

Basic & Extended Examples For 10.4

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for N&E Examples WG

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Outline

- Newly added extended examples
- Ongoing tasks
 - Examples Review
 - Applying Coding Guidelines

New Extended Examples

- 10 new extended examples added since the last CM
 - 9 already included in Geant4 testing and in the Web documentation (generated automatically with Doxygen)
 - 1 in trunk, to be finalized
- A brief overview on the next four slides, a less brief overview in the parallel session 2B on Tuesday

New Extended Examples (2)

- [biasing/GB05,GB05](#)
 - Marc Verderi
 - Already in 10.3
 - GB05: Illustrates a "splitting by cross-section" technique: a splitting-based technique using absorption cross-section to control the neutron population.
 - GB06 : Illustrates the usage of parallel geometries with generic biasing.
- [exoticphysics/dmparticle](#)
 - Vladimir Grichine
 - Geant4 application for testing of dark matter particles and processes (based on TestEm8 and monopole examples)
- [medical/DICOM](#)
 - New development by Susanna Guatelli
 - A high resolution voxelised head phantom for medical physics applications
 - <http://ro.uow.edu.au/eispapers/6652/>

New Extended Examples (3)

- 6 new examples in [medical/dna/](#)
 - **icsd** (Ionisation Cluster Size Distribution)
 - Sylvain Meylan et Carmen Villagrasa
 - Calculation of the distribution concerning the number of ionisations per event in a cylinder of typical dimensions of a 10 base pairs piece of chromatin.
 - **mfp** (mean free path)
 - Sebastien Incerti
 - The mfp example shows how to calculate mean free path of particles in liquid water using the Geant4-DNA physics processes and models
 - **neuron**
 - M. Batmunkh, O.V. Belov
 - Modelling of neuron cell irradiation, including physical, physico-chemical and chemical processes (eg. production of oxidative radical species in the vicinity of neurons)

New Extended Examples (4)

- 6 new examples in medical/dna/ (cont.)
 - **slowing**
 - Sebastien Incerti
 - Shows how to simulate slowing down spectra for electrons in liquid water using the Geant4-DNA physics processes and models.
 - **spower**
 - Sebastien Incerti
 - Shows how to calculate stopping power of particles in liquid water using the Geant4-DNA physics processes and models.
 - **splitting**
 - J. A. Ramos-Mendez*, B. A. Faddegon
 - Shows how to use variance reduction to improve the computational efficiency of calculations of ionization cluster size distributions.

New Extended Examples (4)

- **radioactivedecay/Activation**
 - Michel Maire
 - Survey energy deposition and particle flux from a hadronic cascade.
 - To be renamed in “**activation**” to be consistent with the other examples names in radioactive decay category

Ongoing Tasks

- The WG Wiki pages were updated for Work Plan 2017 items, see
- <https://twiki.cern.ch/twiki/bin/viewauth/Geant4/NoviceExtendedExamples>
 - The link to Wiki pages is also available from the WG Web page
 - Access is restricted to Geant4 developers

TWiki >  Geant4 Web > NoviceExtendedExamples
(2015-05-04, IvanaHrivnacova)

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N&E Examples WG

- [Adding A New Example](#)
- [Extended Examples Review](#)
- [Applying Coding Guidelines](#)
- [Examples Doxygen Documentation](#)
- [Status of Examples MT Migration](#)
- [List of Extended Examples](#)

-- [IvanaHrivnacova](#) - 04 May 2015

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Examples Review

- The list of obsolete features in extended examples with the lists of examples (or files) where they are present was reduced
- Improve `main()` as in basic examples (details on the next slide)
 - Remove `G4VIS_USE` and `G4UI_USE` macros to make the function `main()` easier to understand to users
 - `G4UIExecutive` should be instantiated at the same beginning of `main()`, if interactive mode is enabled. This makes possible to handle the output and eventual exception via the Geant4 UI since the beginning of running example
- Explicitly defined physics lists in examples not demonstrating physics
 - Reduced from 23 (2015) to 12 (2016), 13 (2017)
- Explicit use of `std::cout`, `std::cerr`, `exit()`
 - Increased from 1(2016) to ~10 (2017) !

Macros Review

- Objectives:
 - To review all examples and remove the commands, defined in the example messenger classes, if they are not directly relevant to the features demonstrated in the example.
 - All the useful remaining commands should be demonstrated in a macro, and all macros provided with an example should be referenced in the README.
- The lists of unused commands, generated in a semi-automatic way last year, are available on [the wiki page](#)
- We would really like to have the macro review completed in time for the release
 - The examples developers are kindly asked to collaborate, fix their examples and let us know when done

Coding Guidelines

- Following the coding guidelines is requested when adding a new example
- Progress with automating the procedure of checking
 - Now also the guidelines for class members names can be checked automatically (using modified Doxygen built from sources)
- The number of violations reduced significantly::
 - 663 data member names (sep15) => 95 (july16) => 68 (july17) + 108 in new DICOM reader where using a “the” prefix instead of “f”
 - 32 member function names (sep15) => 18 (july16) => 5 (july17)
- The list of violators (examples files) is available on the wiki page
- All developers which are responsible for the examples, where a violation of guidelines was detected, will be reminded by e-mail after the collaboration meeting

Conclusions

- The number of extended examples is growing
 - 110 (last CM) => 120 (this CM)
- Started effort on reviewing macros
- Progress with eliminating of obsolete features and coding guidelines