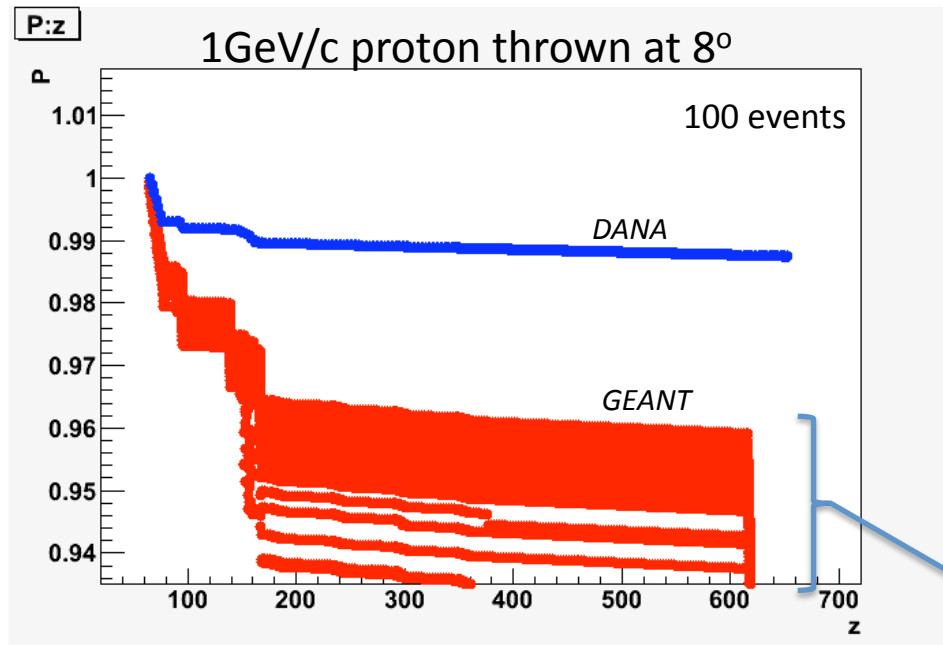


# Momentum loss

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# The issue



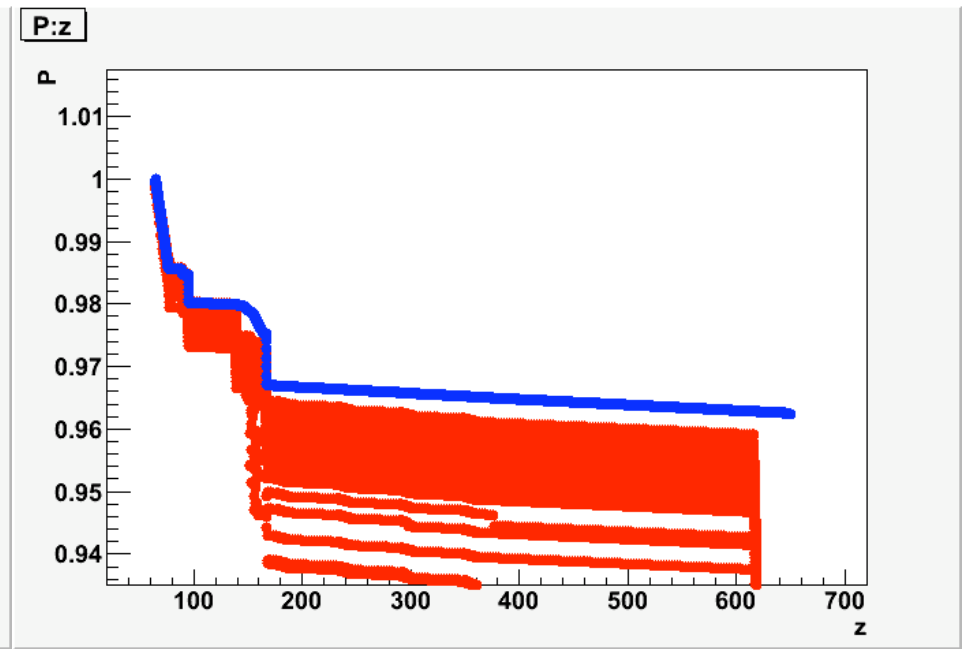
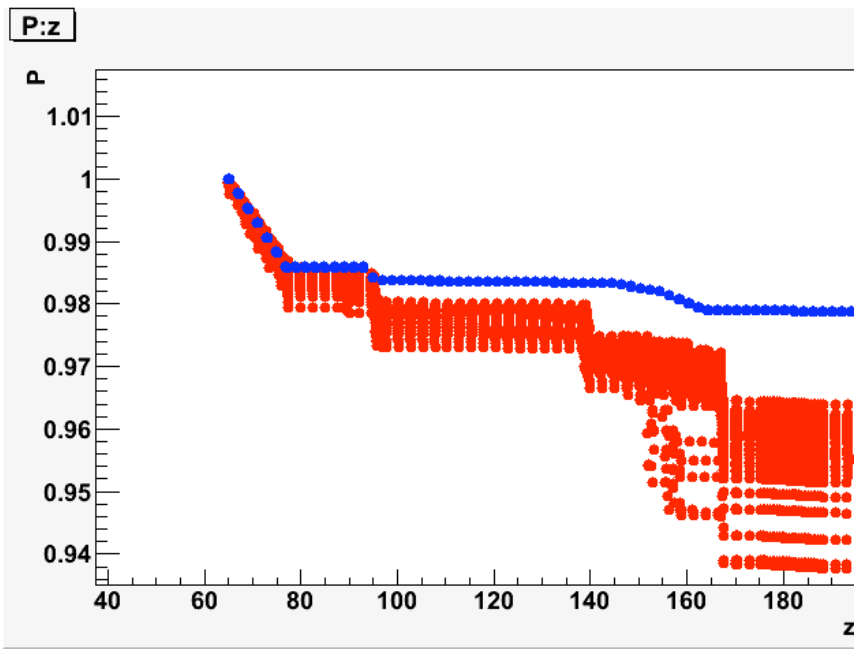
- Reconstructing protons with systematically low momentum
- Pions exhibit much less (if any) such shift
- Energy loss due to material not being properly accounted for

*Spread due to  $\delta$ -ray production. Maximum momentum represents case with no  $\delta$ -ray produced.*

# Status prior to present work

$dP/dx$  multiplied by factor of 2 (??)

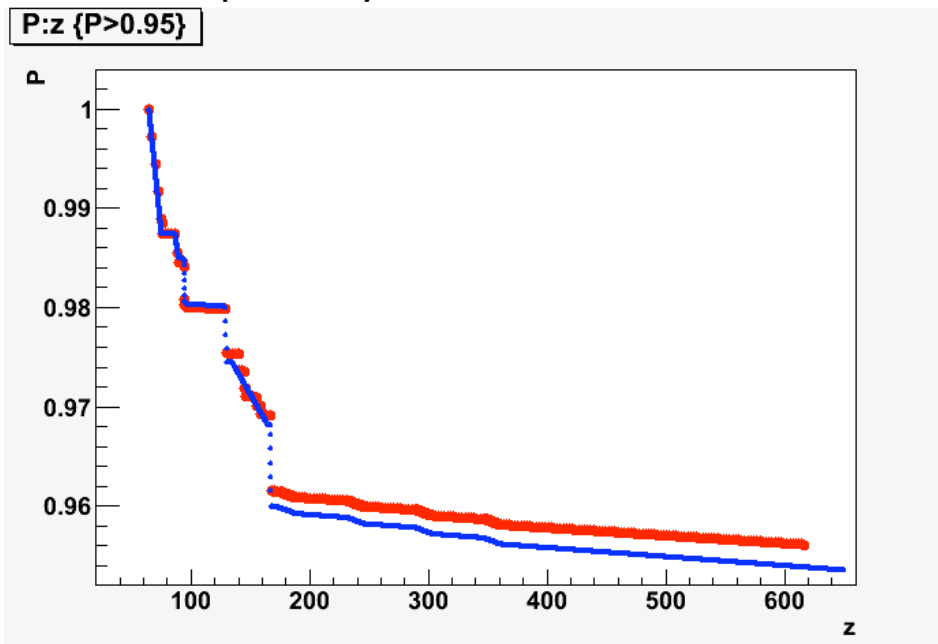
$dP/dx * 2$  and 1mm steps



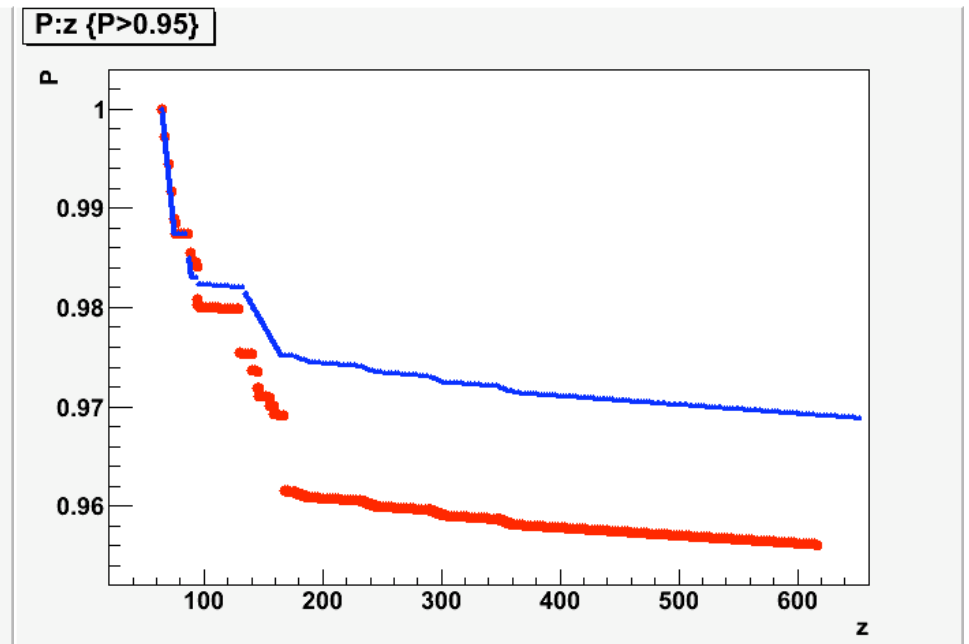
- Energy loss seems to be a factor of 2 too low compared to GEANT (compare target volume)
- Formulas have been reviewed, but haven't found source of discrepancy. Factor of 2 included as empirical factor for now.
- Normal swimming with ALT1 uses 2cm step sizes. Forcing 1mm step sizes gets much better agreement.

- Material maps updated (in particular the CDC)
- Adaptive step size calculation modified to have 100keV/c momentum changes (was 1% change in momentum)
- Still a problem with boundaries

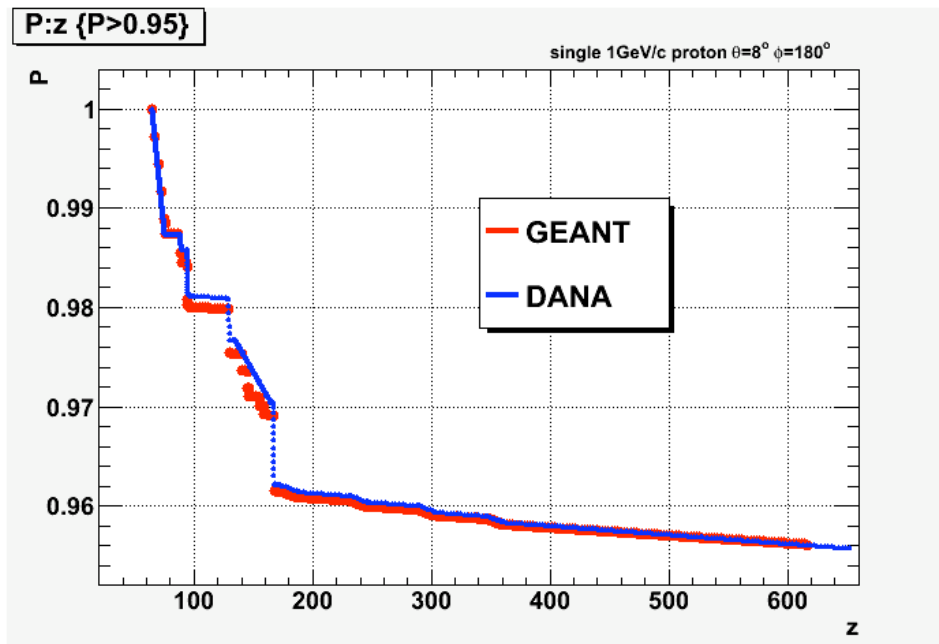
1mm steps everywhere



Adaptive steps based on material and B-field

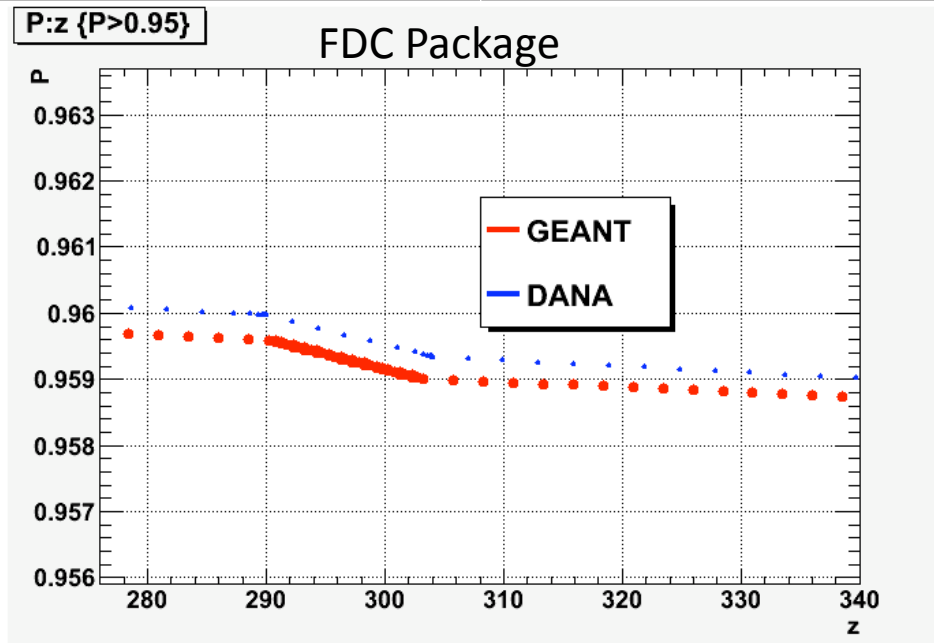
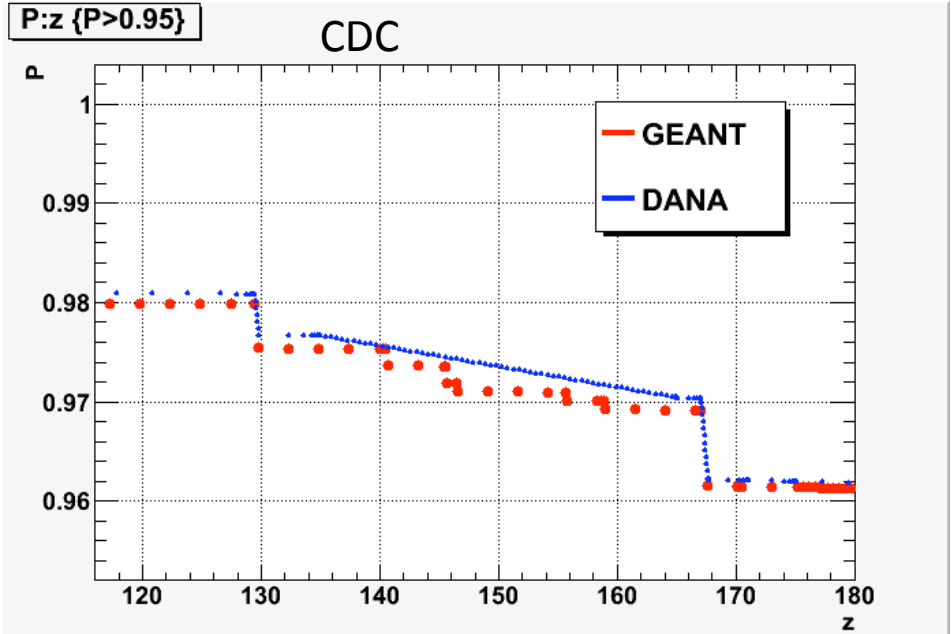
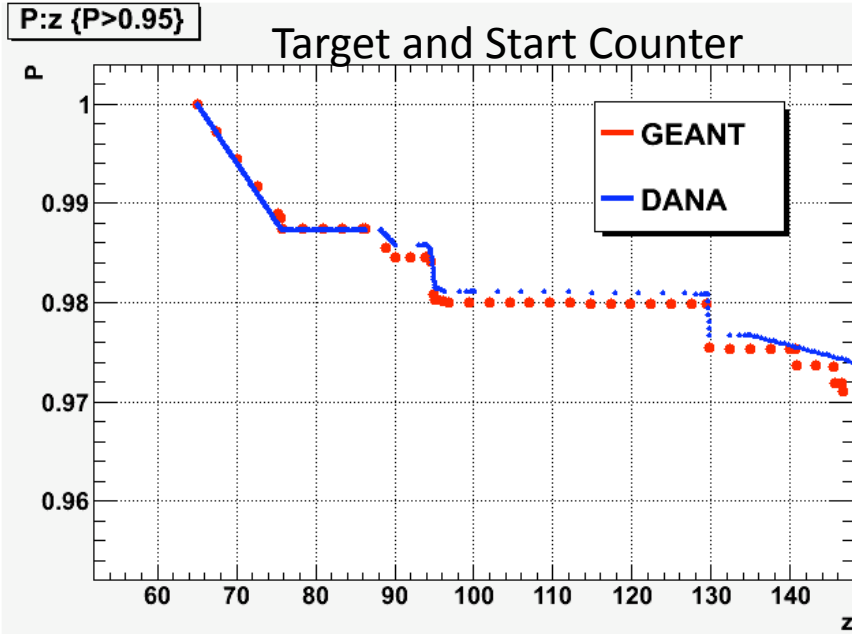


$\theta=8^\circ$

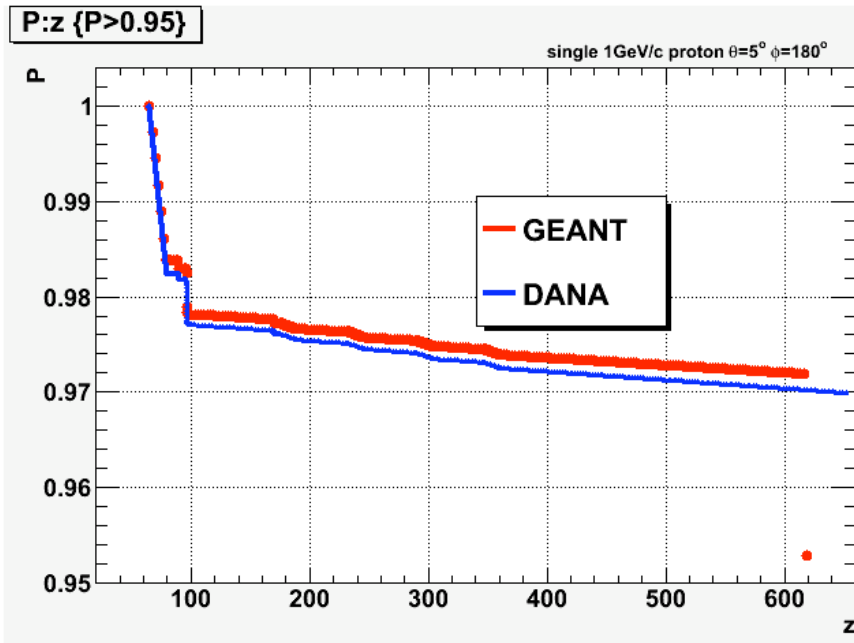


- Boundary checking added
- Estimate distance to material map edge in r-z plane assuming straight-line trajectory
- Check for decrease in radiation length of material by factor of 2 or more within current map
- Good agreement with GEANT

# Adaptive Step sizes



$\theta=5^\circ$



$\theta=70^\circ$

