GEANT4 9.2-patch02
and 9.3 highlights

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Outline

- Major fixes introduced in release 9.2.p02 on top of release 9.2.p01
  - Geometry & GDML
  - Physics
  - Configuration & Kernel
  - All details in:
    - http://geant4.cern.ch/support/Patch4.9.2-2.txt
- Highlights on 9.3
  - Introduced in 9.3-beta
  - All details in:
    - http://geant4.cern.ch/support/Beta4.9.3-1.txt

Release 9.2.p02 (on August 28th)

(details in **http://geant4.cern.ch/support/Patch4.9.2-2.txt**)

9.2.p02: Geometry & Field

- Fixes in solids
  - Fixes in **`G4Ellipsoid`** treatment of tolerance for points on surface in **`Inside(p)`** and **`DistanceToIn(p,v)`**
    - addressing problem reports #1022 and #1050
  - Corrected typo in **`GetSurfaceArea()`** for faceted specific solids, which was returning wrong output
    - addressing problem report #1062
  - Application of distance splitting for long distances in **`DistanceToIn(p,v)`** for curved solids
    - fixing issue of precision loss on 64-bits systems
- Fixes in navigation
  - Fixed treatment of surface normal for rotated cases
  - Fix in **`G4PathFinder`** for treatment of steps at boundary
    - Relevant for use in parallel geometries for cavern studies
  - Field transport: fix in **`G4ChordFinder`** and intersection algorithm to speed up Brent locator

9.2.p02: GDML

- Fix in **`G4GDMLMatrix`**
  - avoid cases of memory corruption
- Fix for handling of **`materials`** and **`solids`** tags
  - allow for definition of quantities in tag scope, foreseen by schema
- Corrected handling of loops for treatment of multiple placements
  - restricted usage to placements of volumes
- Enhanced treatment of Boolean structures
  - handling nested structures with displaced solids applied to both operands (ATLAS use case)

9.2.p02: Hadronic Processes

- Fix to nuclear processes to correct deletion of cross-sections and processes at job closure
  - addressing problem report #1056
- Fixes in **`parton_string`** model
  - for incident anti-baryons: e.g. anti-proton, manifesting in problems with forming hadrons
  - corrected **`pt`** sampling in **`G4LundStringFragmentation`** to avoid near endless loop, slightly improving overall performance; addresses problem report #1066
- Fixed problem in **`neutron_hp`** model for IC electron emission
- Fixed issue with global dynamic libraries on MacOS for extra symbols from RPG model

9.2.p02: Global, Configuration & Examples

- Improved implementation of **`G4String`** and **`G4SubString`**
  - ✧ to reduce generation of temporaries
- Configuration
  - Fixed configuration issues on Windows platforms for clashes in CygWin with MatLab installations
  - Fixes for detection of Qt libraries in Configure
  - Ported code on gcc-4.4.X compiler series
- Review and fixes to advanced examples set

Highlights on release 9.3

(details in http://geant4.cern.ch/support/Beta4.9.3-1.txt)

New Features in 9.3-beta

- Release 9.3-beta made available on June 5th
  - Includes some new features part of the program for release 9.3 of December 2009
- Geometry
  - Revised implementation for curved surface solids with **`Phi`** sections: **`G4Tubs`**, **`G4Cons`**, **`G4Sphere`**
    - As part of code review 2009 for solids
  - Implementation of generic divisions along **`Z`** for polyhedra and polycones

9.3-beta: Global, Materials & Particles

- Reviewed implementation of physics vectors
  - Providing CPU improvement at initialisation
- Implemented migration of **`ICRU-73`** stopping power classes for materials to the **`G4VIonDEDXTable`** interface
  - Access methods of physics vectors have changed (vectors can also be identified via atomic number of material if material is pure)
  - Classes now deliver mass stopping powers instead of stopping powers per unit length
  - Removed dependency on **`ICRU-73`** material densities
  - New utility class **`G4ExtDEDXTable`** to handle external electronic stopping power tables for ions
- Added method **`GetNuclearMass(A,Z)`** in **`G4NuclearProperty`** and made obsolete class **`G4NucleiPropertiesTable`** (will be removed)

9.3-beta: EM physics - 1

- Standard EM
  - Frozen version of default multiple-scattering model (**`G4UrbanMscModel`**) from release 9.2
    - New tuning of multiple-scattering (development class **`G4UrbanMscModel2`**) for central part and tail of the angular distribution
    - Added relativistic factor to Rutherford cross section and various developments for Coulomb scattering classes and **`G4WentzelVIModel`**
  - Simplified initialisation of models and code cleanup
  - Modification in width correction in **`G4UniversalFluctuation`**, fixing step dependency for the correction on energy deposition
  - New Goudsmit-Saunderson multiple scattering model for e+-
  - Fixed algorithm for selection of model by its energy range in G4EmModelManager to better treat energy-region overlap with low-energy models

9.3-beta: EM physics - 2

- Low-energy EM
  - Complete migration to 'standard-EM' design: added Bremsstrahlung physics according to Penelope and Livermore models; added **`G4LivermoreIonisationModel`**, first implementation of low-energy ionisation in the common design
  - New DNA processes migrated to the new design; new G4EMLOW-6.5 data set; made obsolete old cross-sections and final-state classes
  - Added **`G4RayleighScattering`** process to describe Rayleigh scattering and removed obsolete classes
  - Added new scaling algorithm, to obtain heavy ion stopping powers for ions not covered by **`ICRU-73`** report

9.3-beta: hadronic physics

- Models
  - Developments in **`CHIPS`** model to extend its applicability to all energies, particles and targets
  - Model precise sampling and 'on-the-fly' table preparation for **`coherent_elastic`** module
- Physics lists
  - New development physics-lists **`QGSC_QGSC`** (**`QGS`** model with interface to **`CHIPS`** at all energies, still using **`LHEP`** for neutrons) and **`QGSC_CHIPS`** (**`QGS`** model with 'EnergyFlow' interface to **`CHIPS`** at all energies)
  - New physics-lists with special EM options (EMV, EMX, EMY)
  - Declared obsolete old unused configurations

9.3-beta: more …

- GDML
  - Implemented virtual layer to allow customisation of the writer for user-extended schemas
  - Implemented ability to write surface properties associated to volumes and material properties
  - General code cleanup
- Interfaces
  - New class **`G4UIExecutive`** for automatic instantiation of user interactive sessions, as done for visualization drivers
  - Enhancements to **`G4VBasicShell`** for better command completion in command line
  - Developments in Qt driver
- Error Propagation
  - Inclusion of pi+, pi- and proton in physics list
  - Added possibility to account for error deflation for 'smoothing'
- New and updated examples

- List of planned developments for the current year at:
  - http://geant4.cern.ch/support/planned_features.shtml

Platforms supported for 9.3

- Linux SLC5, gcc-4.1.2, gcc-4.3.X, 32/64 bits
- Linux SLC4, gcc-3.4.6, 32/64 bits
- MacOSX 10.6, gcc-4.2.1
- Windows/XP and CygWin Tools
  - Compiler Visual C++ 9.0 (Visual Studio 2008)

- Also tested: gcc-4.4.X, icc-11.X

Thanks!