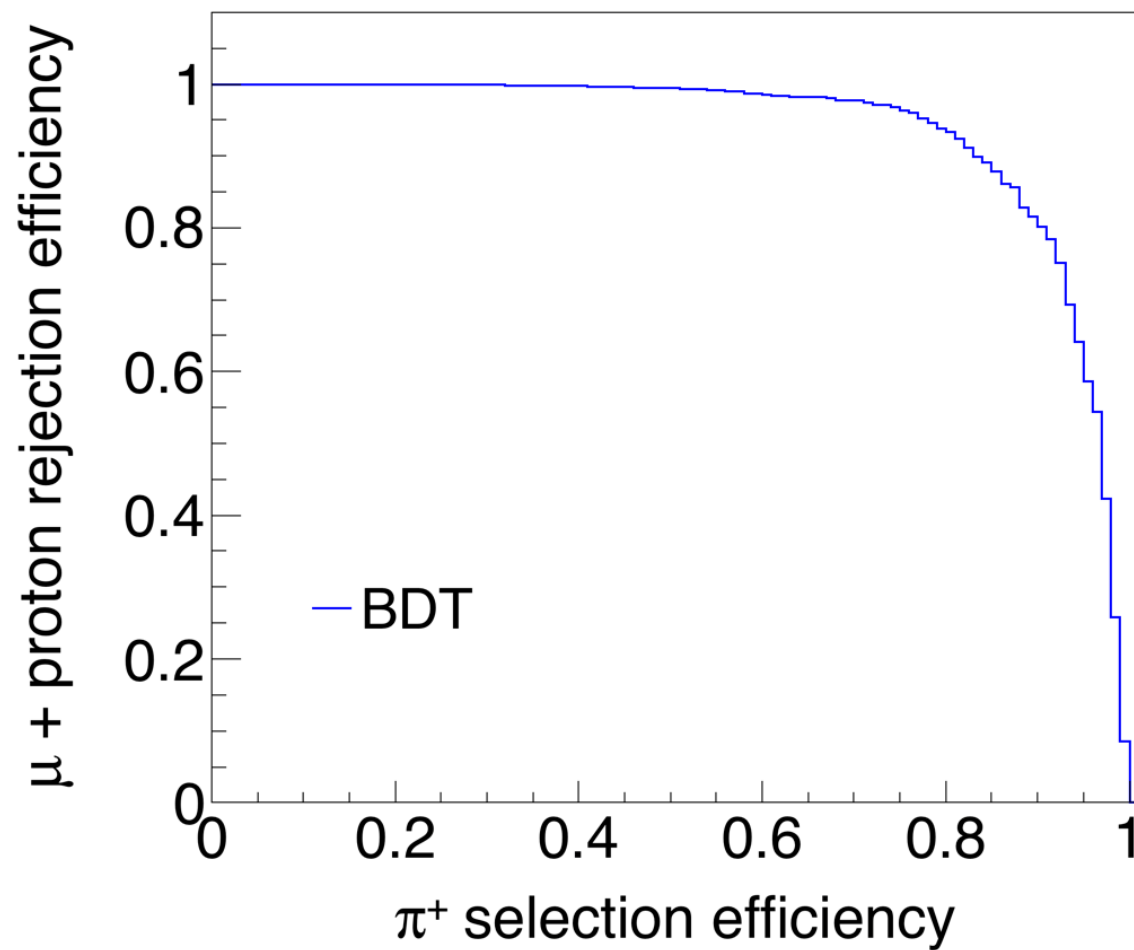
Ratio of dE/dx



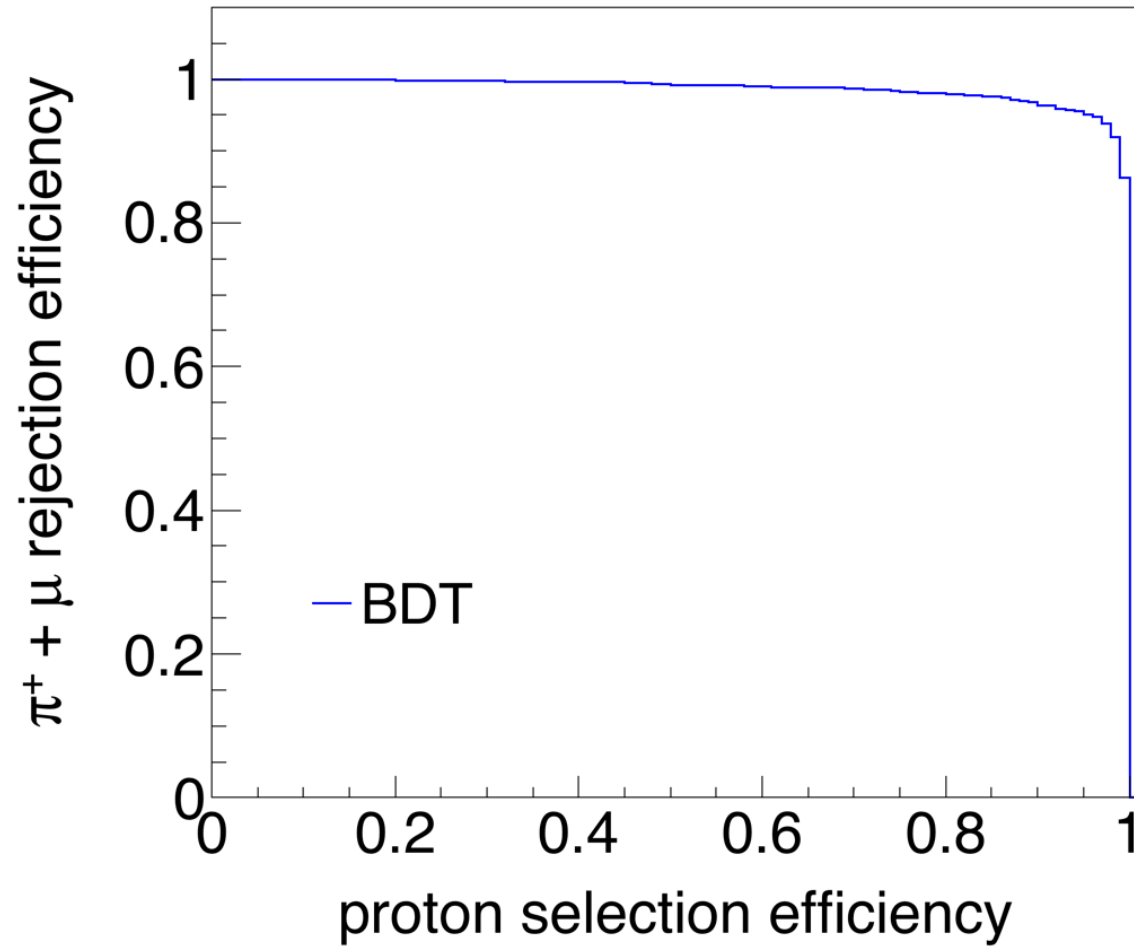
Muon Selection



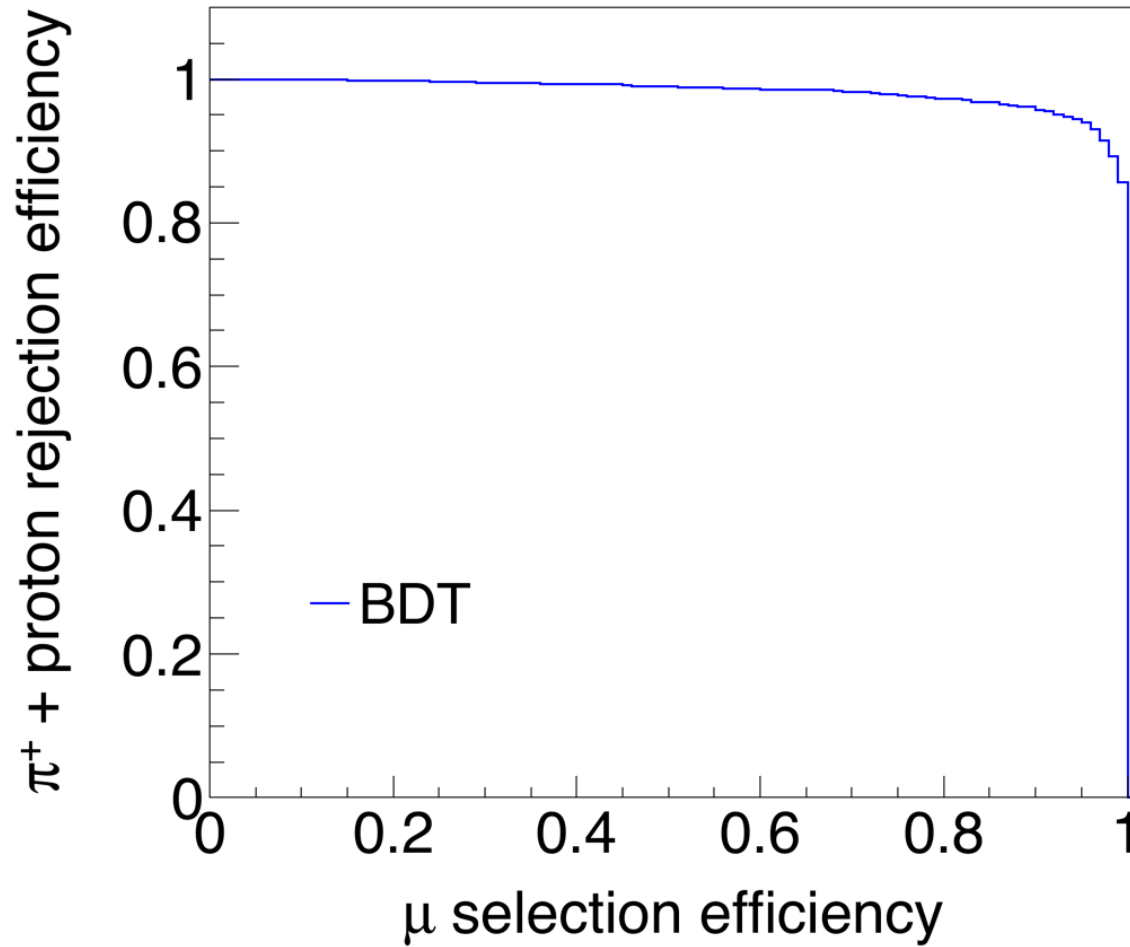
Pion Selection



Proton Selection



3 GeV Muon Selection



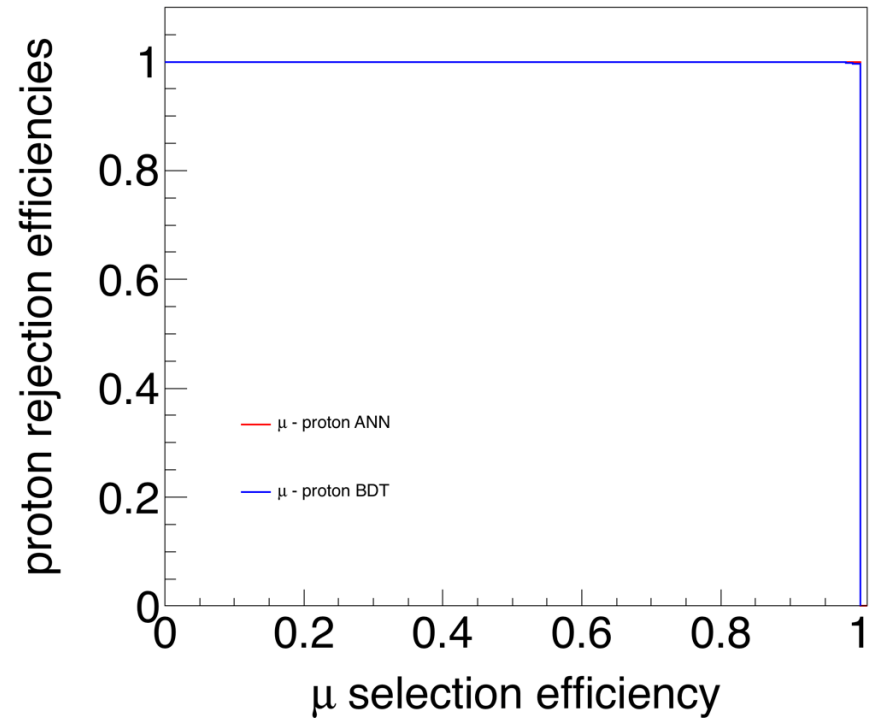
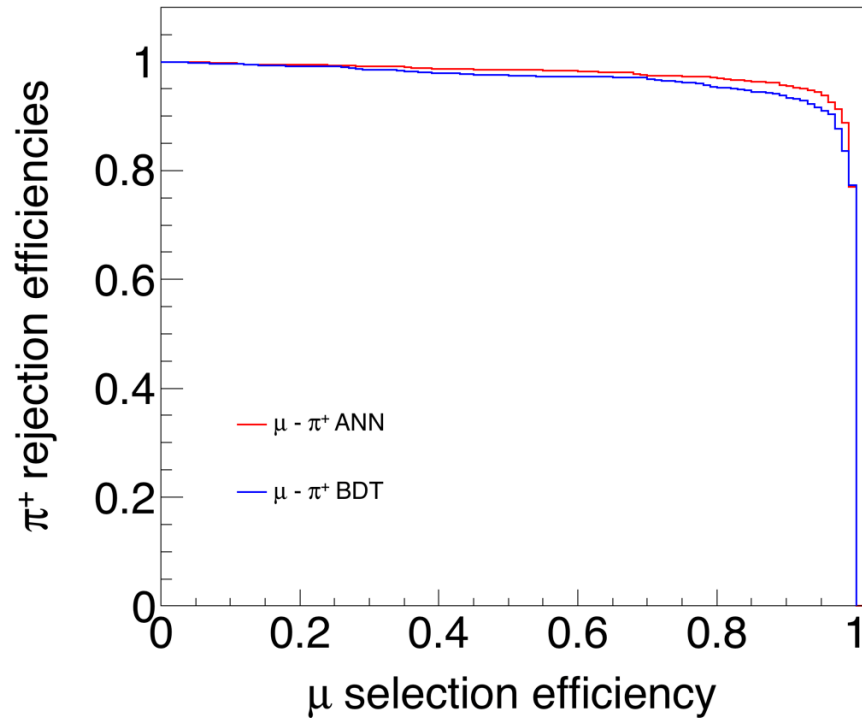
Summary

- Good discrimination between particles

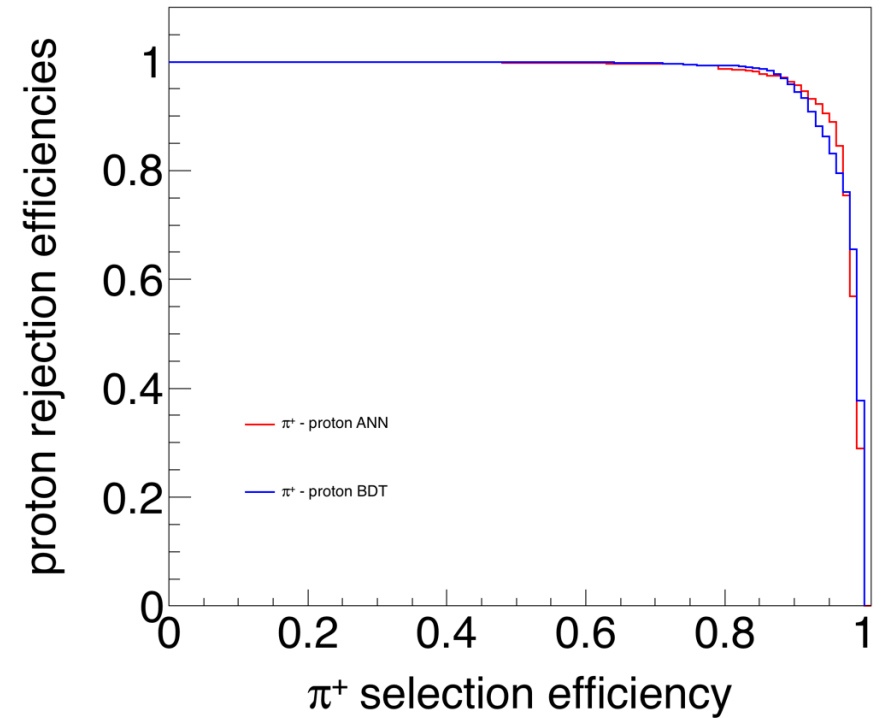
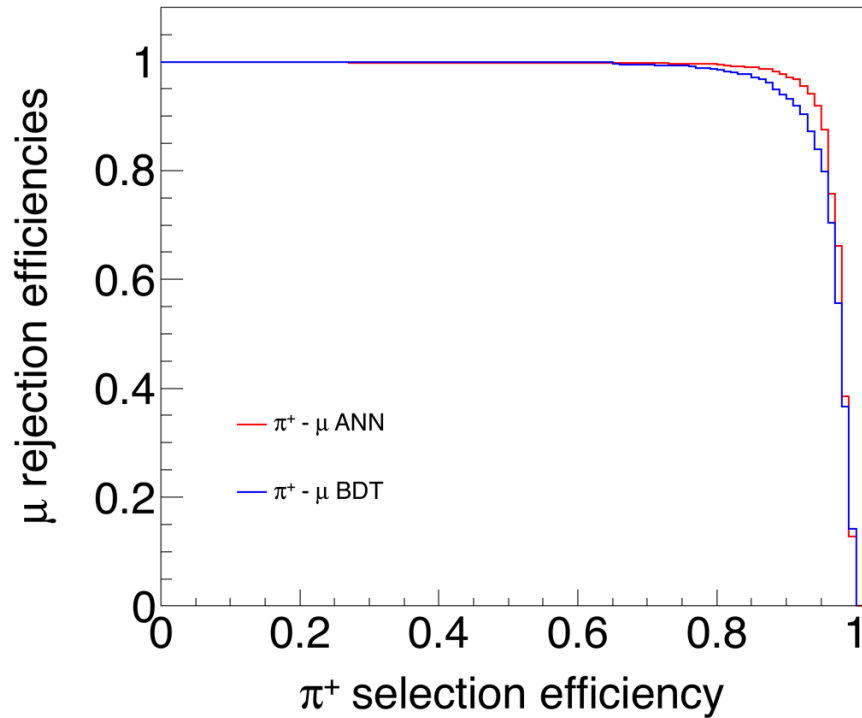
- To do:
 - Add in electrons
 - Look at stopping and exiting particles
 - Efficiency and purity studies
 - Study degradation due to adding cosmics

Backup

Muon Selection



Pion Selection



Proton Selection

