

# Update of Full Simulations for Paper

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4/23/2020

# Preliminaries

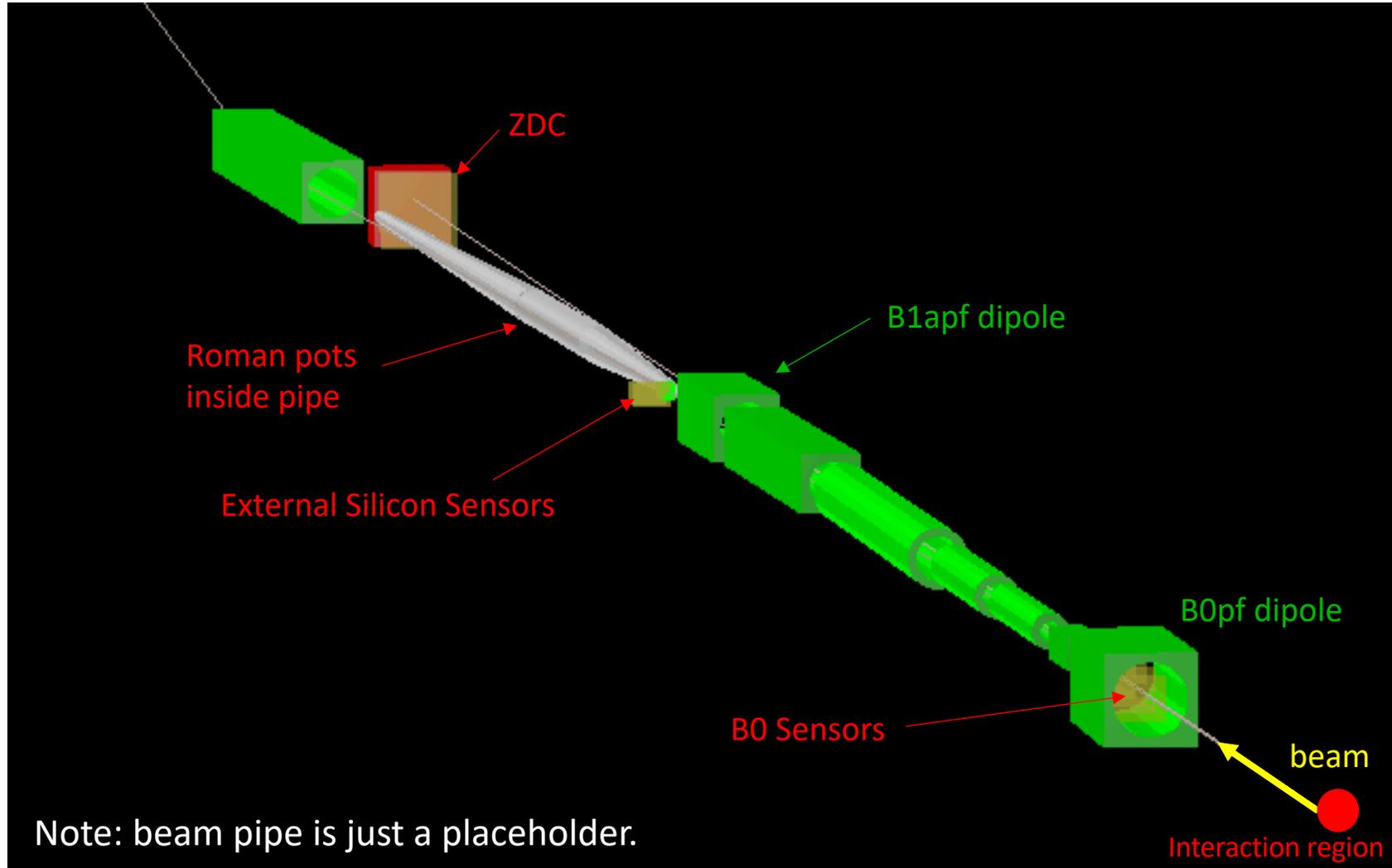
- Lost almost a week due to a technical issue with the IR transfer matrix and geometry. It is fixed now.
- Currently putting together table of all the individual resolution contributions.
  - Angular divergence, detector smearing, etc.
- Money plots will have MC+Accep+Smearing plotted together.

# Preliminaries

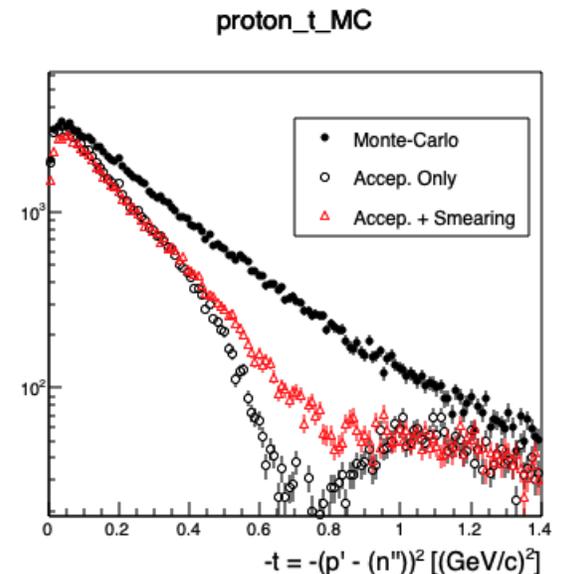
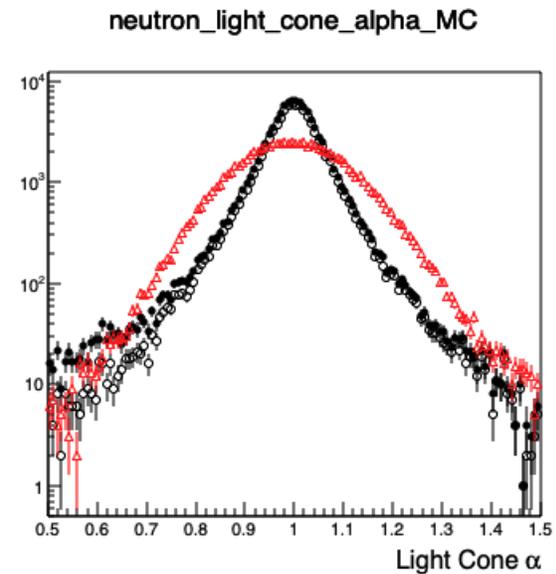
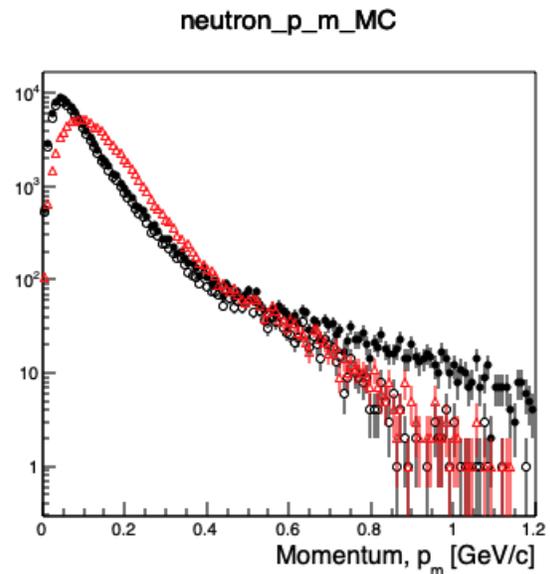
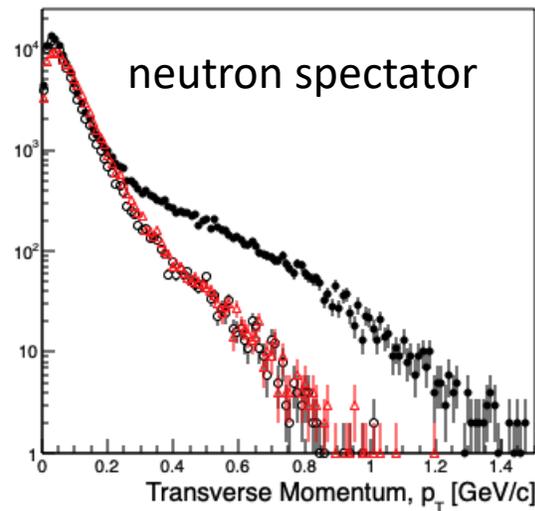
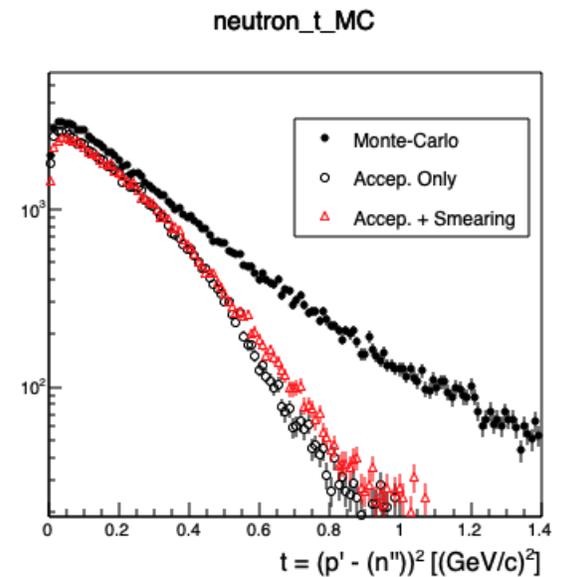
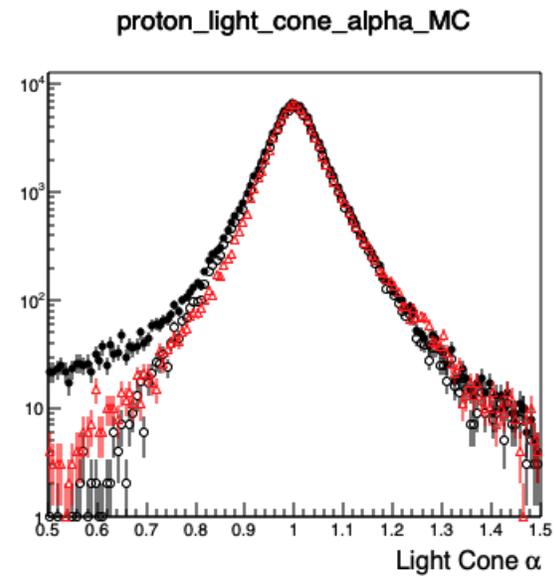
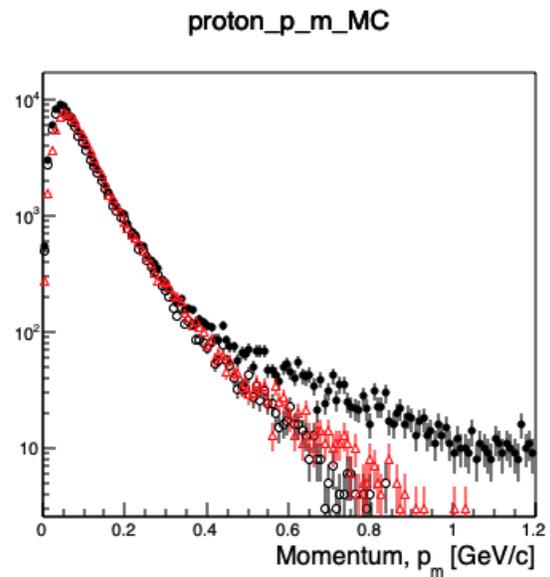
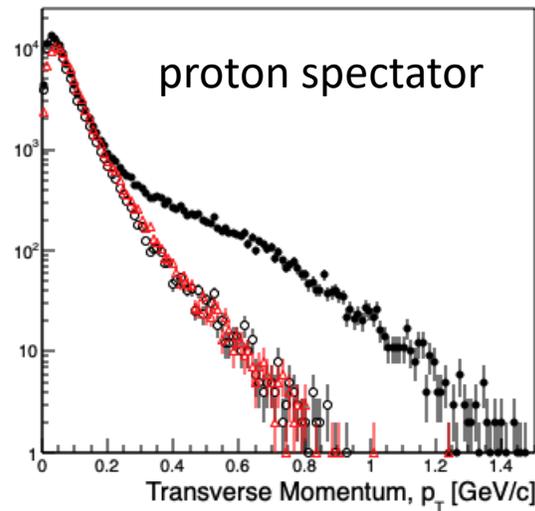
- 18 (GeV) x 135 (GeV/n) e+D events with BeAGLE.
- Results for neutron spectator and proton spectator shown separately.
- ZDC:  $\sigma_E \sim \frac{50\%}{\sqrt{E}} + 5\%$ ,  $\sigma_\theta \sim \frac{3 \text{ mrad}}{\sqrt{E}}$
- External Silicon Sensors:  $500\mu\text{m} \times 500\mu\text{m}$  pixels
- B0:  $50\mu\text{m} \times 50\mu\text{m}$  pixels
- Angular divergence numbers from “high acceptance – 18x275 GeV – full scope” portion of “eRHIC parameters v6.0” table.
- Beam energy spread  $\sim 10^{-4}$
- Vertex smearing (to simulate the crab cavity effect)

# Simulation Apparatus

- EicRoot with GEANT4
- Includes ZDC, B0 sensors, Roman Pots, and External Silicon Sensors for particles with different rigidity.



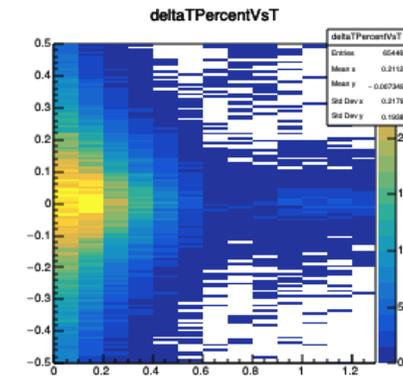
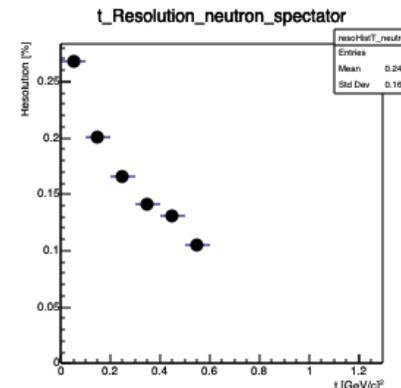
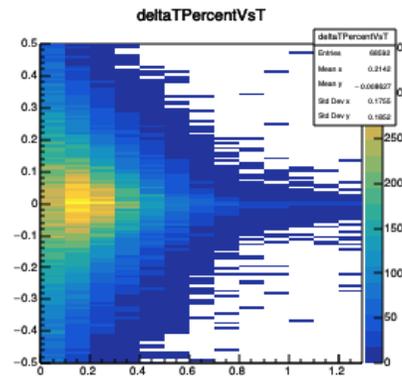
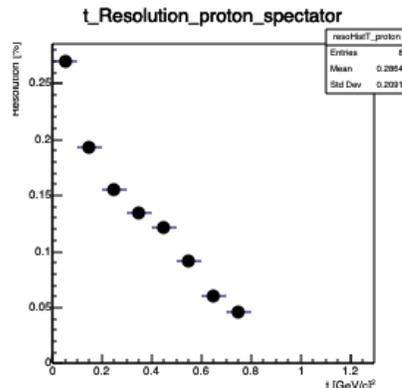
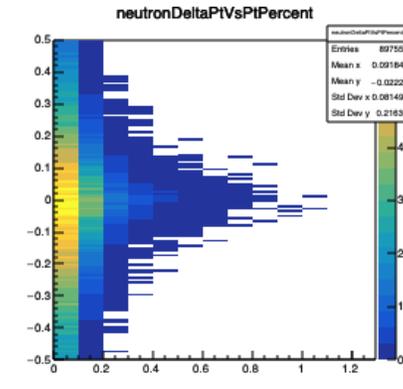
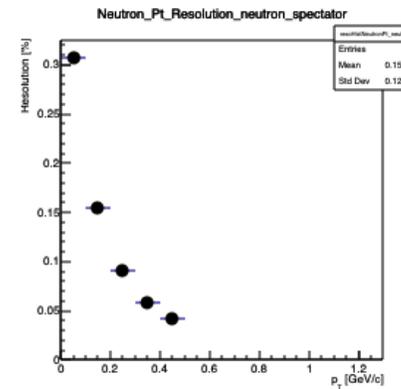
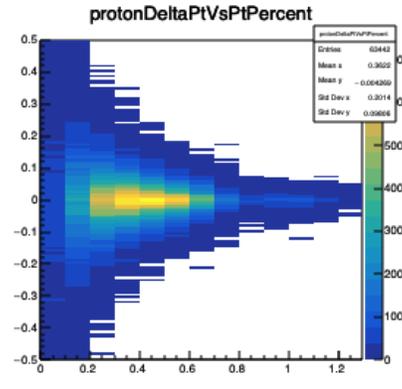
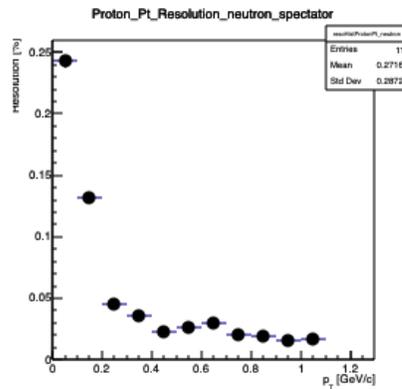
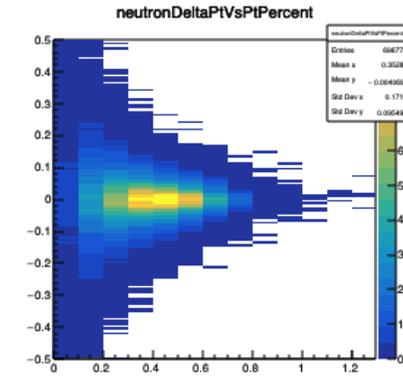
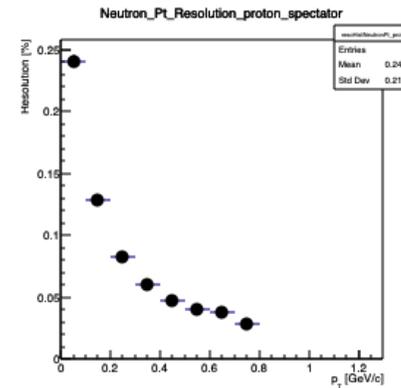
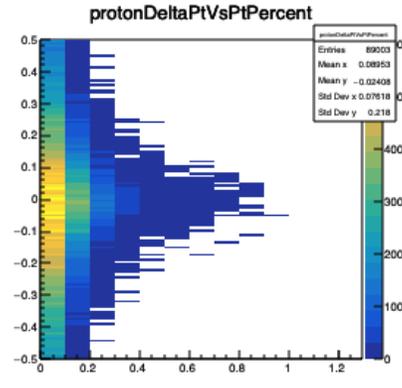
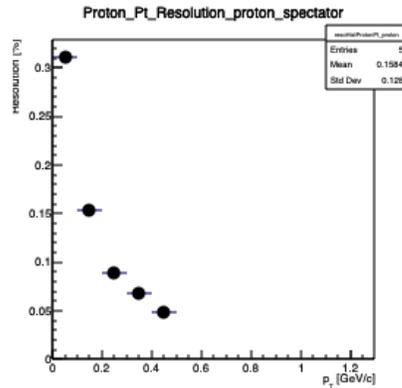
# Preliminary Physics Plots



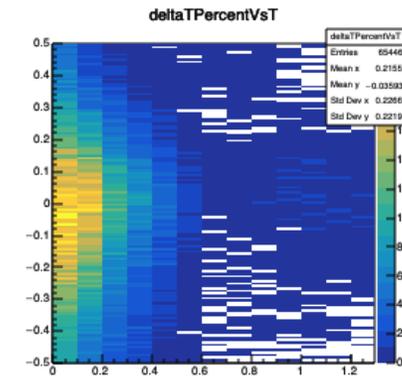
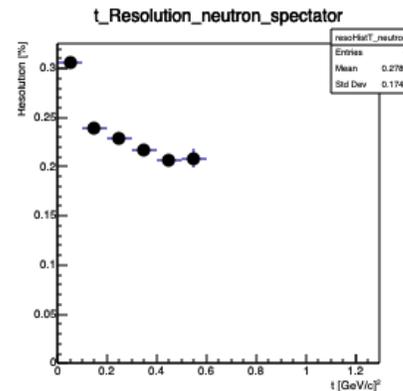
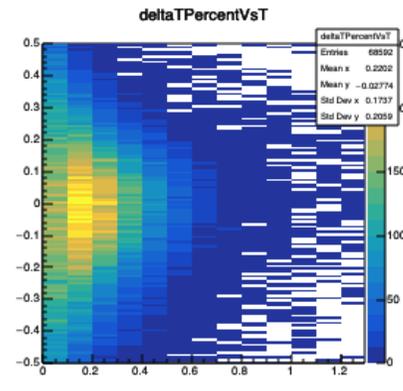
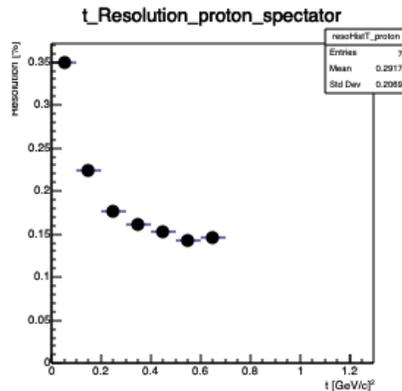
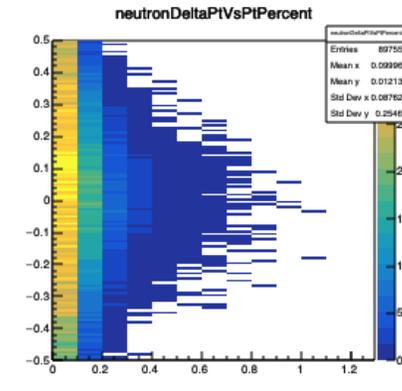
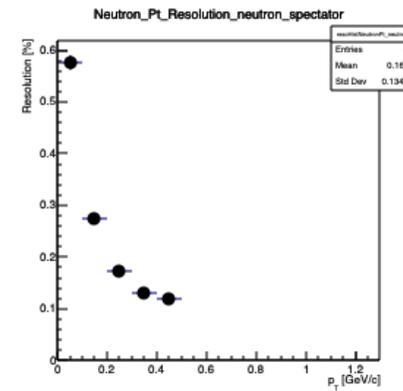
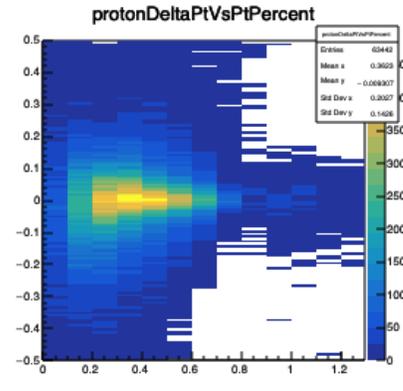
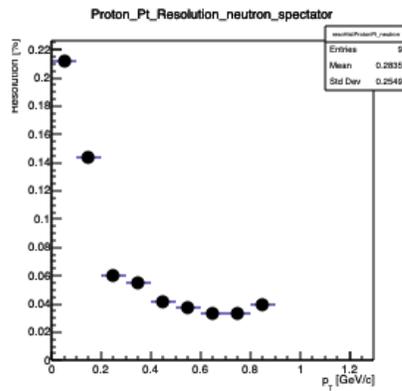
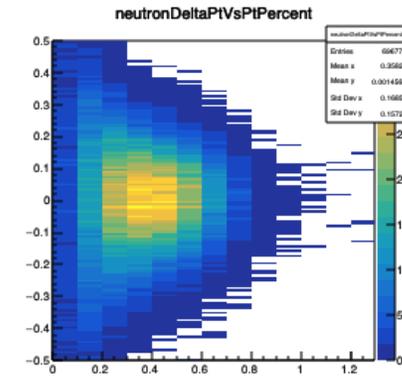
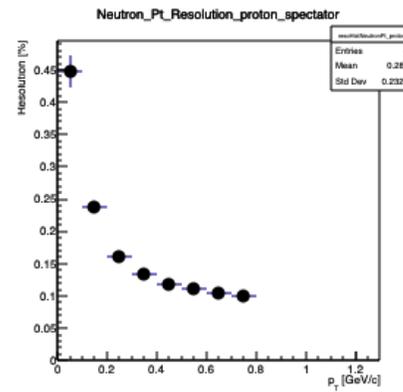
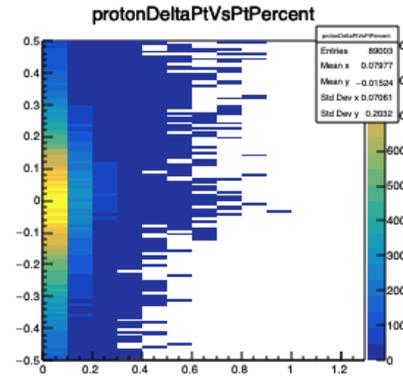
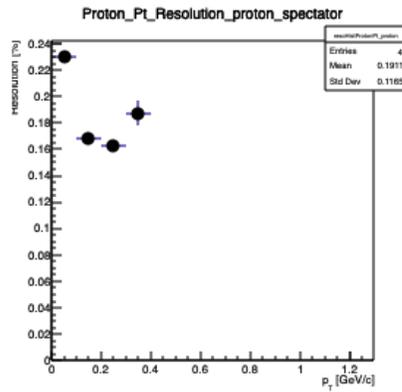
# Resolutions

- p (3-mom) resolution for neutrons
- pt resolution for neutrons
- pt resolution for the protons
- t resolution
- All combinations split up between the spectator proton/neutron cases.

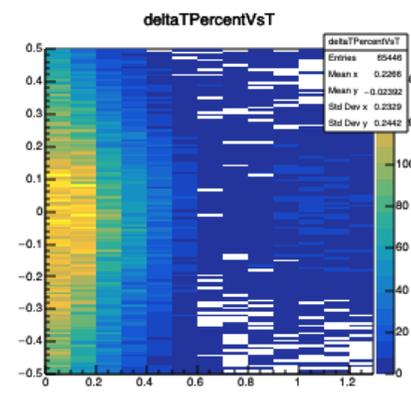
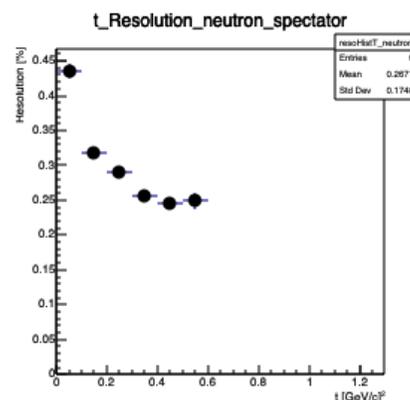
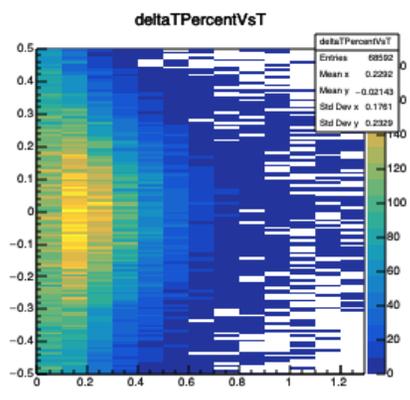
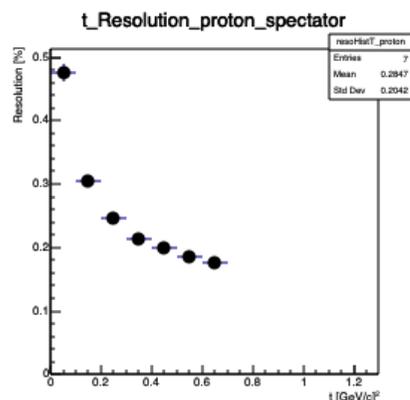
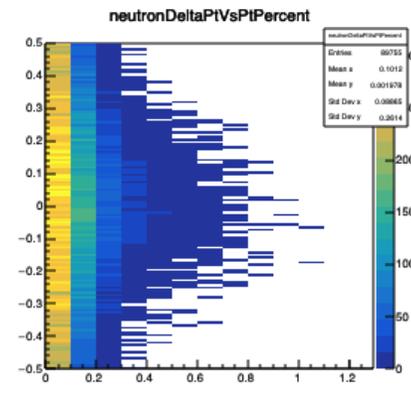
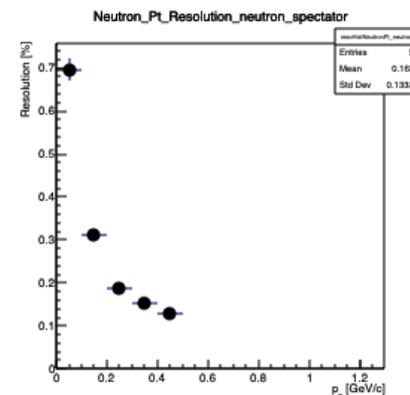
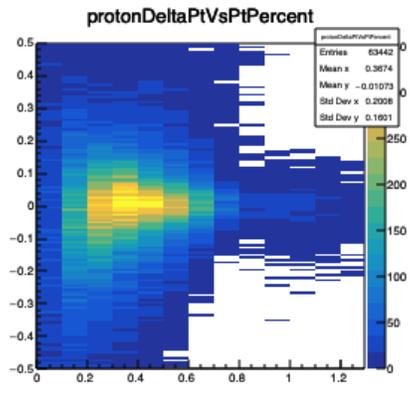
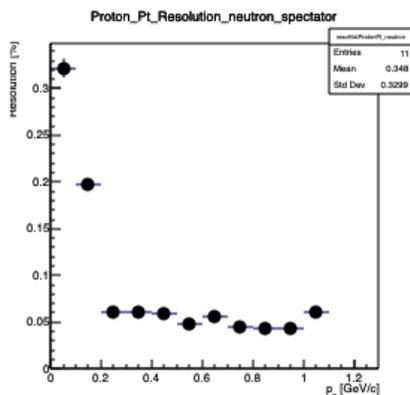
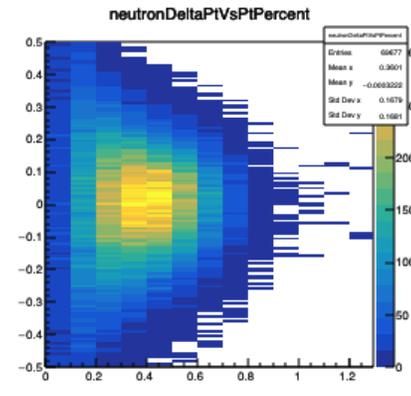
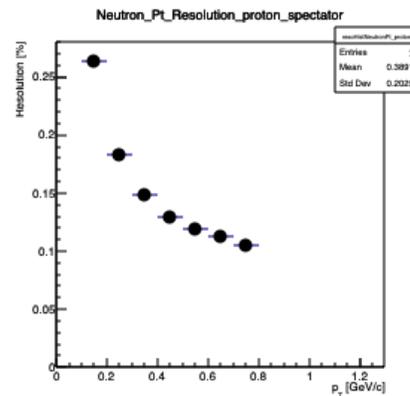
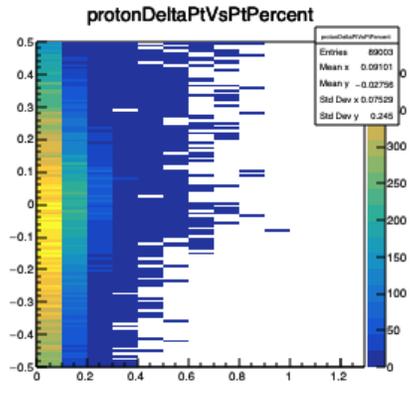
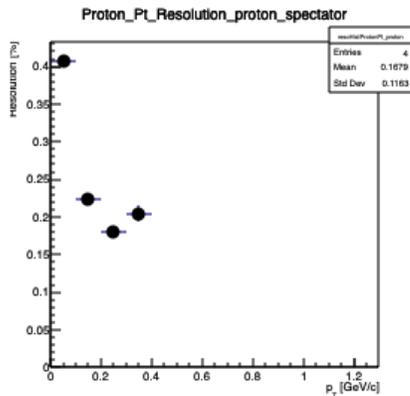
# Quick examples (angular divergence only)



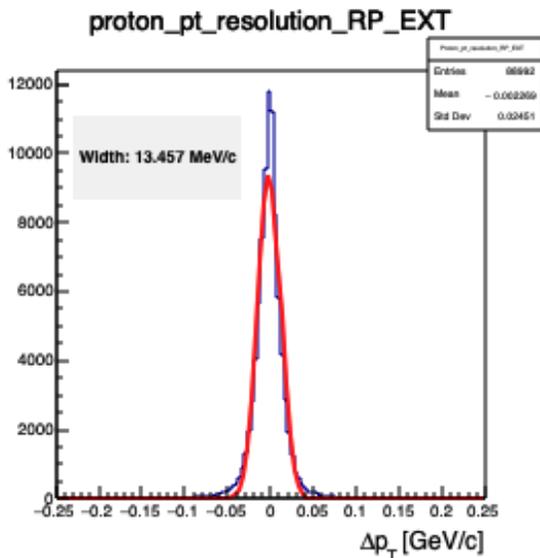
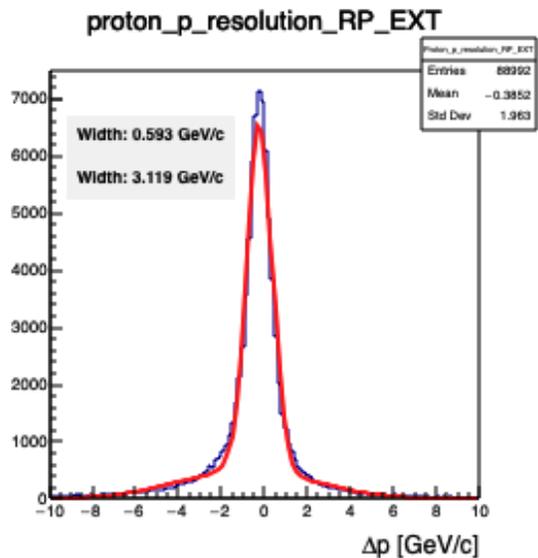
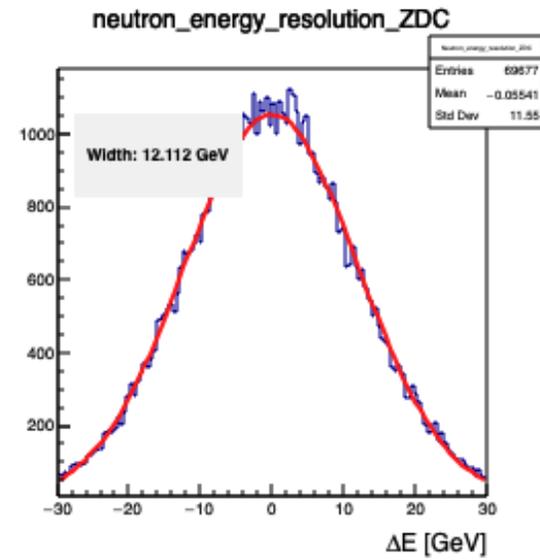
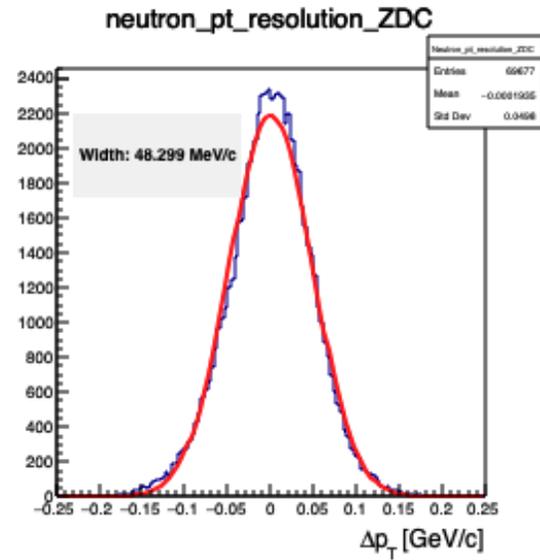
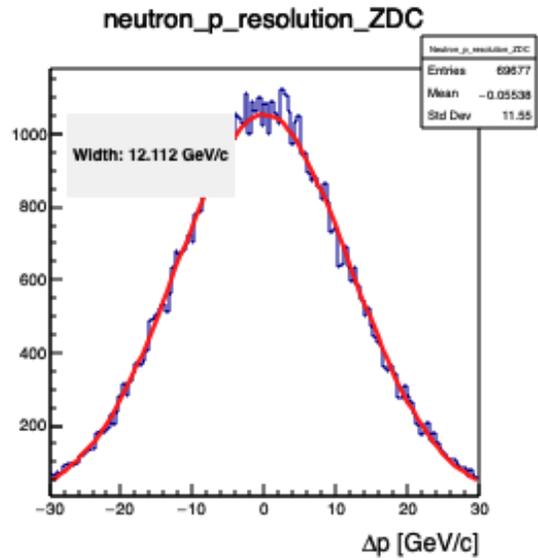
# Quick examples (detector effects only)



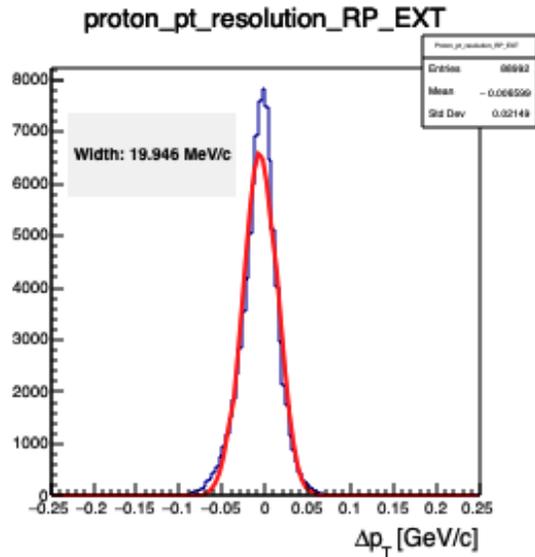
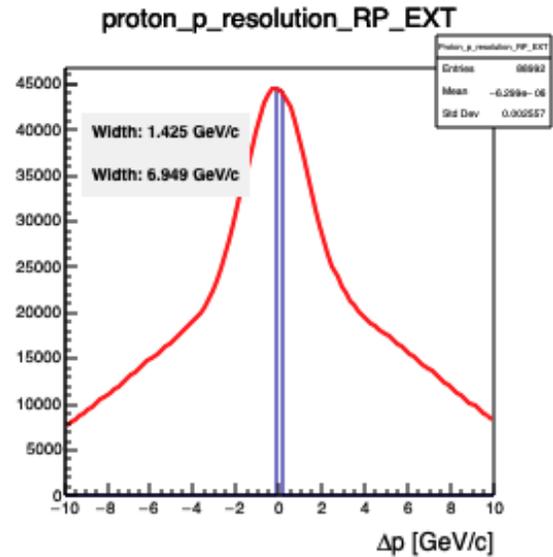
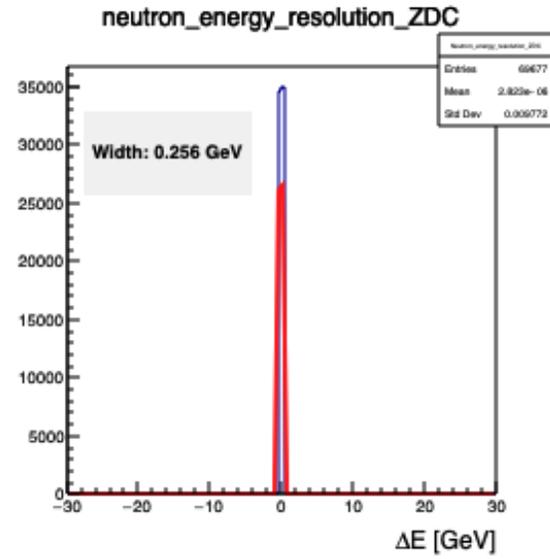
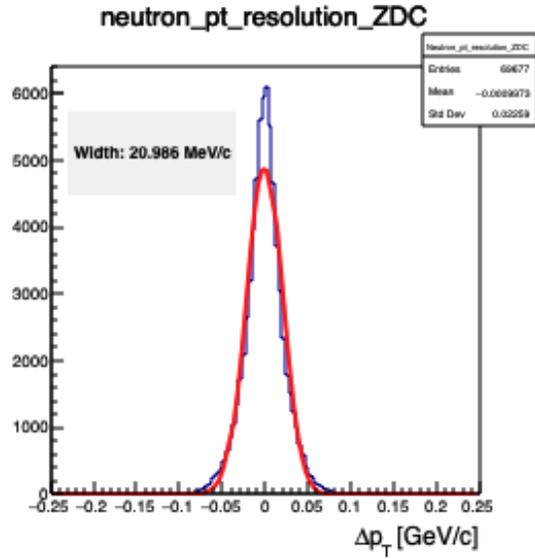
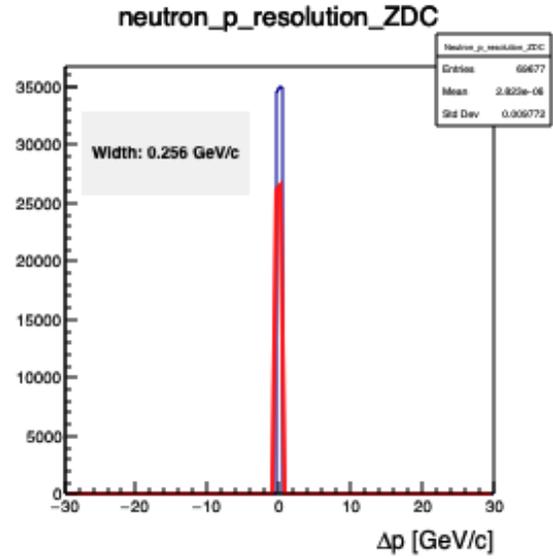
# Quick Examples (full smearing)



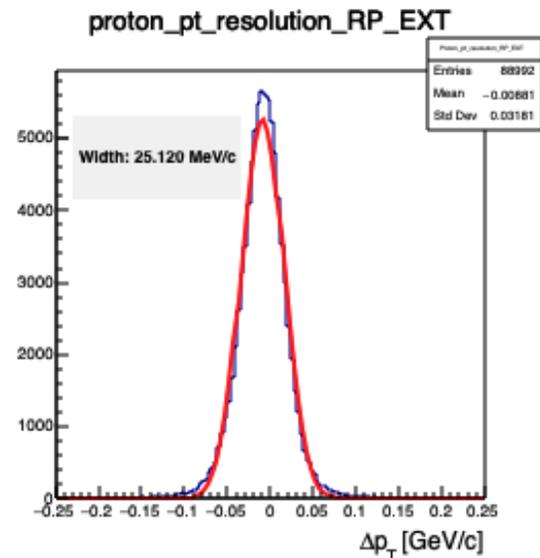
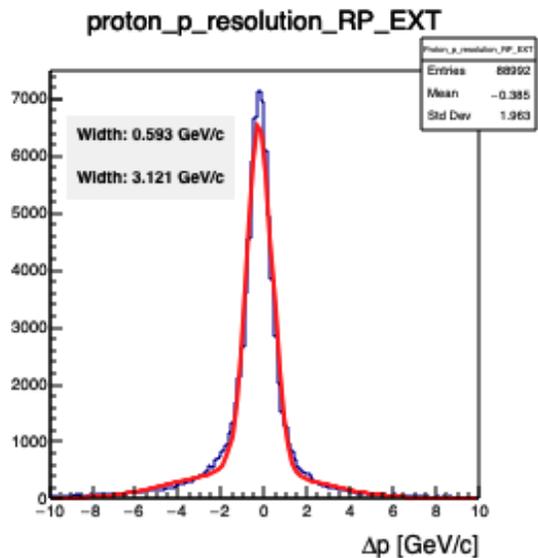
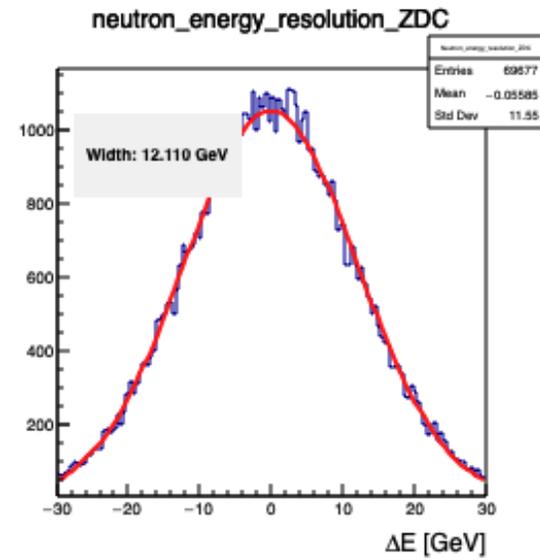
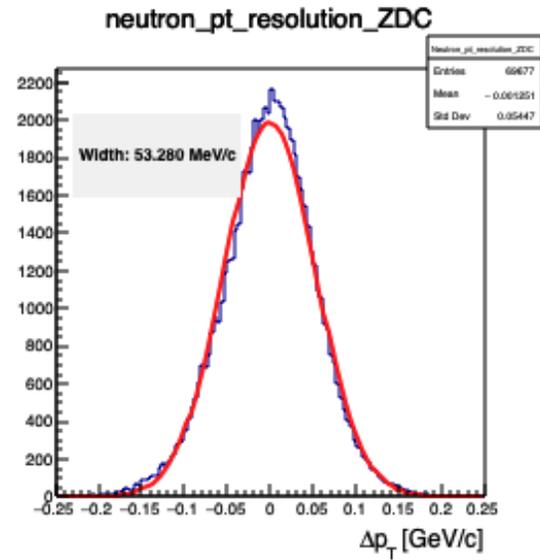
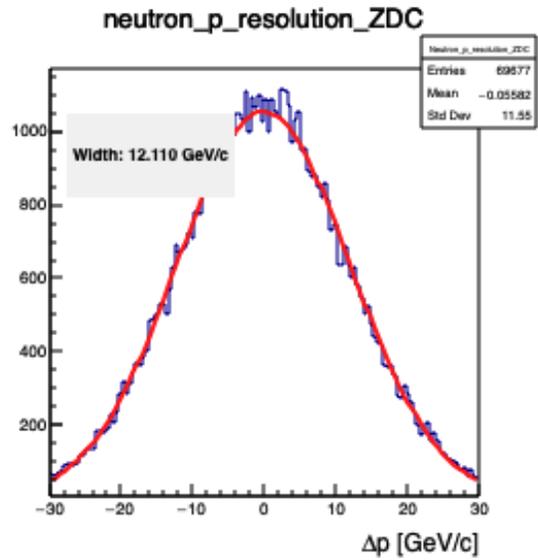
# Average Smearing [MeV/c] (detector only, proton spectator)



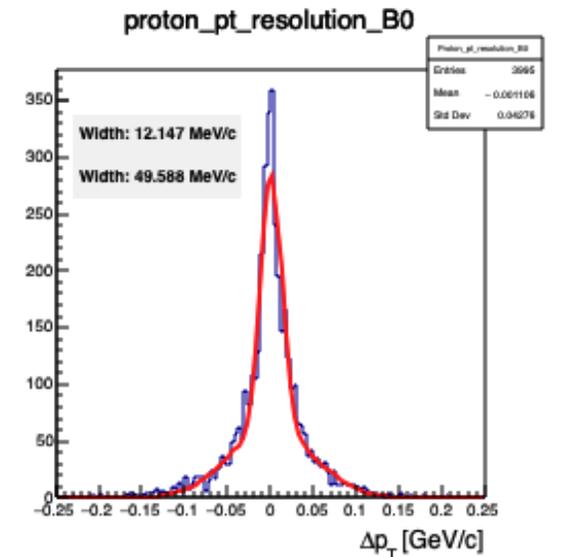
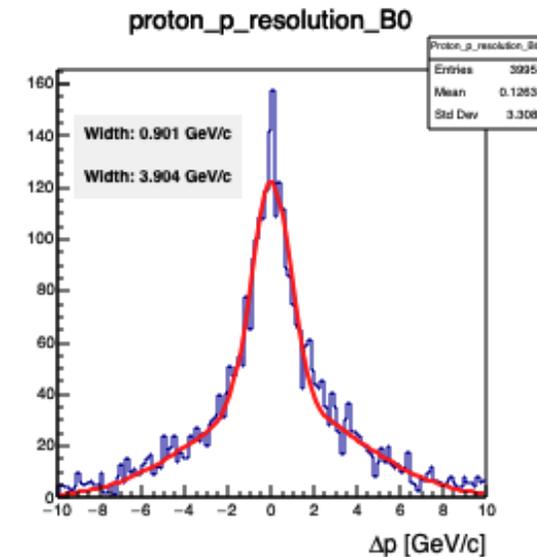
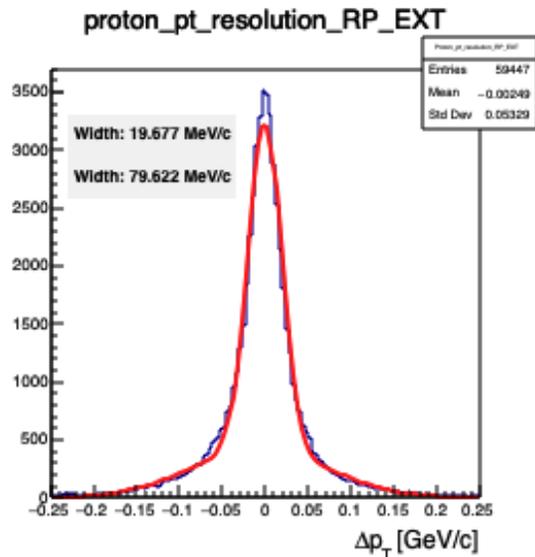
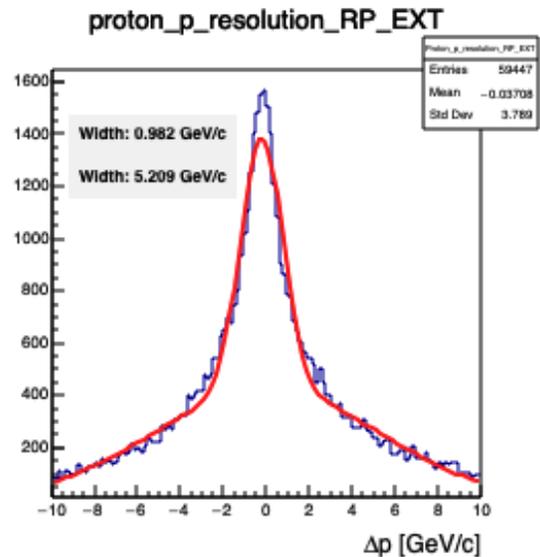
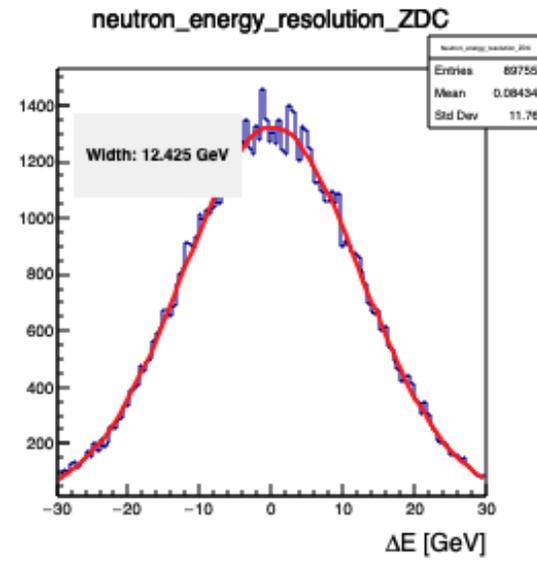
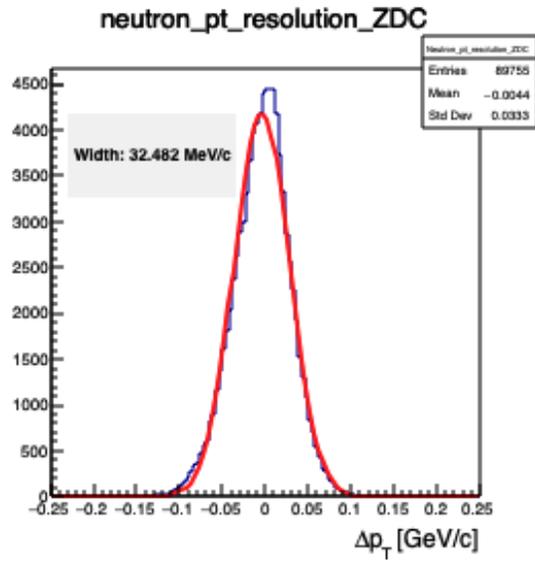
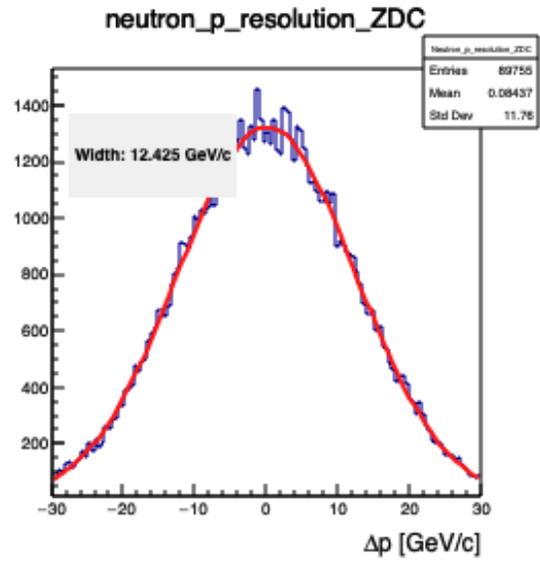
# Average Smearing [MeV/c] (divergence only, proton spectator)



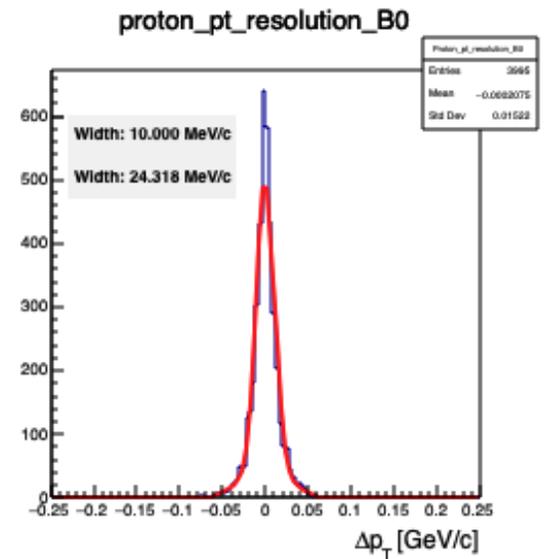
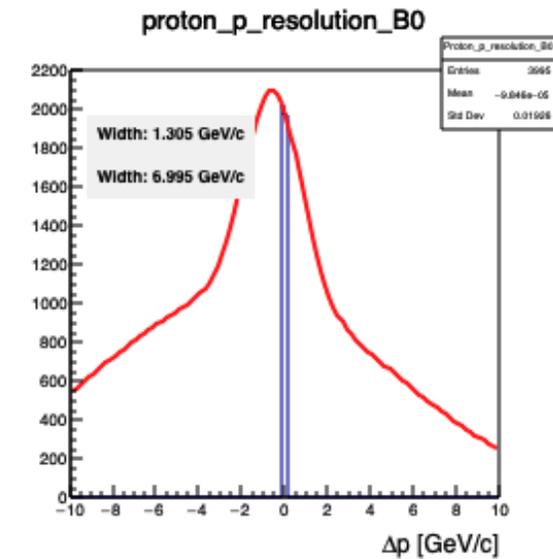
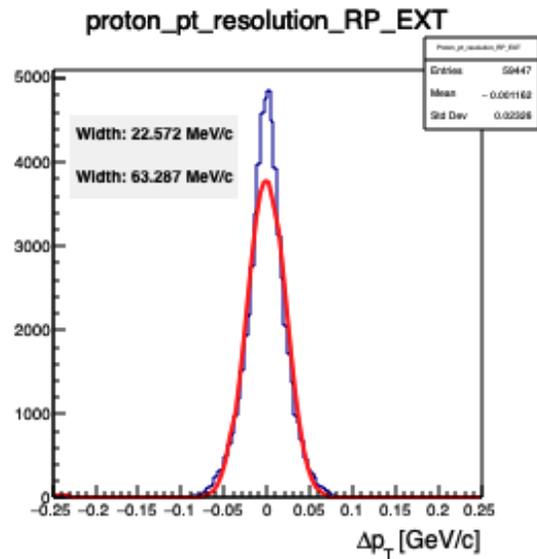
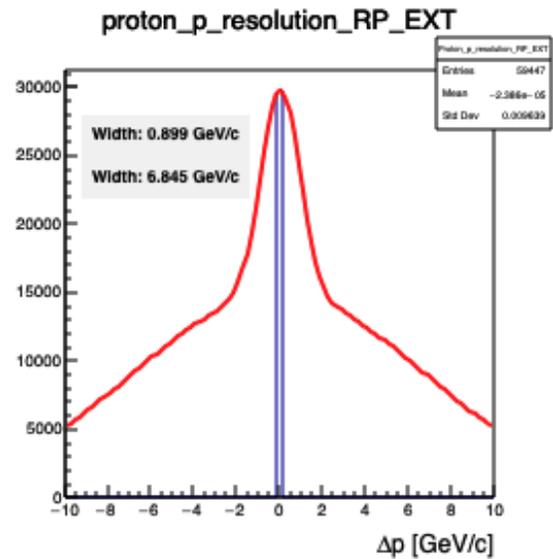
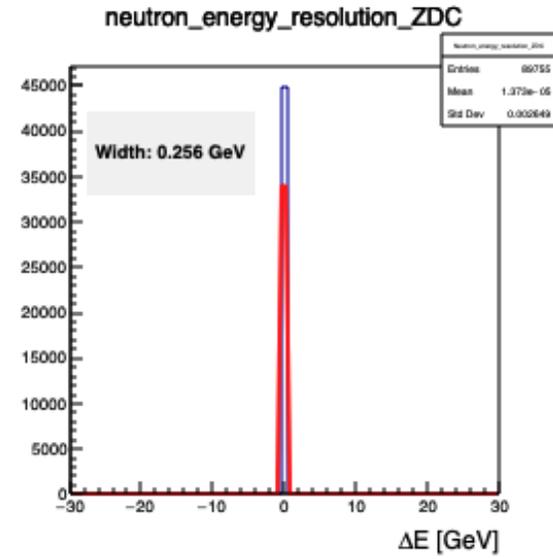
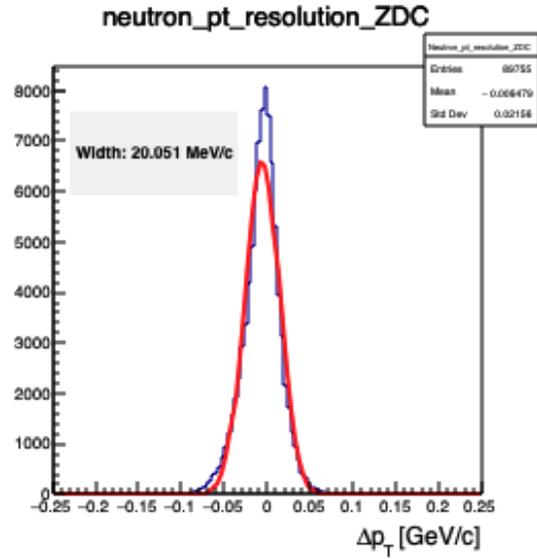
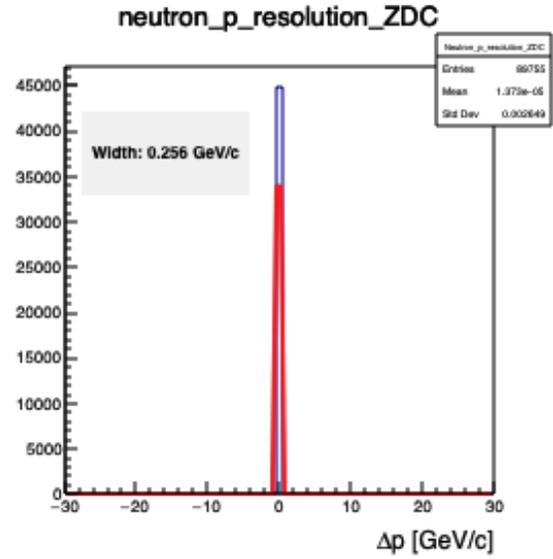
# Average Smearing [MeV/c] (full smearing, proton spectator)



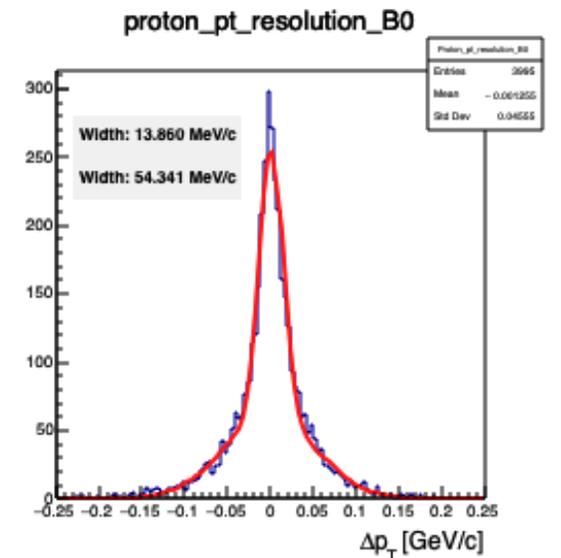
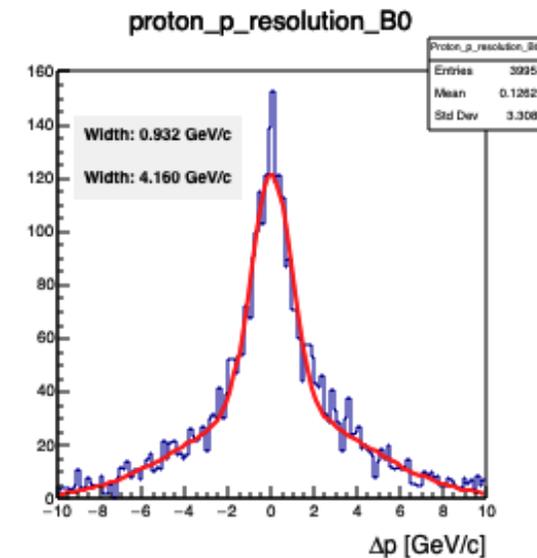
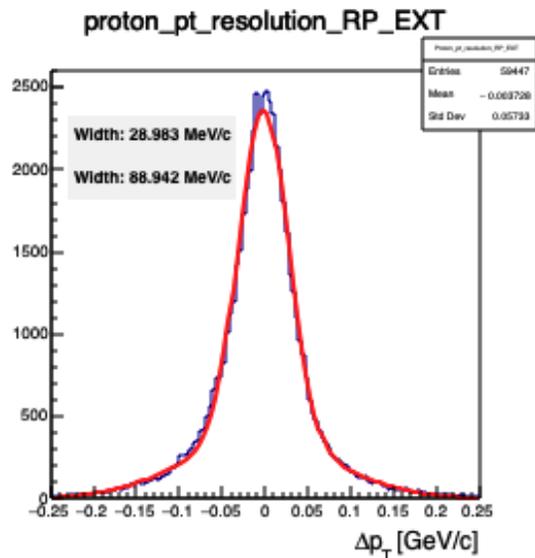
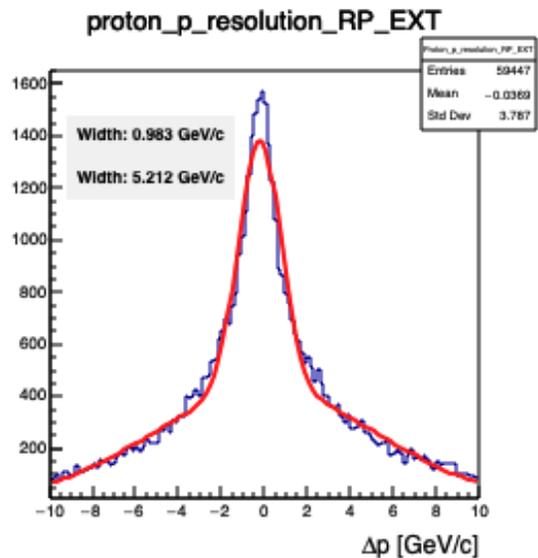
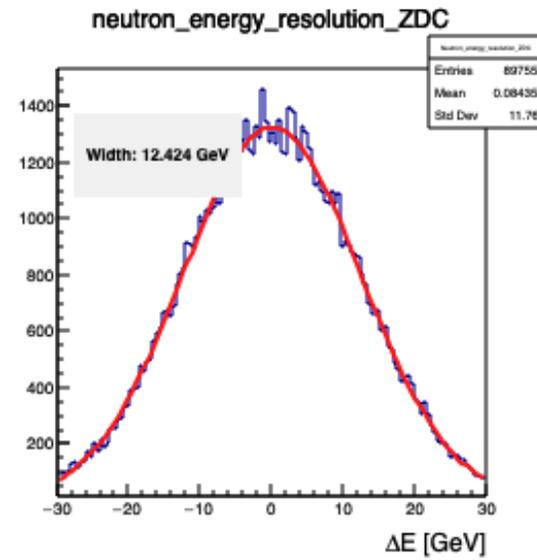
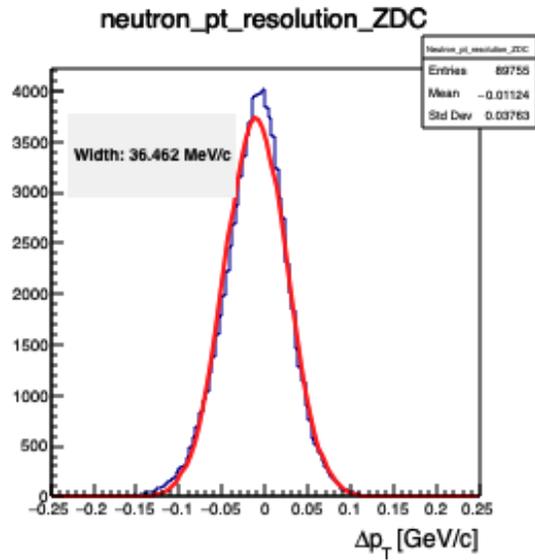
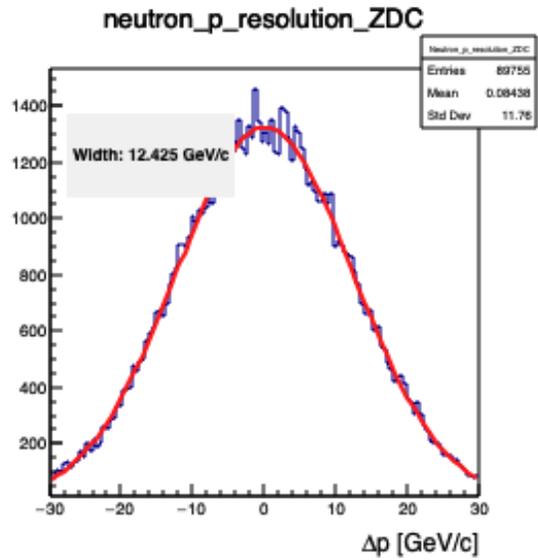
# Average Smearing [MeV/c] (detector only, neutron spectator)



# Average Smearing [MeV/c] (divergence only, neutron spectator)



# Average Smearing [MeV/c] (full smearing, neutron spectator)



# Takeaways

- The main physics plots are ready, minus plot beautification, etc.
- Need to finish putting together all of the individual contribution numbers for the smearing effects (1-2 days max).
- Need to update the acceptance table in the paper as well.
- I'd like to sit on the results over the weekend to check things at a calmer pace to ensure I have caught any possible bugs before saying plots are final.