Hands-On on physics

« TestEm12 »

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2015 Geant4-DNA Tutorial

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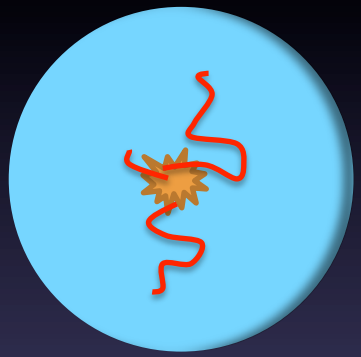
TestEm12

- Shows how to simulate energy deposit distribution for electrons shot within the center of a liquid water sphere (« Dose Point Kernel = DPK » distributions)

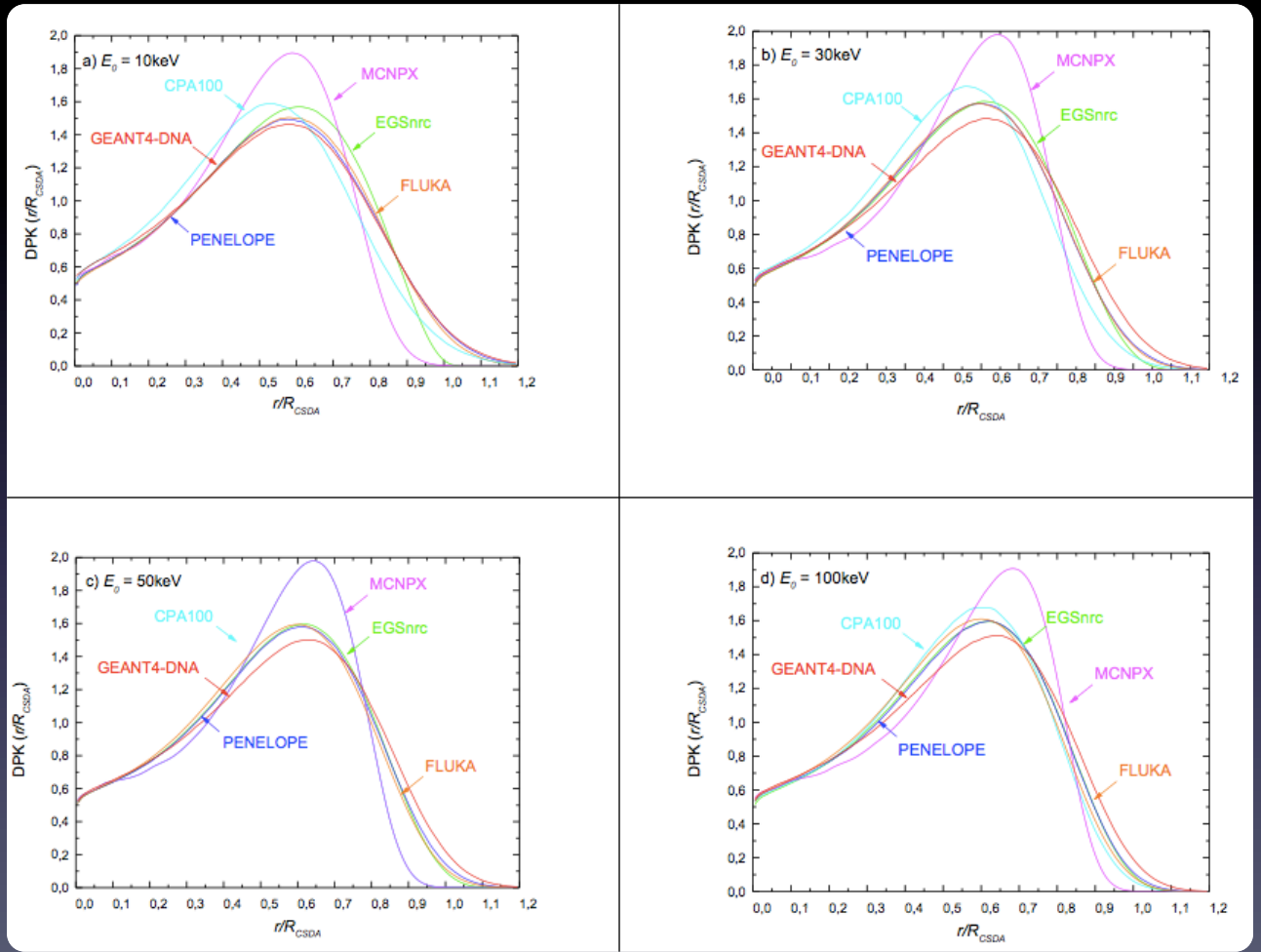


- Uses Physics constructors
  - Standard EM
  - Low Energy EM
  - Geant4-DNA
    - To be run with macro dna.mac
- Produces histograms
- Can be fully run & configurated through UI commands

DPK simulations in liquid water

- Geant4-DNA is compatible with EGSnrc, PENELOPE and FLUKA
- But not compatible with CPA100 (30 keV and 50 keV) and with MCNPX* (all energies)

*
- v2.7.0
- F8 tally
- EFAC=0.917
- transport cutoff of 1 keV
- ITS option
- ESTEP = 10 or 100



The geometrical granularity used in this study might be too large to get accurate DPK profiles using MCNPX

See Appl. Radiat. Isot. 83 (2014) 137-141 (link)

TestEm12

- Copy the TestEm12 extended example to your local directory, create your build directory and compile TestEm12

```
cd
cp –R $G4EXAMPLES/examples/extended/electromagnetic/TestEm12.
mkdir build-testem12
cd build-testem12
cmake ../TestEm12
make
```

- Run TestEm12 with macro dna.mac

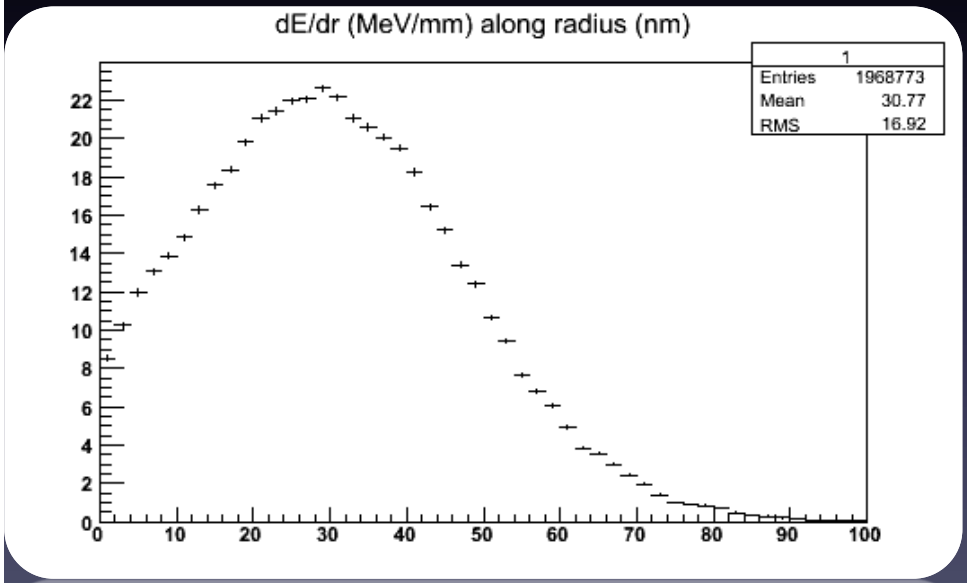
```
./TestEm12 dna.mac
```

  - 5000 electrons of 1 keV are shot
  - Results are saved in the dna.root file

- Try to plot longitudinal energy deposition profile using ROOT
  - To visualize your results start a ROOT session, do new TBrowser and open dna.root

Example of results

dE/dr along radius of sphere



Track length of primary e-