

C3 Beam Background Studies

Elias Mettner - March 13, 2023

Hadron Pair Background Production

- Successfully worked through the errors in setting up Pythia and generating a HepMC3 file
- Quick Setup Guide [HERE](#)
- Updated main69.cc and Makefile [HERE](#)
- Example of pythia output (in hepMC3 format) can be found
 - cmslpc: /eos/uscms/store/user/emettner/C3/Pythia/hepmcout69test.dat
 - lxplus: /eos/user/e/emettner/C3/Pythia/hepmcout69test.dat

Running HepMC Files Through Geant

- Now that we have the HepMC output, we are having trouble feeding it into geant
- Only modification to C3_G4guineapig.py file: calls HepMC reader instead of GPig
 - Successfully loads the geant4 shell “Idle>”
- Issue when actually running “/run/beamOn”
- Skips over every event in the file, can’t find Track or Step Info

```
HepMC::EventStream WARN +++ Skip event with ID: 39401
HepMC::EventStream WARN +++ Skip event with ID: 39402
HepMC::EventStream WARN +++ Skip event with ID: 39403
HepMC::EventStream WARN +++ Skip event with ID: 39404
HepMC::EventStream WARN +++ Skip event with ID: 39405
HepMC::EventStream WARN +++ Skip event with ID: 39406

----- EEEE ----- G4Exception-START ----- EEEE -----
*** G4Exception : Geant4InputAction[Input]: Event 0 Error when moving to event - EOF: [end of file].
    issued by : Input [dd4hep::sim::Geant4InputAction]
*** Geant4Action:: Error when reading file Geant4EventReaderHepMC|./hepmc69test.dat
*** Run Must Be Aborted ***
    **** Track information is not available at this moment
    **** Step information is not available at this moment

----- EEEE ----- G4Exception-END ----- EEEE -----

ParticleHandler INFO +++ Event 0 Begin event action. Access event related information.
ROOTOutput WARN +++ [Event:0] No valid MC truth info present. Is a Particle handler installed ?
```

Running HepMC Files Through Geant - Ideas

- Issue with Pythia?
 - Do we need to go back and expand main69.cc further?
 - I did notice when running Pythia that several errors/warnings were thrown, which could mean some necessary info for geant was left out of the hepmc file
- Issue with EventReaderHepMC?
 - Bryan mentioned the reader is built for HepMC2, so it could be outdated
 - But our hepmc file is at least parsed through, so the reader has some understanding of the file structure
- Other issue?
 - I don't think so, since we've only changed two things about our run setup (swapped to hepMC reader and using a hepmc file)