Geant4 User Requirements from Cosmic and Underground Experiments

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Geant4 Collaboration Meeting

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Outline

- Phonon/solid state physics
- Radioactive decay physics
- Low energy physics
- High energy nucleus-nucleus
- Neutrinos

Phonon and Charge Carrier Physics

- Complete work on phonon and e/h model in Ge at 0 K
- Extend work from Ge to Si, as CDMS will also have Si detectors in experiment
- Add lattice parameterizations for Al, W, Si
- Develop phonon splitting process for boundary reflections
- Develop phonon to particle-hole pair conversion model

Radioactive Decay Physics

- General improvement of RDM code including:
  - missing levels and lifetimes
  - bugs and recovery of lost features in biased mode

- Add new channels
  - β–delayed neutron emission
  - spontaneous fission
  - decay by proton
  - decay by neutron emission
  - double beta decay

Low Energy Physics

- Improved scintillation processes in noble liquids
- Correlation of gammas from nuclear de-excitation
- (α, n) reactions at < 7 MeV
- Photo-nuclear models for < 20 MeV
  - especially photo-neutrons

High Energy Hadronic Physics

- Nucleus-nucleus models for > 500 GeV/N
  - also requires improvement in current hadron-nucleus models

Neutrino Interactions

- Provide coherent elastic neutrino scattering
  - neutrino “wall”
  - interface to GENIE

- Provide neutrino biasing