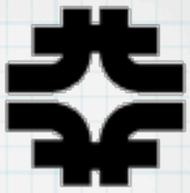


Fake Volumes and the trials and tribulations of working on FLUGG

Robert Hatcher

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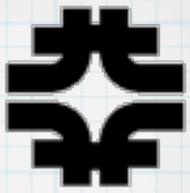
“NuMI-X” (MINOS+NOvA) Mtg 2013-12-13



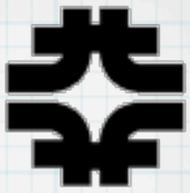
Concept

- Problem: interactions in the air upstream of the target cause `stuprf` to be called before `fluscw` and leave the `Nimpwt` uninitialized
- Insert a non-physical volume within which the beam particles originate but quickly exit to induce an early boundary crossing triggering a call to `fluscw`
- Additionally perform some cross check that particles are starting within the new volume
 - the geometry placement and the setting of the beam origin are not tightly coupled (geometry building code that doesn't have access to fluka data card settings)
- All so easy enough in principle...

Components

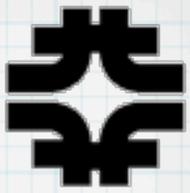


- fluscw.f
 - separate trigger of first call for a new beam particle from recording initial target info (proton[x|y|z] protonp[x|y|z])
 - if(ij.eq.1.and.ENDIN.and..not.STARTIN.and.NCASE.ne.levt) then
 - if(ij.eq.1.and.NCASE.ne.levt) then
 - also initialize lrun from \$RUN
- NumiDataInput.[cc|hh]
 - default placement & size parameter; mechanism for overriding via shell variables
- NumiDetectorConstruction.cc
 - actual G4 Geometry ctor of shape & volume
 - communicate settings to fortran (soevsv) via common block
- soevsv.f
 - overrides default fluka routine
 - checks starting position is in the volume



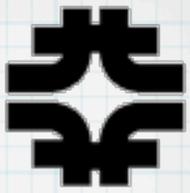
More Components

- g4numi_flukaMat_[helium|shield].inp
 - ASSIGNMAT card to map new volume to a material
- mgdraw.f
 - use NCASE rather than evtno(iNu) for evtno in ntuple



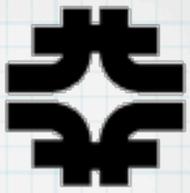
Implementation

- 2103-12-02: had a proof of concept and preliminary runs that seemed to indicate that it worked
- 2013-12-03: attempted to demonstrate a completely clean implementation starting from basics (flugg tar file + direct checkout from a CVS code repository)
- Followed by 10 days of head banging as jobs (with and w/o the changes) failed due to log files filled with “Magnew” error messages
 - same failure mode that was seen when we tried gcc 4.1



Key Points

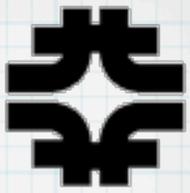
- All done with fluka 2008.3d/Linux+2.6-GCC_3_4
- Yes, I was using gcc 3.4.3 -
 - hacked GNUMakefile and scripts to check
- Confusion about G4 source under /grid/fermiapp/nusoft/products/prd/geant4/4.9.3/
 - Linux+2.6-GCC_3_4_3/geant4.9.3.p02 is what it says
 - Linux+2.6-GCC_3_4 is actually g4.9.2 source
- The flugg_2009_4.tar.gz is what is suggested on the fluka website, but only flugg_2009_3.tar.gz works
 - reverting to _3 is what made the Magnew errors go away
 - though changed to g4.9.2 at same time
 - need retry w/ that undone, or even newer



Early Results

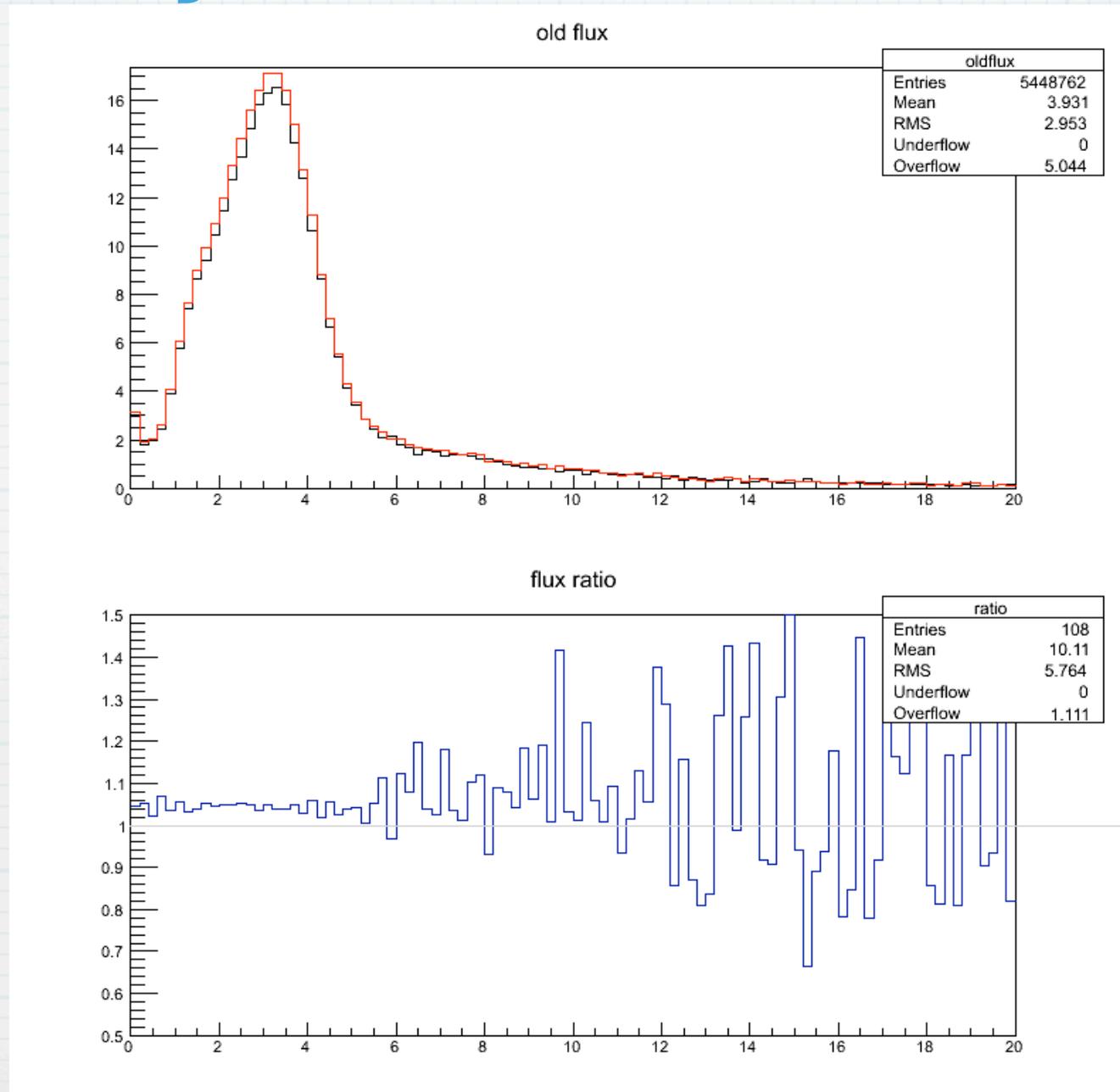
- Fix the Nimpwt issue?
 - new 5704764 entries; 19 w/ Nimpwt=0
 - old 5477427 entries; 28665 w/ Nimpwt=0
- this small number is roughly consistent w/ scattering in the traversal of 0.1cm in the fake volume
 - can make the disk thinner
- evtno is never zero in file !
- run is set in file ! ... mostly ... some ==0
 - probably need to make same fix as evtno as well

Early Results - Ratio

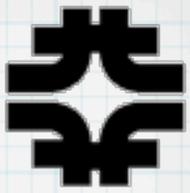


● Fix ?

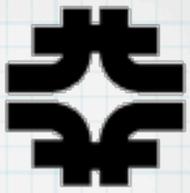
●



Higher Statistics Results

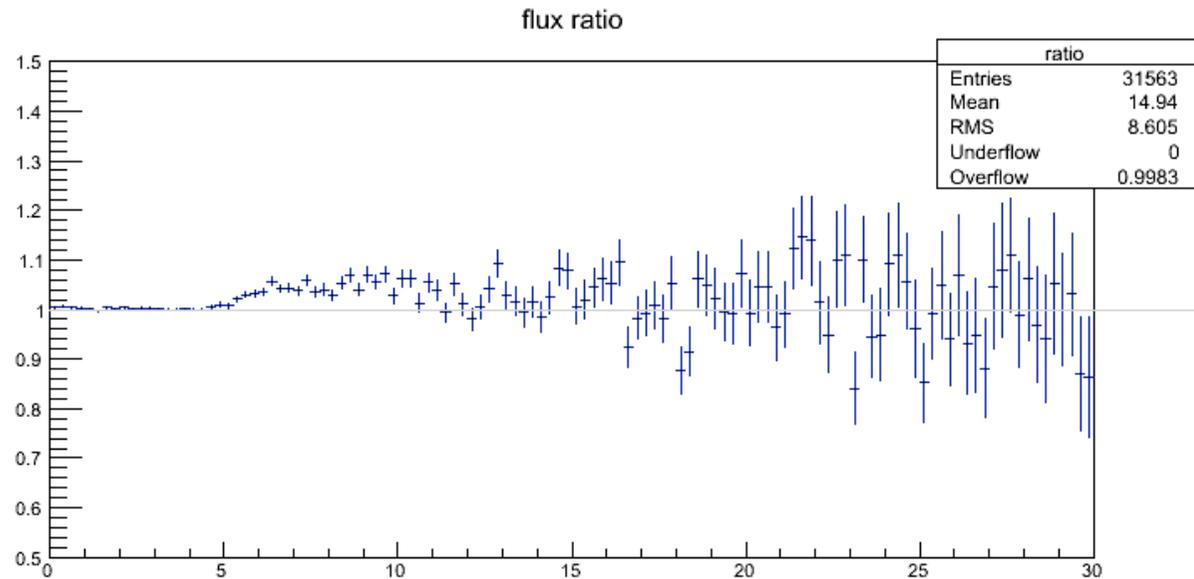
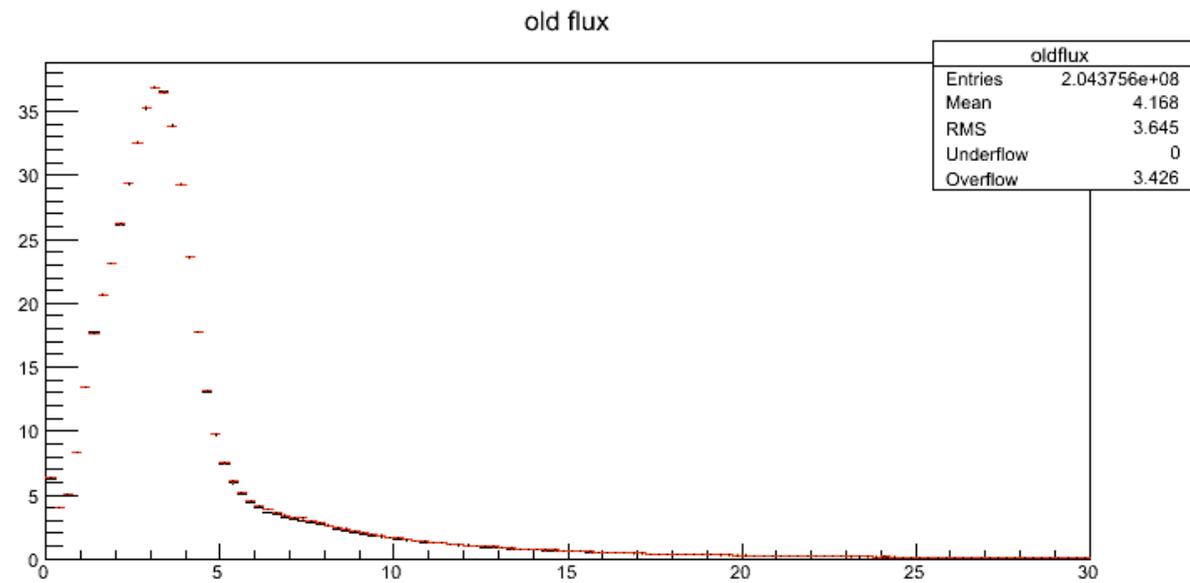


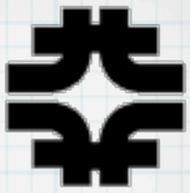
- 416 files of 500K protons-on-target
- Fix the Nimpwt issue?
 - new 205610976 entries; 320 w/ Nimpwt=0
 - old 205447102 entries; 1071528 w/ Nimpwt=0
- changed range [0:20] 100 bins \Rightarrow [0:30] 120 bins



Results - Ratio

- Fix ?
-





Comments

- Matches what Adam S. sees (yeah!)
 - why was it +5% flat [0:5]GeV in the early results
 - but flat 0% in the later results?
- early results were 10 files x 100K + 10 files x 500K
 - are we somehow sensitive to # proton/file?
 - that would be ... bad
 - though I could have possibly had the mix 9x100K+11x500K ~6.6%