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PhysicsLists in Geant4 Advanced Examples

<http://www.ge.infn.it/geant4/examples>

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On behalf of the Advanced Examples Working Group

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Mission

Investigate, evaluate and demonstrate Geant4 capabilities in various experimental environments

Provide guidance to Geant4 users in realistic experimental applications

Provide feedback to Geant4 developers about successful results, problems etc.

Identify requirements for further Geant4 improvements and extensions to address new experimental domains

Advanced Examples

1. air_shower
2. brachytherapy
3. *cell_irradiation*
4. composite_calorimeter
5. cosmicray_charging
6. gammaray_telescope
7. hadrontherapy
8. *human_phantom*
9. IAr_calorimeter
10. medical_linac
11. microbeam
12. *nanotechnology*
13. purging_magnet
14. *radiation_monitor*
15. radioprotection
16. raredecay_calorimetry
17. Rich
18. Tiara
19. underground_physics
20. xray_fluorescence
21. xray_telescope

- Released
- *In preparation*
- Orphan
- Wide experimental coverage
 - HEP
 - Space science/astrophysics
 - Medical physics
 - Radiobiology
 - Detector technologies
- Wide Geant4 coverage
 - Geometry features
 - Magnetic field
 - Physics (EM and hadronic)
 - Biological processes
 - Hits & Digis
 - Analysis
 - Visualisation, UI

Physics Lists in Advanced Examples

• PhysicsLists

- Ad hoc in most examples: **transparent, easy to understand**
- A couple use pre-packaged Geant4 PhysicsLists

• **Goal:** document quantitatively the validation of the physics selections of all advanced examples

- Objectively supported physics options rather than “educated guess” PhysicsLists

• Strategy

- **Generic** validation studies of processes/models used
- **Specific** validation studies with ad hoc experimental data

Orphan
Under development

Validation

1. air_shower
2. brachytherapy
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16. raredecay_calorimetry
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18. Tiara
19. underground_physics
20. xray_fluorescence
21. xray_telescope

- 1.
2. Generic + Specific
3. Specific
- 4.
- 5.
- 6.
7. Generic + Specific
8. *Not pertinent*
- 9.
10. Generic + Generic + Specific
11. Generic + Specific
12. Specific
- 13.
14. Specific
15. Generic (EM, partly hadronic)
- 16.
17. *TNS?*
18. *NSS 2006?*
- 19.
20. Generic + Specific
- 21.

Published

Existing, to be
published

In preparation

*Apologies for any omissions
Please let me know of other
pertinent validation results
and publications*