

Space Users Requirements

Dennis Wright (SLAC)

Geant4 Collaboration Meeting

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Geant4 Usage by Space Community

- Broadest energy range for any Geant4 user community
 - eV to TeV
 - also broadest range of simulation scales
- Micro-electronics applications
 - small volumes - can benefit from DNA work
 - interested in heavy fragments from reactions
 - low energy EM, high energy ion-ion
- Space environment
 - radioactive decay
 - EM fields
 - low to medium energy processes (EM and hadronic)

Micro-electronics Requirements (Robert Reed – Vanderbilt)

- Energy loss in volumes smaller than 10 nm
 - to simulate single event effects, small feature sizes in electronics are important
 - extensions of DNA to silicon planned: how far along are they?
 - many exotic materials used in thin-gate technology; silicon not enough
- Electron transport down to ~ 10 eV
 - can Geant4 provide insight as to the scales at which quantum effects become important?
 - also look to DNA for this?
 - Fan Lei's 2016 test of MicroElec example was 10x slower than using single scattering process

CAD and Visualization Improvements

(Insoo Jun, Chad Lindstrom, Brian Zhu – JPL)

- Better/easier process to convert from CAD to G4 geometry
 - current solutions are either incomplete or require purchase of external code
 - generate STEP files directly from Geant4 geometry – don't do STEP to GDML conversion first (CadMesh available, but goes the other way)
- Better visualization tools for debugging geometry
 - some of the current tools too hard to use
 - do not show enough detail
 - maybe implement surface/volume rendering so things look more CAD-like

Scoring

(Fan Lei, RadMod Research)

- Enable tally of any flux- or fluence-based quantity using user-supplied conversion coefficients
 - coefficients are material dependent factors affecting the score

Possible Future Requests (Vanderbilt, JPL)

- Some interest has been shown in pion- and muon-induced heavy fragments
 - Geant4 can do the reactions, but never looked at heavy fragments in final state
- Gamma- and electro-nuclear reactions
 - generally useful, but need validation (and verification)
 - not much demand for electro-nuclear from Europa Clipper (no evidence for such reactions)