

Motivation of the Simulation

- Neutron Gun Simulation

We want to see how far neutron travels to investigate a possible use and the location for the installation of the neutron gun. Ideally we would want detailed information about **neutron tracking steps and capture gamma position and energy** information.

- DCGLG4sim Sanity Check

We want to see if G4 is doing a valid simulation or not. Ideally we would want detailed information about **neutron and other hadrons tracking steps and any gamma position and energy** information.

Access to Particle Trackings in DOGS

Track Info (_part.root)

ParticleThInfoTree contains essential information about **initial and final step** of an each particle produced such as position and energy information. Particle is identified by a tracking ID.

Step Info (_tracks.root)

TrackThInfoTree in file contains essential information about **each step** in a particle's track. Includes energy, position, physics process name of the step, associated tracking ID.

Options to Save Tracking Info

- **Most Detailed**

 - Track Info : gamma + hadrons (except proton)

 - Step Info : gamma + hadrons (except proton)

Keep all tracking informations except for protons. This allows us to see capture statistics as well as every steps of tracked particles.

- **Detailed**

 - Track Info : gamma + hadrons (except proton)

 - Step Info : hadrons (except proton)

From “Most Detailed” option, we exclude info about track steps of gammas. This allows us to reduce the file size to a half.

- **Essentials Only**

 - Track Info : gamma + neutrons

 - Step Info : neutrons

We only keep neutron and gamma tracks + steps of neutrons.

Approximate Numbers for **le6** Simulation

for Kazu's MBP (2.2GHz 4GB RAM)

Simulation option	File Size	Simulation Time	Ev. Loop Time
Most Detailed	47 GB	2200 min	(700 min)
Detailed	23 GB	1270 min	450 min
Essentials only	12 GB	960 min	35 min

My Suggestion

- We use either “Detailed” or “Essentials Only” option. The former is good enough for both sanity check of G4 and neutron gun simulation. The latter is for neutron gun simulation only.
- The event loop time for $1e6$ neutron simulation with the output format of “Detailed” option is >7 hrs, not realistic! I suggest we separate the sanity check of G4 and neutron gun simulation. Sanity check may be done with $1e4$ event simulation with “Detailed” option on either a local machine (my MBP) or cluster. Neutron gun simulation should be done with $1e6$ event simulation with “Essentials Only” option on the cluster computer.