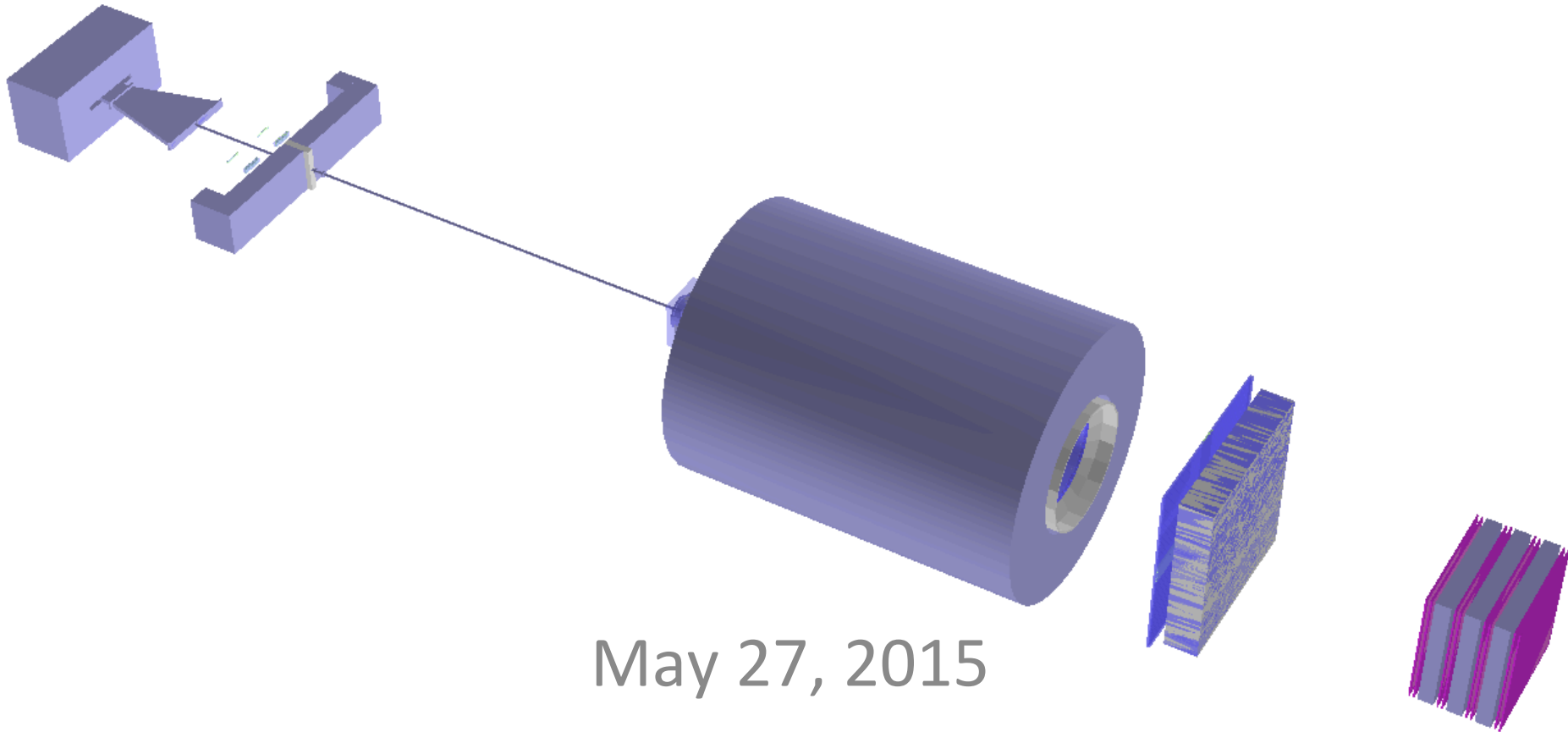


CPPsim (Geant4 + GlueX)

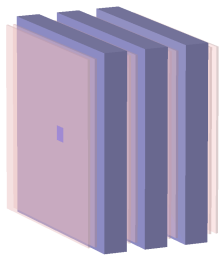


May 27, 2015

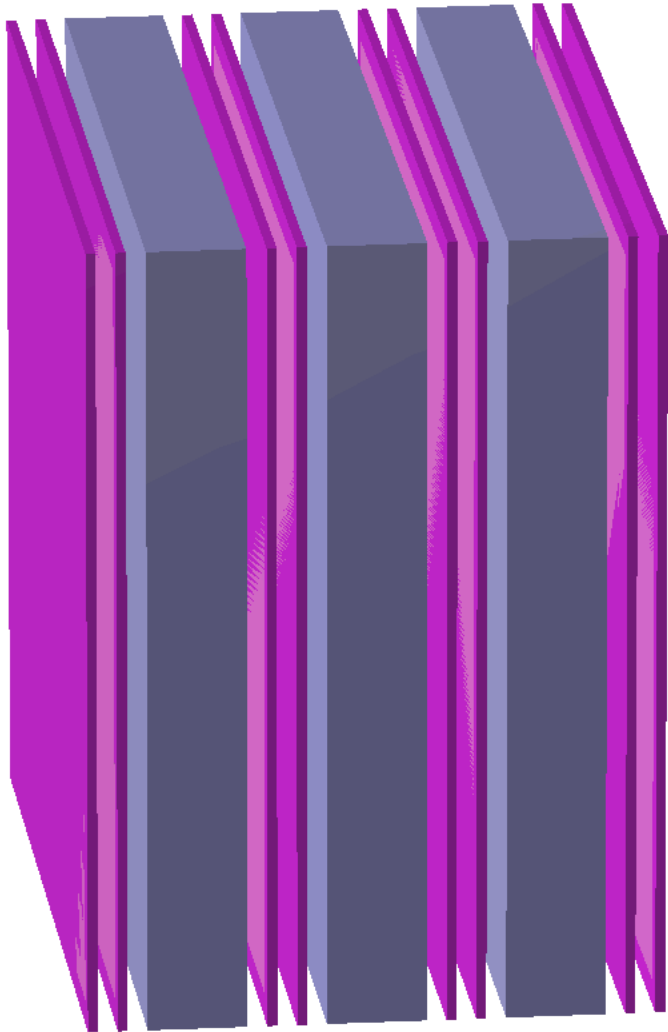
David Lawrence JLab

Geometry Implementation

- Geometry implemented in standard GlueX HDDS, but with dedicated top-level XML file
 - main_HDDS.xml -> cpp_HDDS.xml
 - Removed:
 - Start counter
 - Target
 - ComptonEMcal
 - Added:
 - MWPC
 - (still need to add upstream nuclear target)
- Geometry converted to GDML automatically when building HDDS
IF local ROOT was built with GDML support
- Anticipate GDML will be replaced in near future with alternative provided by Richard Jones



MWPC definition



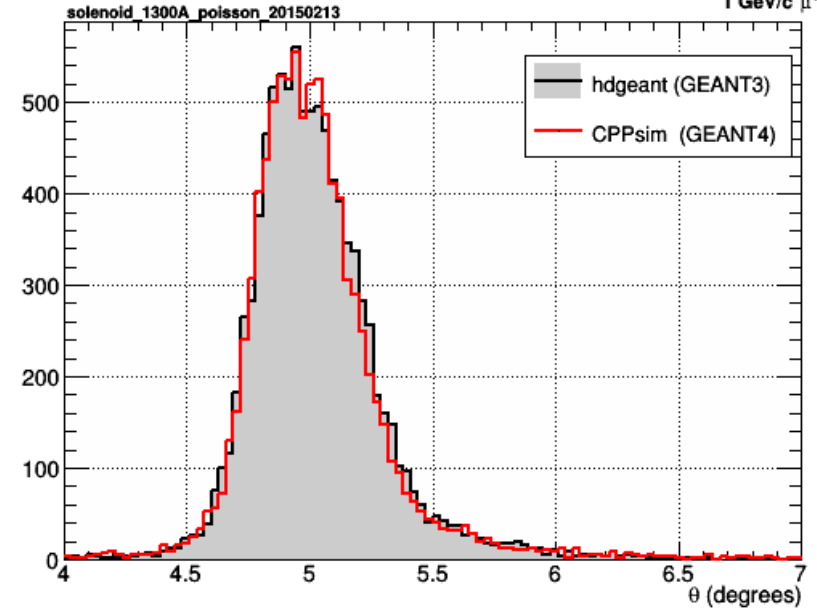
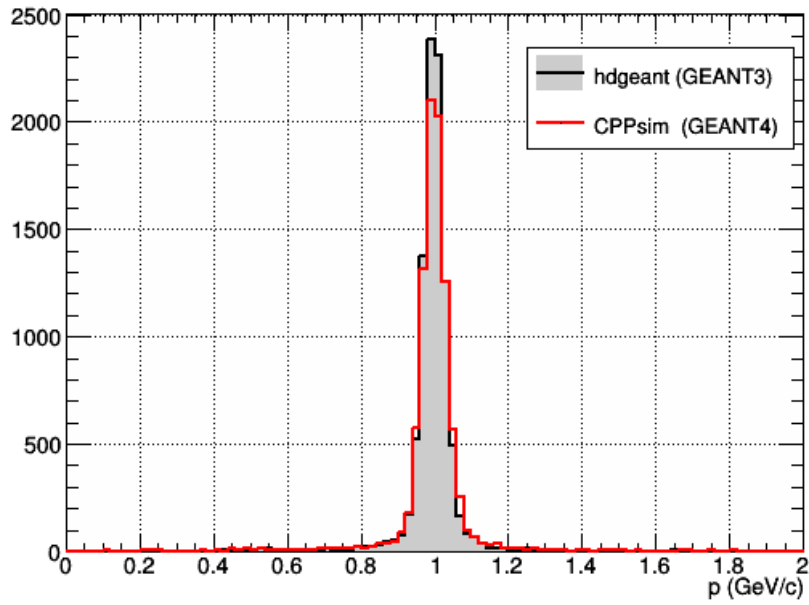
- 8 chambers
 - 2cm Ar/CO₂ (38%/62%)
 - 60" x 60"
 - Frames are 4" wide FR-4
 - Wires not in geometry but hits calculated assuming 1cm spacing with upstream chamber of each pair having wires oriented vertically and downstream chamber horizontally
- Absorbers
 - 20cm Iron
 - 64" x 60"
 - 12cm x 12cm beam hole

Compatibility with *hdgeant*

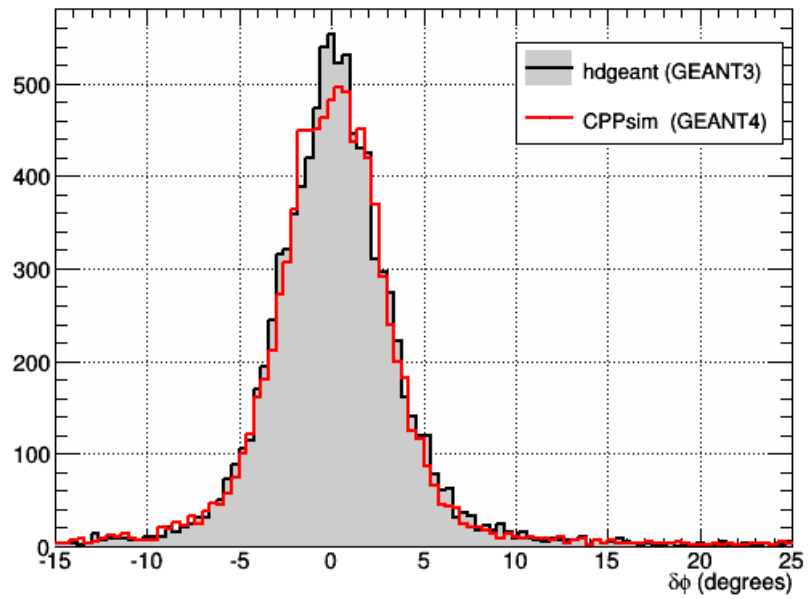
- Reads same *control.in* (*not all flags honored*)
- Implements particle gun
- Reads same generated event format (HDDM)
- Writes same output format (HDDM)
 - TOF hits
 - FCAL hits
 - FDC hits
 - MWPC hits (*not implemented in hdgeant*)

Charged muons in FDC

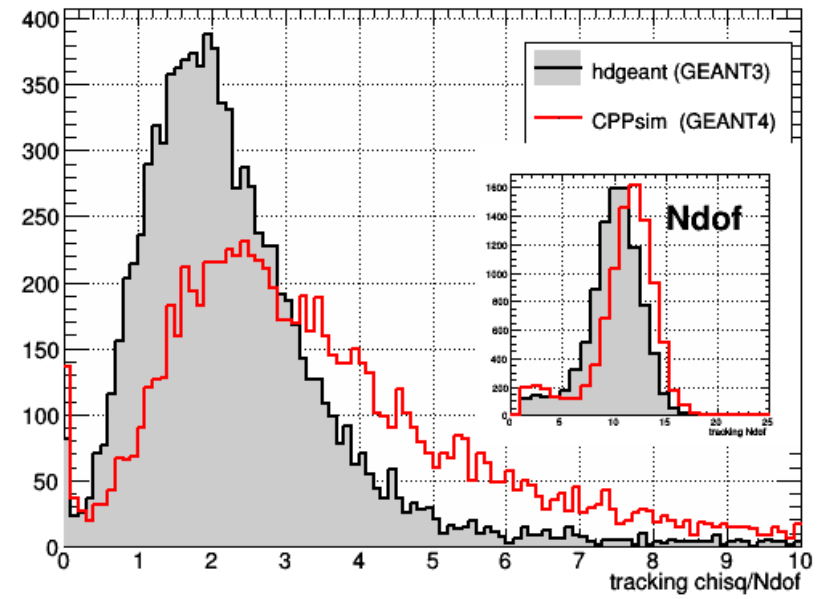
May 6, 2015 DL
syn revision 18238
1 GeV/c μ^+ $\theta=5^\circ$



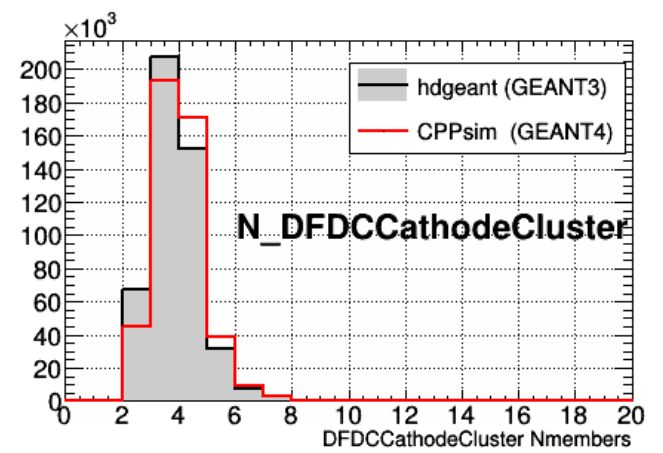
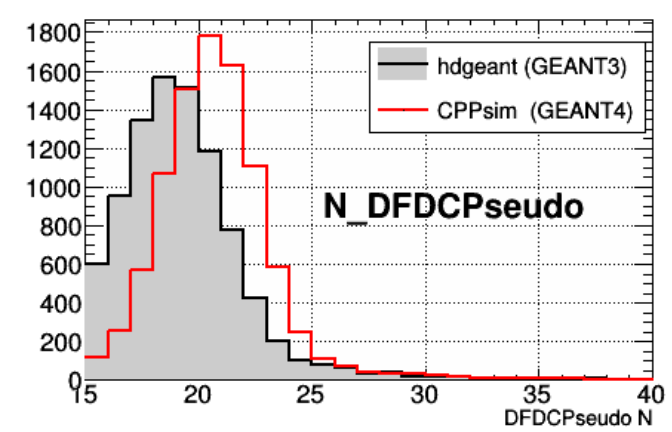
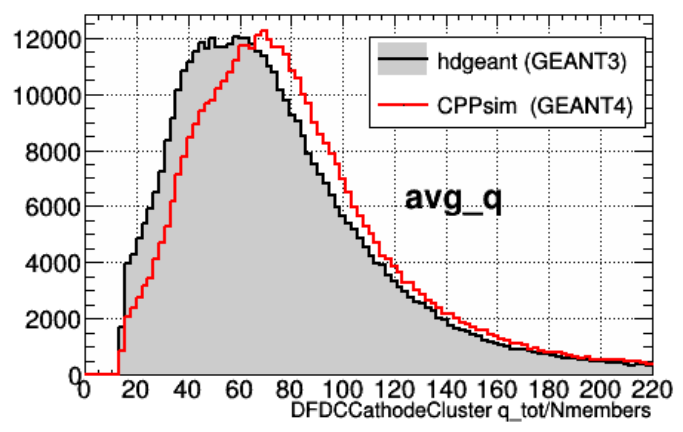
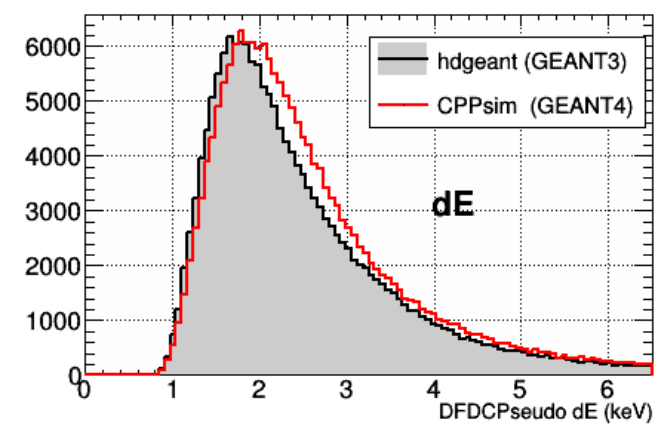
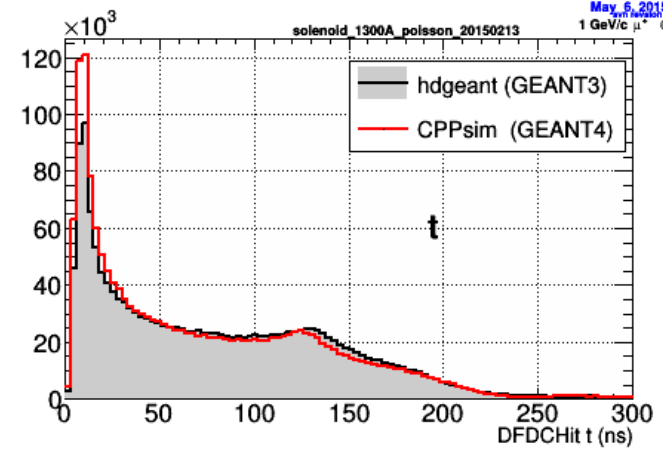
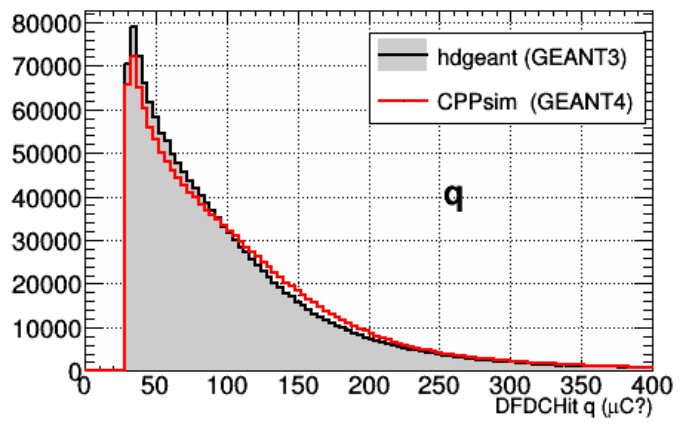
ϕ



chisq



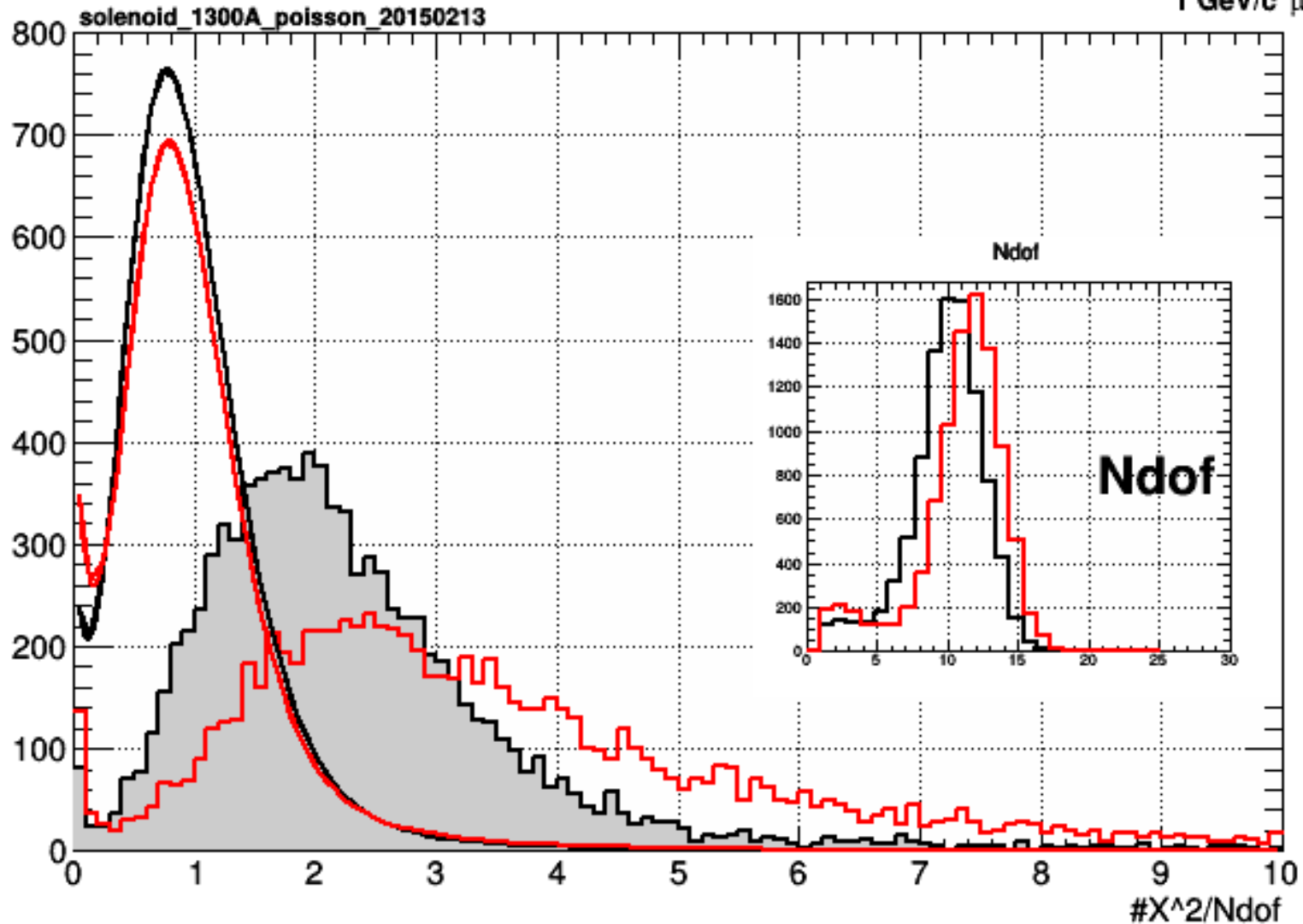
Charged muons in FDC



Comparing chi-sq to expected

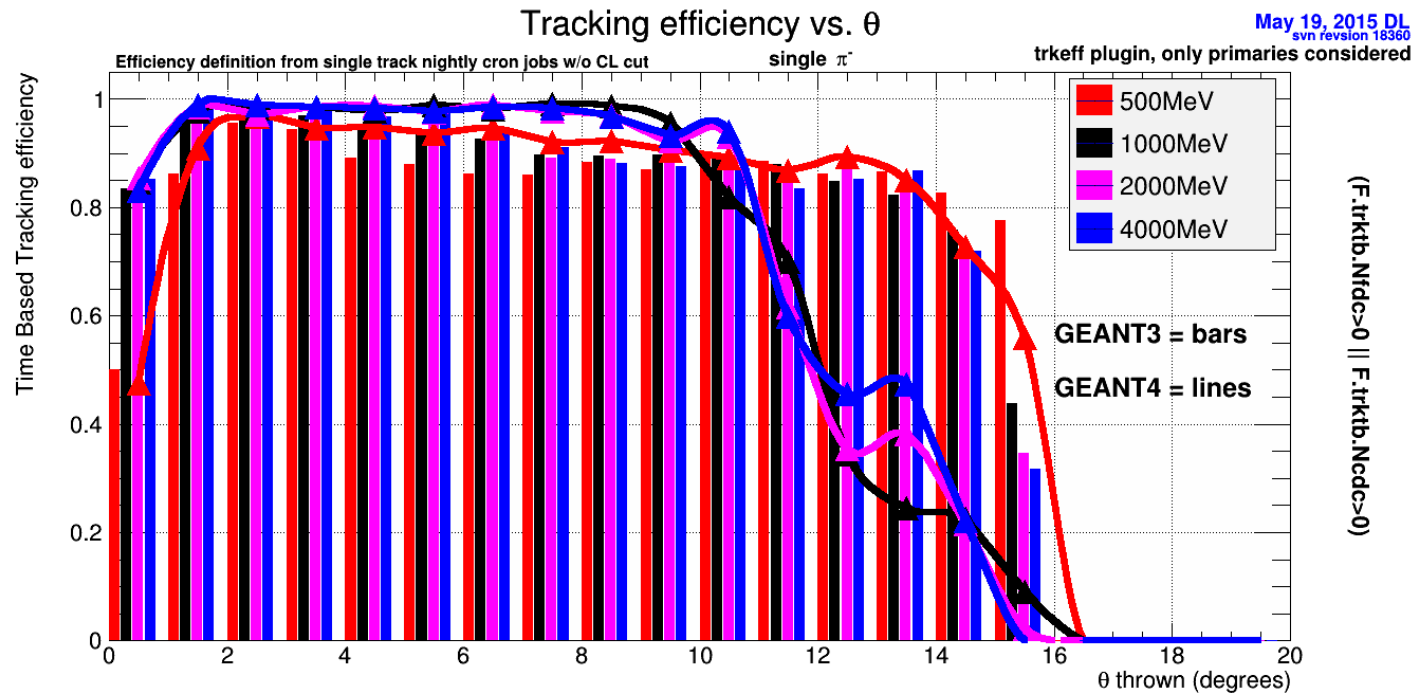
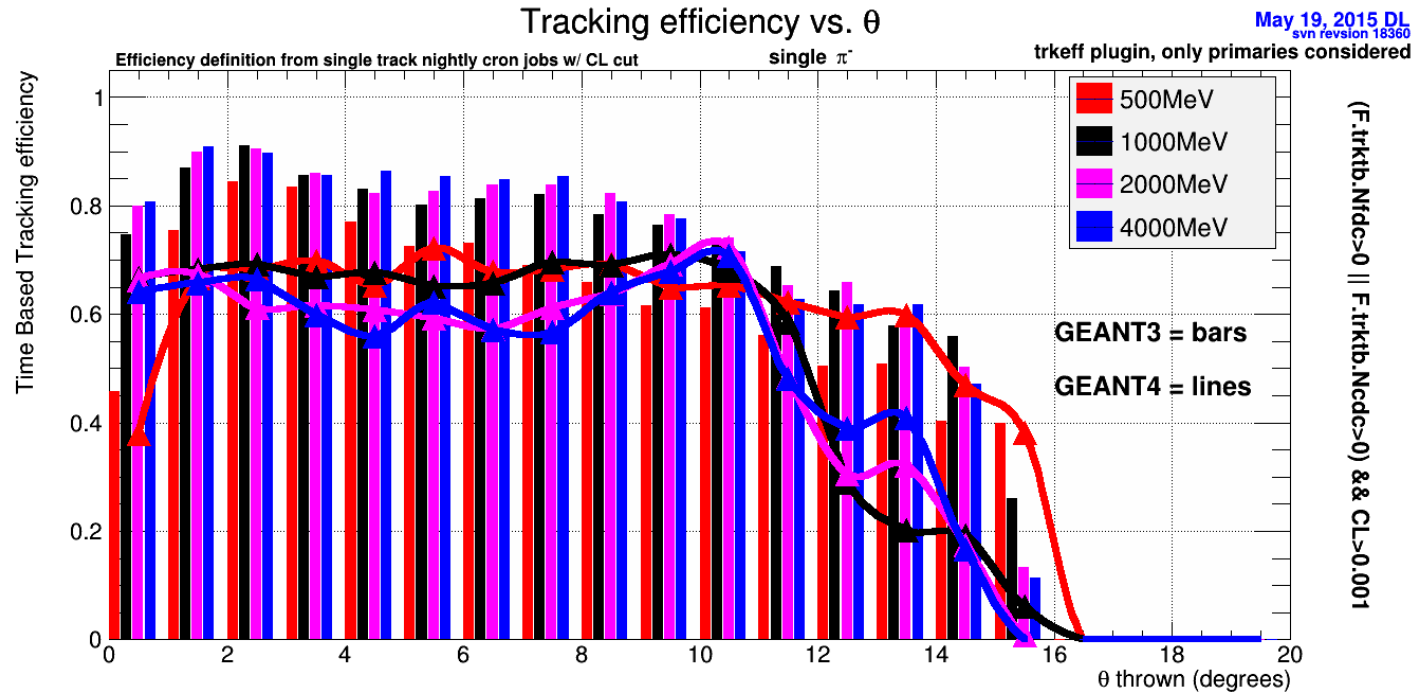
$$\chi^2/N_{\text{dof}}$$

May 6, 2015 DL
svn revision 18236
1 GeV/c μ^+ $\theta=5^\circ$



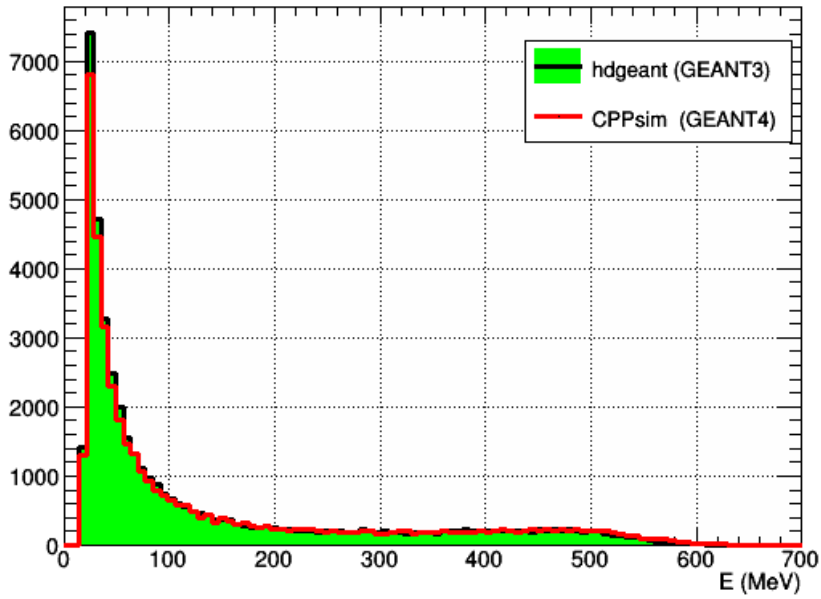
Efficiency from single tracks

Single track nightly cron jobs produce tracking efficiencies with and without CL cut

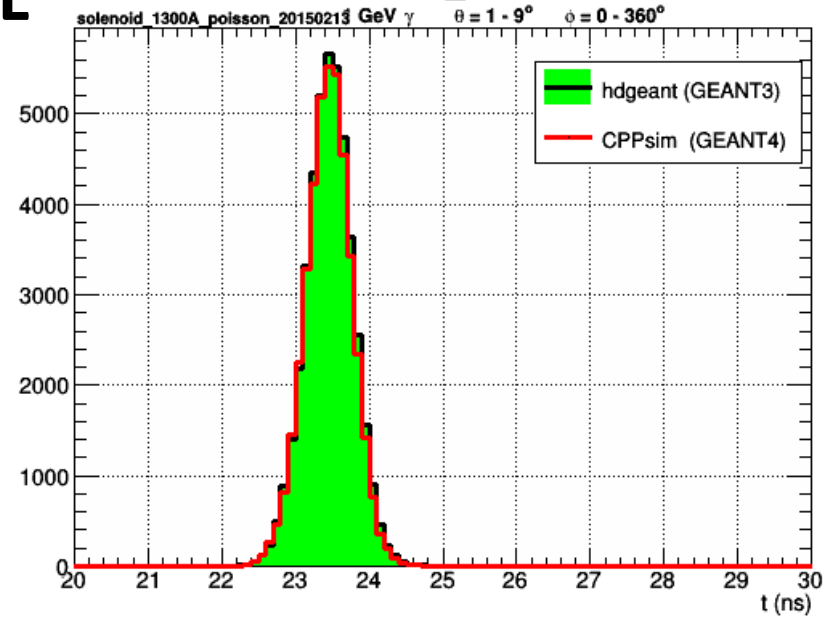


FCAL

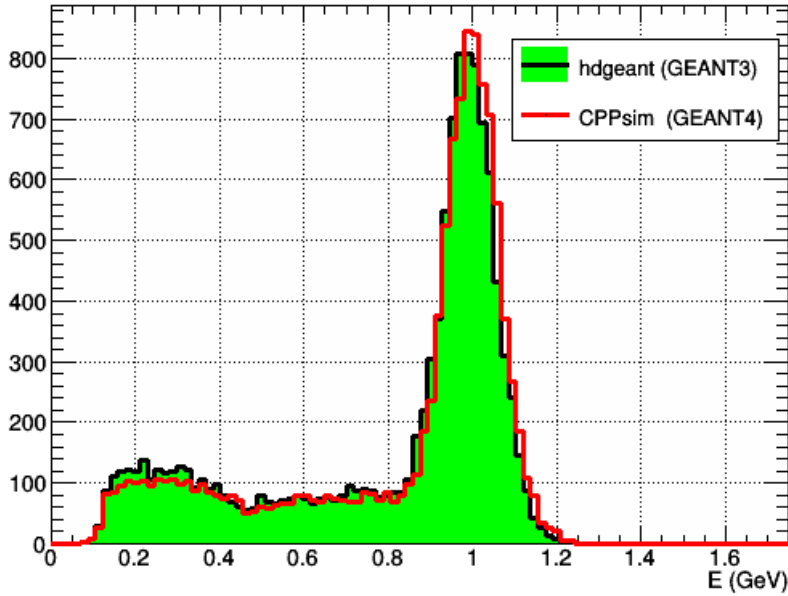
hitE



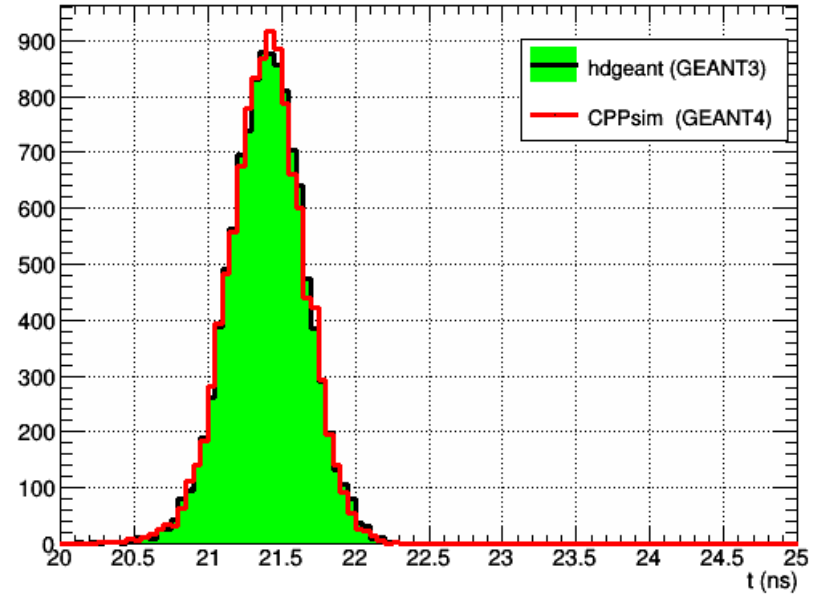
hit_t



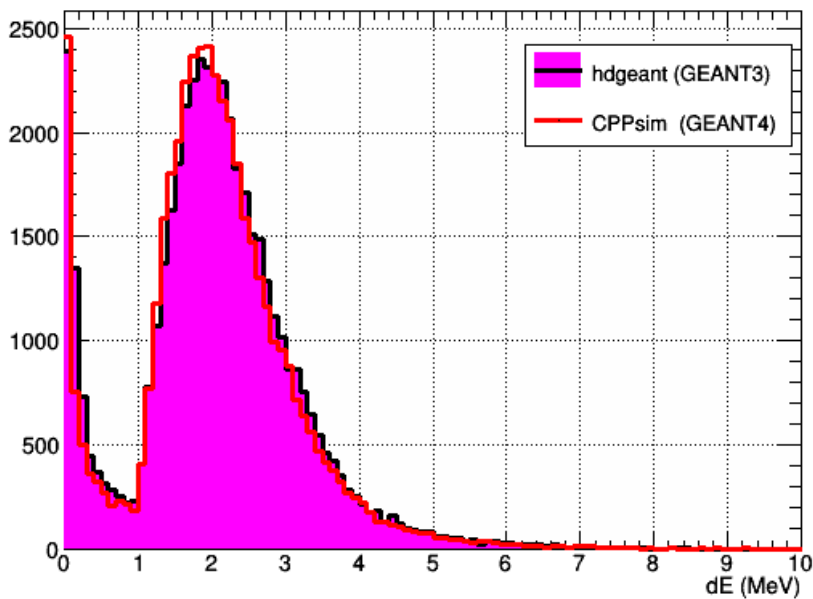
showerE



shower_t

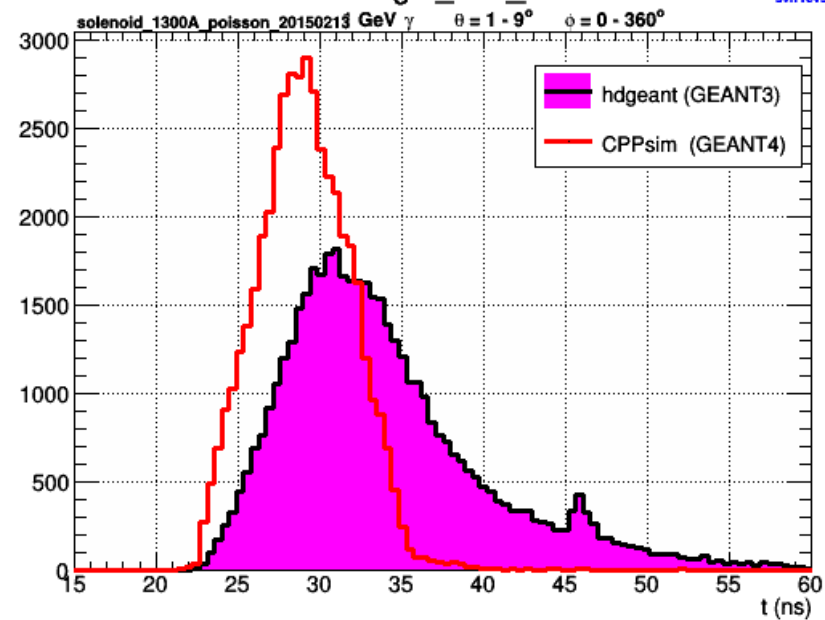


single_end_dE

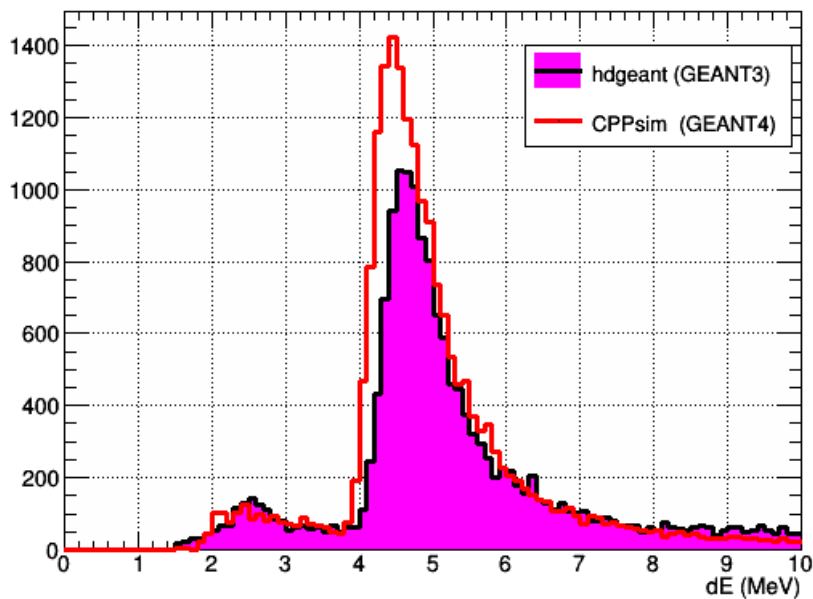


TOF

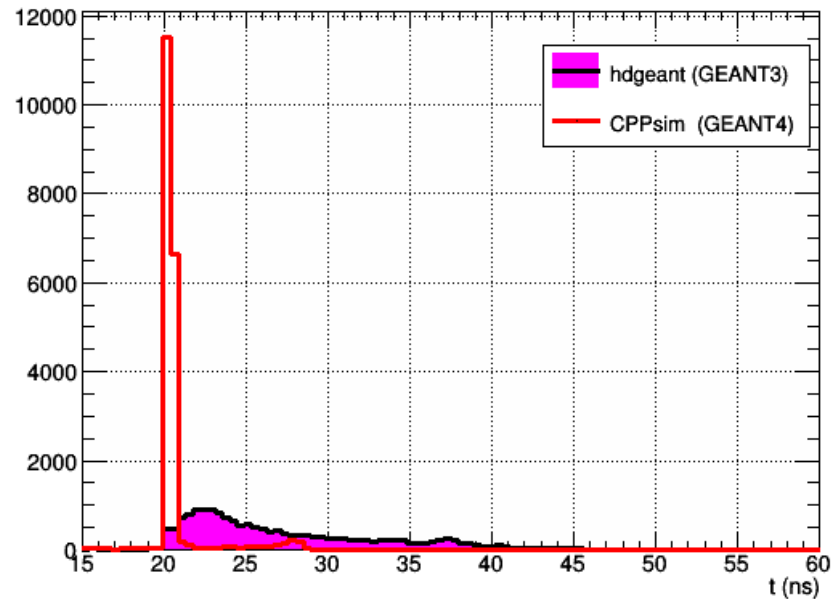
single_end_t

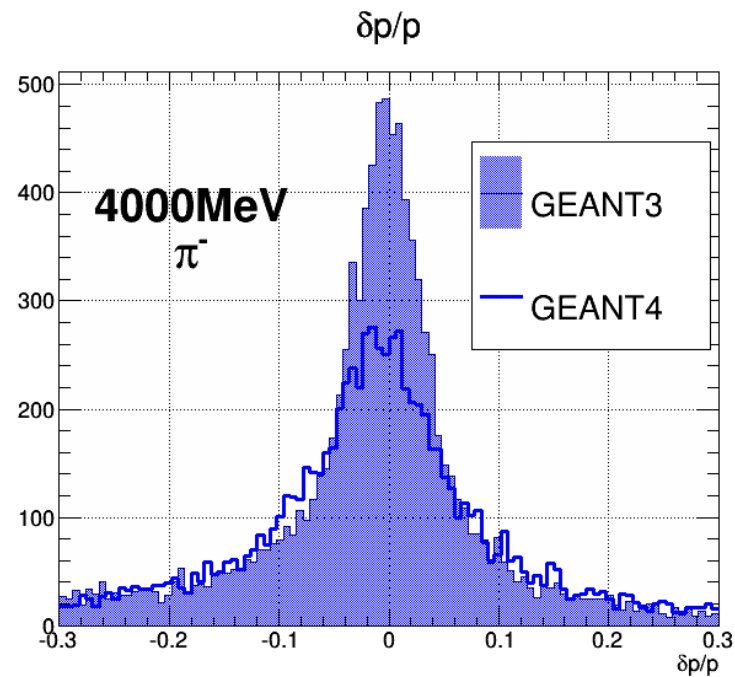
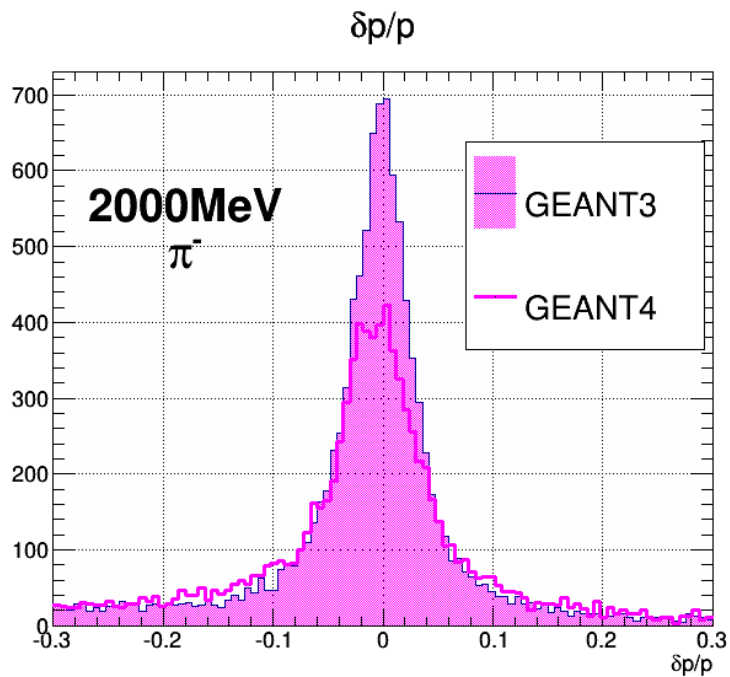
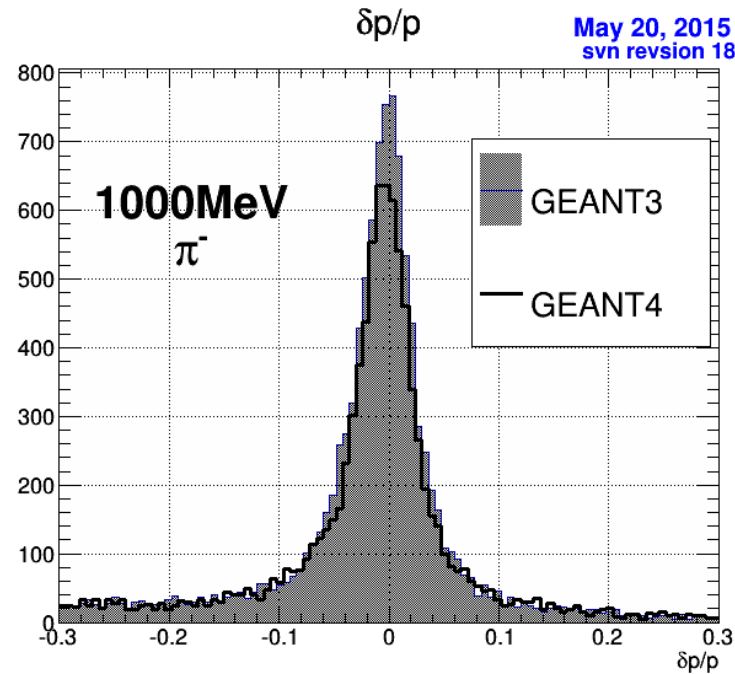
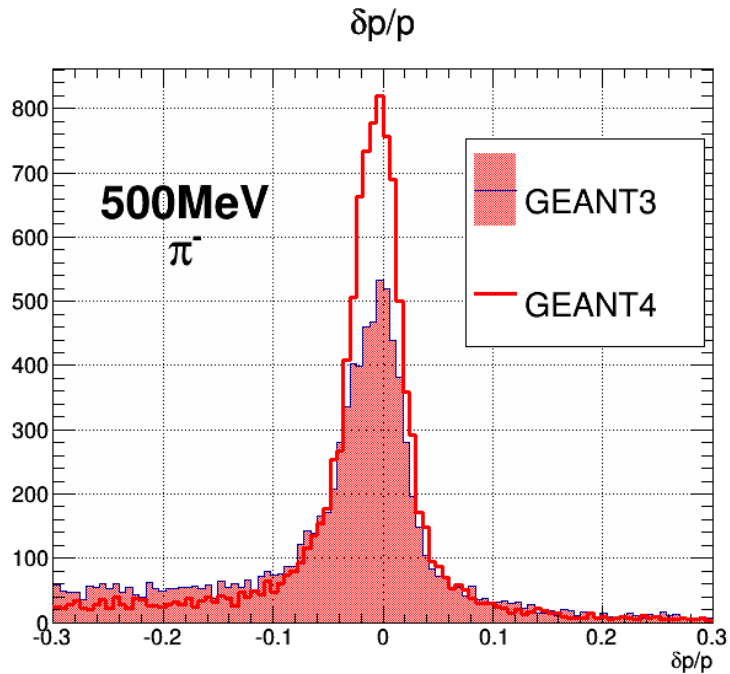


coincidence_dE

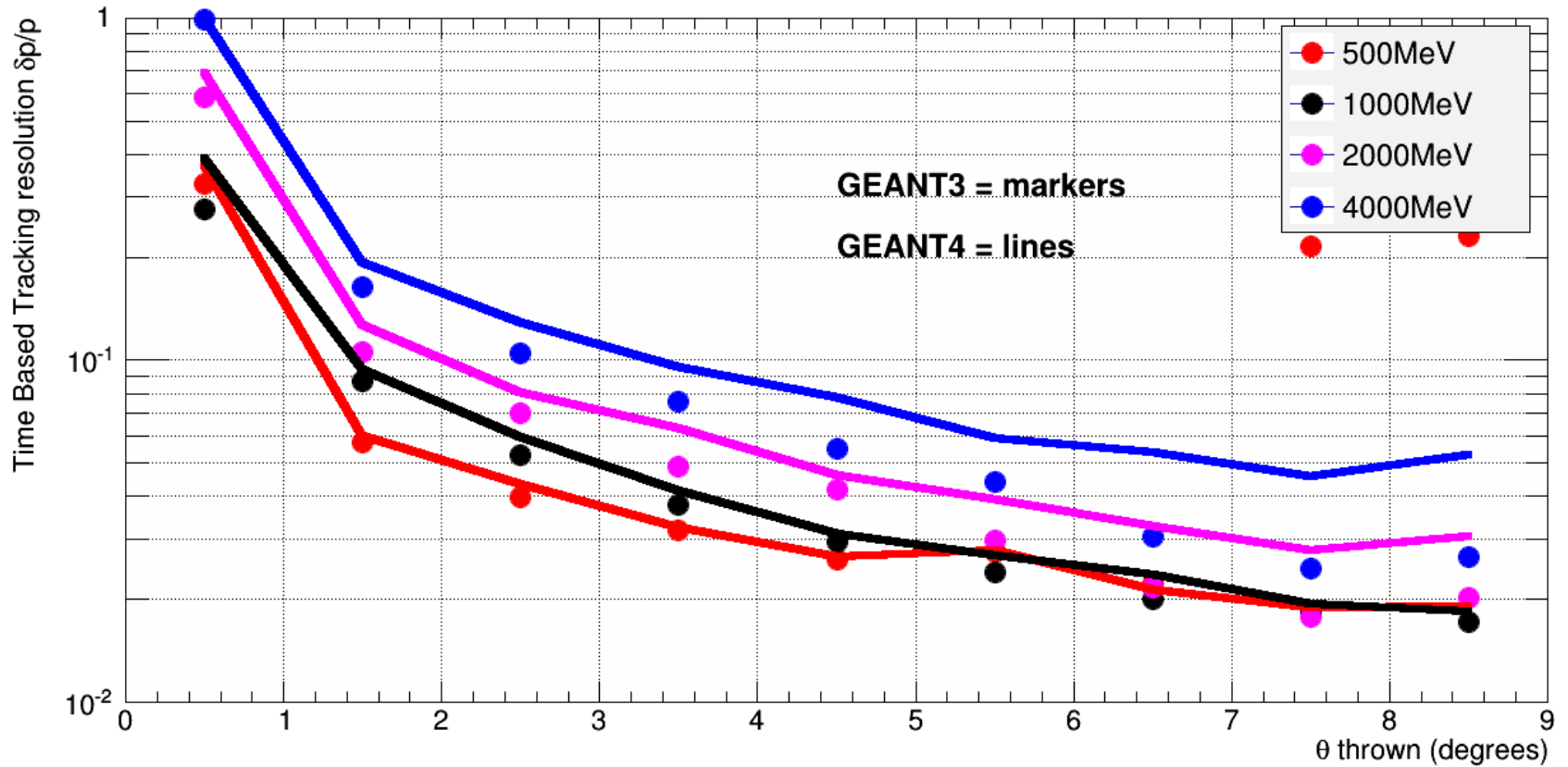


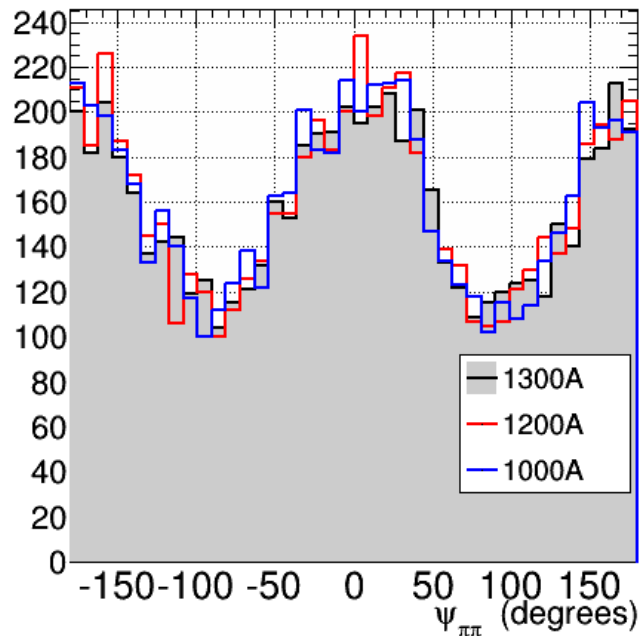
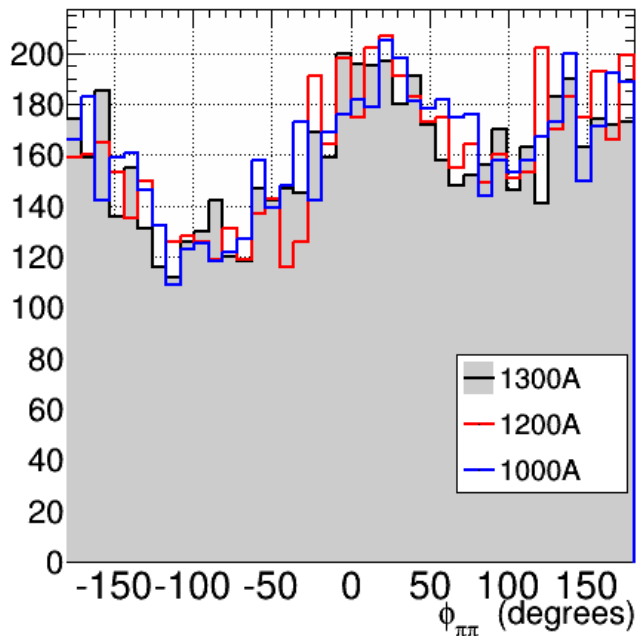
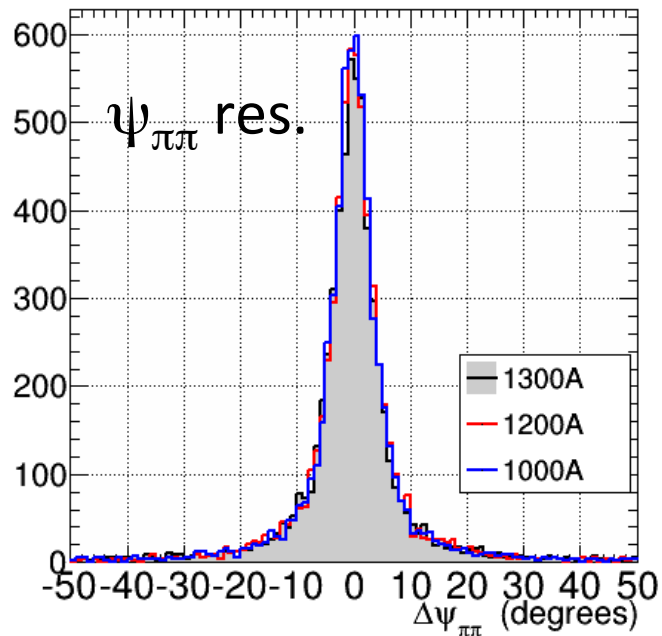
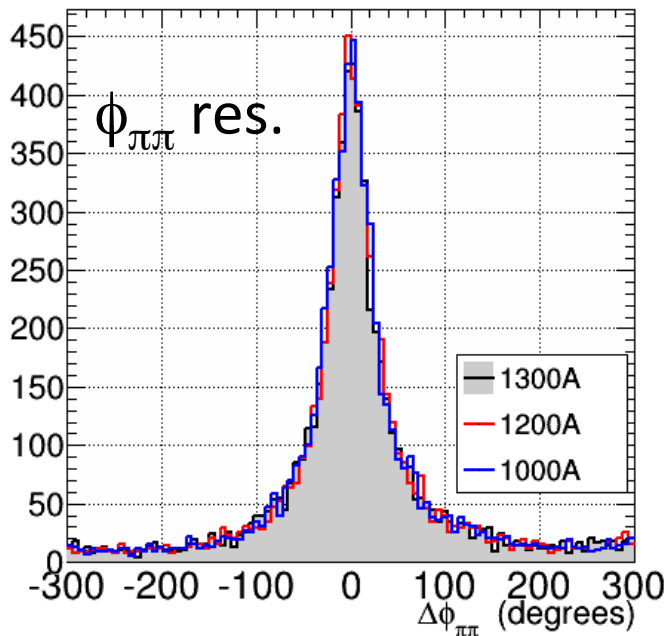
coincidence_t





Tracking momentum resolution vs. θ





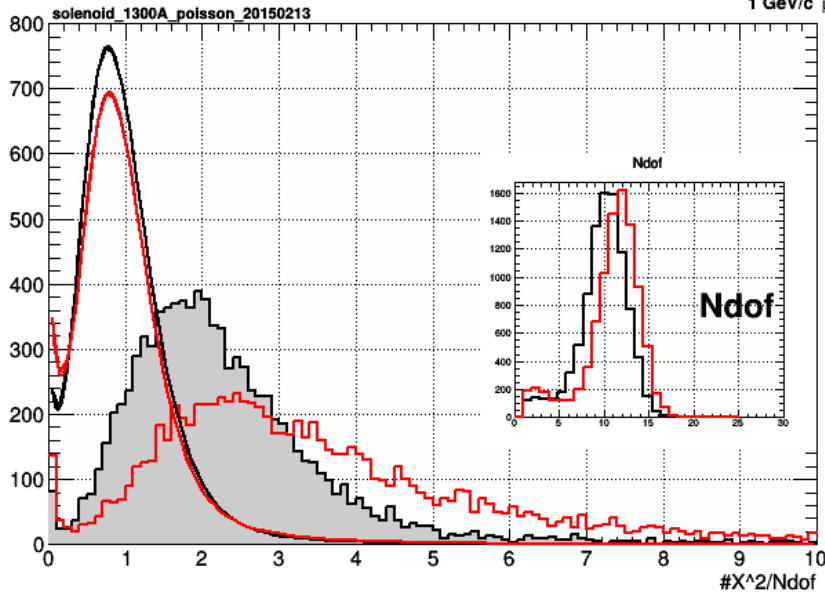
Summary

- Nearly complete with first stage of GEANT4 simulation that contains both the full GlueX geometry and the CPP MWPC
- Hits for FDC, TOF, FCAL, and MWPC implemented *(good agreement with hdgeant in many places)*
- Will stage acceptance studies for lower fields next

Comparing chi-sq to expected

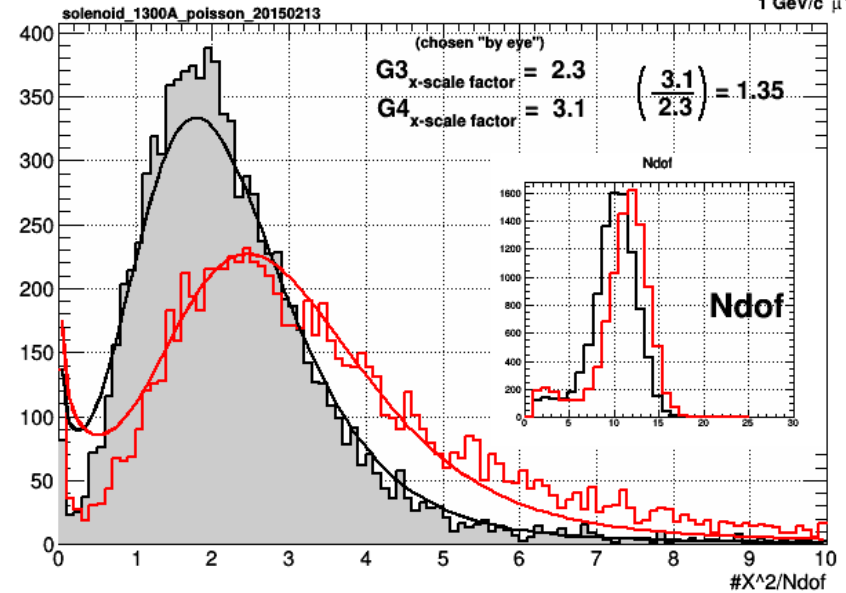
χ^2/N_{dof}

May 6, 2015 DL
svn revision 18236
1 GeV/c μ^+ $\theta=5^\circ$



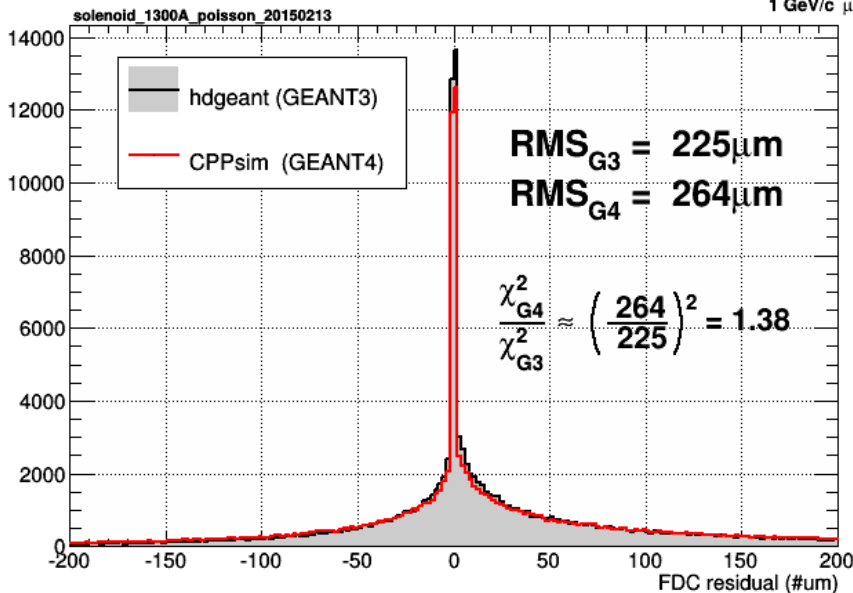
χ^2/N_{dof}

May 6, 2015 DL
svn revision 18236
1 GeV/c μ^+ $\theta=5^\circ$



χ^2/N_{dof}

May 6, 2015 DL
svn revision 18236
1 GeV/c μ^+ $\theta=5^\circ$



χ^2/N_{dof}

May 6, 2015 DL
svn revision 18236
1 GeV/c μ^+ $\theta=5^\circ$

