New Requests & Requirements
Geant4 Technical Forum Mar 2005

Editor J. Apostolakis

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1. Polarised Rayleigh scattering

Originator: PoGO (Tsunefumi Mizuno)

- The astronomical hard X-ray polarimeter called PoGO, aims to measure the polarization from astrophysical object in 30-100 keV range by measuring the asymmetry in azimuthal scattering angle.

- We discovered that the Rayleigh scattering process in Geant4 does not deal with the photon polarization, and consequently gave an artificially small modulation. Since the Rayleigh scattering cross-section is not negligible in the energy of our interest, this needs to be solved to simulate accurately.

- Request to implement the polarization process in Rayleigh Scattering
  - Offer to provide code we created as sample if needed.

- Since the energy bands of astrophysical Compton polarimeters are similar with each other, the implementation of polarized Rayleigh scattering is expected to be valuable to the community.

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2. Selective verbosity

Originator: LHCb (G. Corti)

- We would like more configurable debugging features.
    - It is possible to follow in details various aspects of the simulation by setting verbose levels.
    - This is very hard to use when tracking complete pp events because millions of G4Track are produced.
- It would be very useful to be able to selectively turn on such verbose for a single G4Track, a single region of the detector, a combination of the two.

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3. Treat particles with dipole moments

Originator: AD (Bertalan Juhasz)

- The user should be able to calculate the force acting on the magnetic (and possibly electric) dipole moment of a (neutral or charged) particle in an inhomogeneous magnetic (electric) field [F = mu * grad B]
  - for this, the magnetic dipole moment of a particle should be available for the equation of motion;
- Note that the magnetic moment is not necessarily a vector of constant magnitude, as its magnitude and direction might depend on e.g. the magnitude and direction of the external magnetic field
- Potentially no new standard G4 equation of motion class is needed; the force should be calculated by a user-derived equation of motion class

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4. Neutron data for additional elements

Originators: (BaBar, Vanderbilt)

- BaBar needs the elements Nd (Neodymium) and Sm (Samarium) added to the high precision neutron models.

- In addition Vanderbilt are asking that As, In, Ge, Ga, Sb, Hg, Cd, Te, and Gd also be added.

Seconded by ESA.

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New proposed 'platforms': gcc 3.4.3

Originator: ATLAS (D. Quarrie, A. Nairz)

- ATLAS, and the other LCH experiments, intend for the next two supported platforms to be:
  - gcc 3.4.3 with SLC3 in 32-bit mode (IA32)
  - gcc 3.4.3 with SLC3 in 64-bit mode (AMD64)
- Current understanding (which should be checked) is that these will be binary compatible with both Intel & AMD 32-platforms and EM64T Intel 64-bit platforms (not IA64 - Itanium).
- The [requested] timescale is that porting of external software to IA32 is about to start [now] and we hope to have a prototype ATLAS port available in Sept, but not yet in production.

- Also interested to maintain compatibility with CLHEP 1.8 for approximately the next 3 months.

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Other

A) Example for new particles

Originator : Atlas/CMS

Example for creating new type of particles: creating a new particle and a modified primary transformer that creates tracks

Use case: creating new heavy sleptons particles, to investigate potential new physics in LHC experiment detectors.

B) Python UI

Originator : ATLAS (A. Dell'Acqua, A. Nairz)

- More support for a python UI in
- G4 (not only the current UI/macro version).

C) User Limits per region

Originator: EXO experiment (SLAC)

- Enable choice of User Limits per region
- "Given Geant4 allows defining cuts per region, why it does not allow defining G4UserLimits to a region?"

Notes: A first examination showed that this will not conflict with existing use cases for User Limits.

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