Requirements from Domains: Medical Physics

Extracting from Monday's talk just those slides of relevance to Hadronics

16th Geant4 Collaboration Meeting
SLAC
19-23 September 2011

Physics Lists

- We've taken one of our our greatest assets, flexibility, and turned it into our greatest liability:
  - accomplished scientists feel stupid when they encounter Geant4 physics lists
  - makes them reluctant to try alternatives

Accuracy and Validation

- For a limited set of particles, energies, materials
  - Particles:
    - e- & gamma, to 25 MeV
    - proton to 250 MeV
    - Carbon to 400 MeV/nucleon
  - Materials:
    - materials of the treatment head
    - materials of the patient
- Users do not expect us to be perfect, but need to know where we stand
  - Clear explanation of materials, ionization potentials, special features in the code for G4_Water, etc.

Contributions from Medical Physics

- Medical Physicists are willing to help with ongoing validation tasks.
  - Quality Assurance is a routine part of every medical physicist's job
- They do not expect to get something for nothing
  - They will help get us experimental data
  - They will help run validation tests
  - They will help analyze validation results
  - And if they could understand our physics lists and models a little better, they would contribute to improving the models
- They will become full collaborators, taking real work off the rest of us

Stability

- Accuracy must remain same or improve over time
- Users are very distressed if we regress

Hadrontherapy Example

- Hadrontherapy Example has been the primary teaching tool for Hadronic Physics for medical physics users
- Developers have been responsive to users on the hypernews