Hands-On on physics

« svalue »

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svalue

- We are going to study the svalue extended example which makes use of

  Geant4-DNA Physics processes and models

  - This is another application example of Geant4-DNA Physics

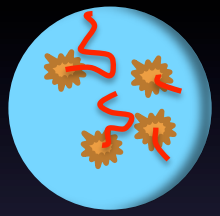
- This is an extended example and it is located in

  $G4INSTALL/examples/extended/electromagnetic/dna

Beta version

svalue

- This example teaches to Geant4 users how to use the Geant4-DNA physics processes and models in a spherical liquid water volume for the simulation of monoenergetic S-values



$$\overline{D}(r_T \leftarrow r_S) = \tilde{A}_{r_S} S(r_T \leftarrow r_S),$$

- This example can be easily crontrolled through UI commands, in particular:
  - The sphere radius
  - The use of a tracking cut (partciles are killed below this cut and deposit their energy locally)
  - The selection of a Geant4-DNA Physics constructor : G4EmDNAPhysics, G4EmDNAPhysics_option2

- The output results consists in a text file (s.txt), containing :
  - the radius of the sphere (in nm)
  - the energy of incident particles (in eV)
  - the S value (in Gy/Bq.s)
  - the rms on S value (in Gy/Bq.s)

svalue

- Copy the svalue extended example to your local directory, create your build directory and compile it

```
cd
cp –R $G4EXAMPLES/examples/extended/medical/dna/svalue .
mkdir build-svalue
cd build-svalue
cmake ../svalue
make
```

- Run svalue

```
./svalue svalue.in
```

  - 1000 electrons of 100 eV, 200 eV …. 10 keV are shot
  - Emitted randomly from within the sphere

Output of svalue

```
======================== run summary =====================

The run is 1000 e- of 100.00 eV  through a sphere of radius 20.00 nm of G4_WATER (density: 1.00 g/cm3 )

Total Energy deposited        = 87.307 eV  +- 27.131 eV

S value                       = 417.427 Gy/Bq.s  +- 129.718 Gy/Bq.s

Track length of primary track = 11.052 nm  +- 10.220 nm
Projected range               = 1.410 nm  +- 9.037 nm

Nb of steps of primary track  = 35.04 +- 38.75

Step size                     = 3.711 Ang +- 1.832 Ang

======================== run summary =====================

The run is 1000 e- of 200.00 eV  through a sphere of radius
```