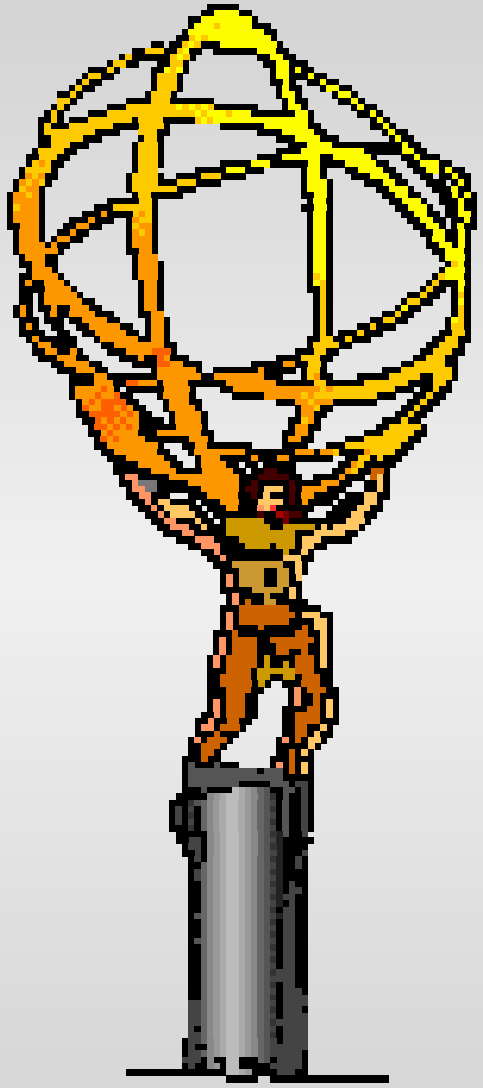


Requirements & experience from ATLAS

Geant4 Technical Forum

5 February 2004

Adele Rimoldi

performance improvements for EM physics

- In our preproduction we simulated the same sample of events both with G3 and G4 with comparable geometry setup.
  - What we found for example is a situation like the following one:
  - single electrons, pT=50 GeV, |eta|<2.5,
  - full detector (NCUsec equiv. Of CPU time on 500 MHz PIII machine):
  - GEANT3 ... 78 NCUsec
  - GEANT4 ... 166 NCUsec

  - while we demonstrated that using hadrons or muons the hadron physics or tracking is not responsible of this slowness.
  - (e.g. 50 GeV mu+- 2.12NCUsec/ev G3, 2.45 NCUsec/ev G4
  - pi+- 50 Gev 69.14NCUsec/ev G3, 84.87 NCUsec/ev G4)

improved robustness for Had physics (1/2)

- **crashes due to segmentation faults**, issuing stack traces starting with G4StringChipsParticleLevelInterface::Propagate(G4KineticTrackVector*, G4V3DNucleus*)

...(occurred in O(5-10%) of high-pT single e,pi jobs).

- Reported to HPWellisch, found a bug "dividing through the transverse mass for on shell gammas in projectile-side diffractive events" (i.e., division by zero), fixed it. No problem since then.

improved robustness for Had physics (2/2)

- new problem just detected (yesterday): job abortion
  - (single pions, pT=200 GeV, |eta|<3.2.), issuing diagnostics

```
***G4Q::HQ:M=1072.33=>rPDG=2112(rM=939.566)+sPDG=211(sM=139.57)=1079.14
***G4QEnvironment::Fragment: Exception is catched
***G4QEnv::Fragment:Exception #1:
***G4Quasmon::HadronizeQuasmon:QHadron+SHadron DecayIn2
***G4QEnvir::Fragment:nH=0,nQ=1,E={Z=28,N=34,S=0,M=57671.6}
***G4QEnvir::Fr:Quasm#0=(2.08167e-15,3.60822e-15,150.717;1082.87){2,2,0,1,0,0}
***G4QEnv::Fragment: ---------- End of CleaningUp:
4Mdif=(0,0,0;1.59162e-12)
***G4QEnv::Fragment:*Recover*Env={Z=28,N=34,S=0,M=57671.6},4M=(2.08167e-15,3.60
822e-15,15 0.717;58754.5)
***G4QE::Fragm:Q(0)=(2.08167e-15,3.60822e-15,150.717;1082.87){1,2,0,0,0,0}
***G4QEnv::Fragment: Exception is pushed Up to Hadronics *** ^^^ ***
*** G4Exception : 027
      issued by : G4QEnvironment::Fragment
*General CHIPSException
*** Fatal Exception *** core dump ***
*** G4Exception: Aborting execution ***
```

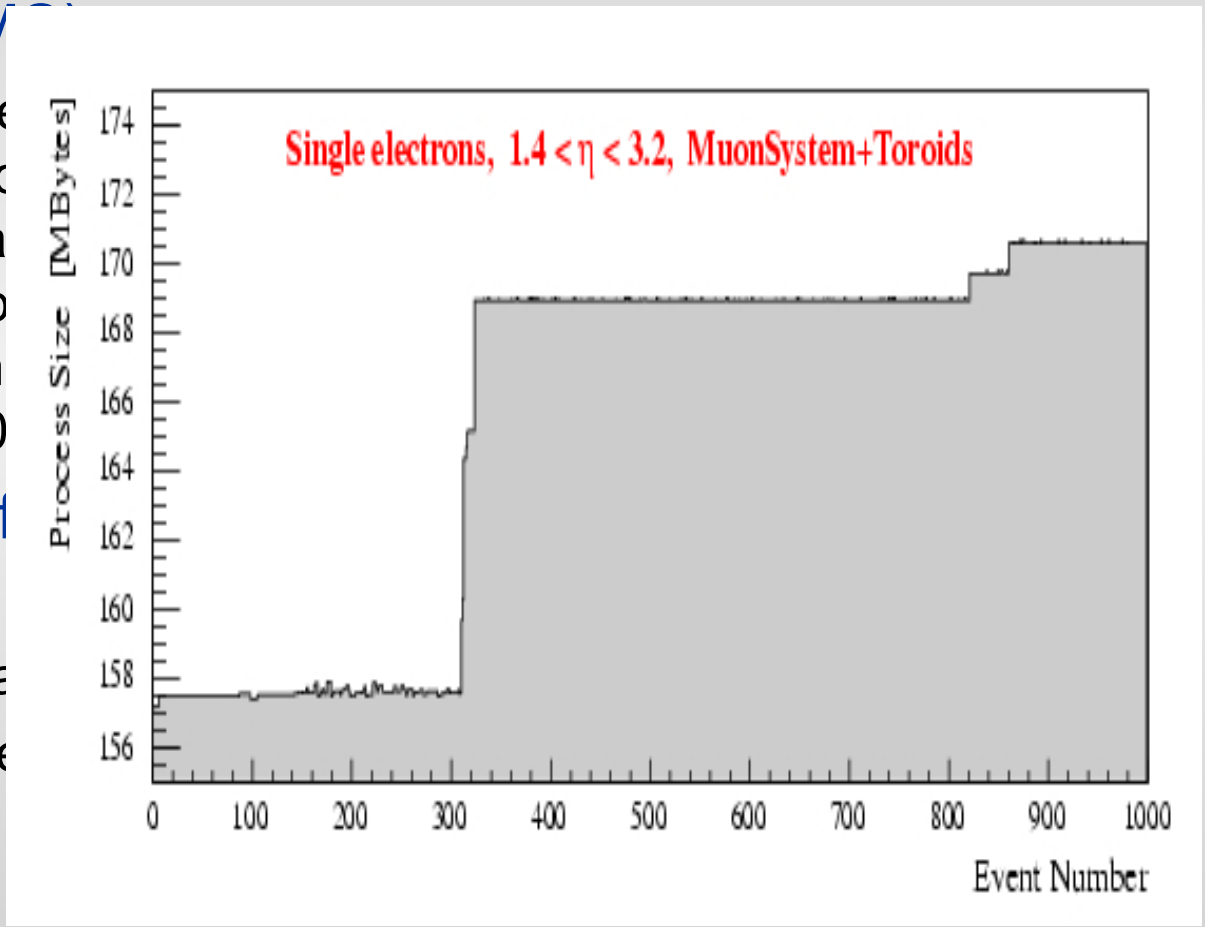
  - a fix was proposed by HPWellish and the related test is foreseen shortly.

Varia 1/3

- possibility of customizing volume/solid creation step
  - e.g. add a call to a user routine when a volume is created in order to add attributes to the volume (detectorName::, other?)
  - The ATLAS implementation could be propagated back?
- exchange format for geometry (GDML? DDD? other?)
- improved visualization options
  - change colors/visibility interactively etc.
    - the ATLAS implementation could work also here

Varia 2/3

- possibility of releasing the track stack on request (G4Allocator, ->CM
  - from recent runs we monitored a job in c (G4Performance ta 2003) where a step evaluation of the m the order of ~20-30
- particle properties f
  - Status?
  - PDG table to be loa
  - Is your muon differe



G4Performance talk by A.Nairz,Atlas Soft Workshop dec 2003

Varia 3/3

- MC truth scheme
  - Centralize different implementations in the different experiments ?
    - Reimport from ATLAS perhaps?
- tools for optimization of tracking through magnetic field
  - some interactive functionality in order to set up parameters from outside without modifying the code