Weekly RBRC meeting 20/May/2021

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Summary of two weeks

- Working for ZDC simulation.
  - Reproduced Ohsumi-kun's results.
  - Talked to M. Murry, joining to the EIC ZDC (eRD27) effort.
  - Moving from "**g4e**" framework to "**Fun4All**" framework.
- Waiting for BNL account…

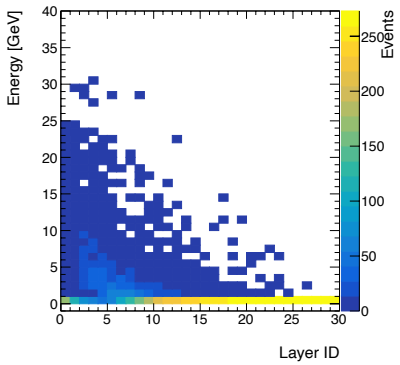
Radiation Study

Reproducing Ohsumi-kun's result

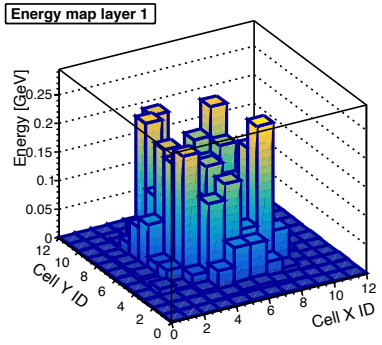
- Shot **Neutron beam** on a **Tungsten box** of 60 x 60 x 150 cm, using General Particle Source.
  - A box is divided into cells of 5 x 5 x 5 cm.
  - Neutron with E = **50 or 200** GeV with σ=0.3 GeV (Gaussian), angular distribution of **1D or 2D** gaussian with σ corresponding to p_T=0.3 GeV.
- Estimate dose [Gy = J/kg] from the maximum energy deposit in a cell.

50 GeV, 2D gaussian sample

Energy deposition per layer



Energy map on the 2nd layer (averaged per event)



Cell energy $\lesssim$ 0.25 GeV
→ Estimation of maximum dose

Neutron beam			cell energy	Deposited energy	Dose [Gy/event]	Ohsumi-kun's value
Energy	Angular distribution					
50 GeV	2D gaussian	σ_x = 6 mrad σ_y = 6 mrad	$\lesssim$ 0.25 GeV	$\simeq$ 0.4 x 10^{-10} J	$\simeq$ 1.6 x 10^{-11}	1.7 x 10^{-11}
200 GeV	2D gaussian	σ_x = 1.5 mrad σ_y = 1.5 mrad	$\lesssim$ 3 GeV	$\simeq$ 4.8 x 10^{-10} J	$\simeq$ 21 x 10^{-11}	18.2 x 10^{-11}
50 GeV	1D gaussian	σ_r = 6 mrad	$\lesssim$ 1 GeV	$\simeq$ 1.6 x 10^{-10} J	$\simeq$ 6.4 x 10^{-11}	--

- **Estimated dose ~ O(10) x 10^{-11} Gy per event, consistent with Ohsumi-kun's result.**

Moving to the Fun4All framework.

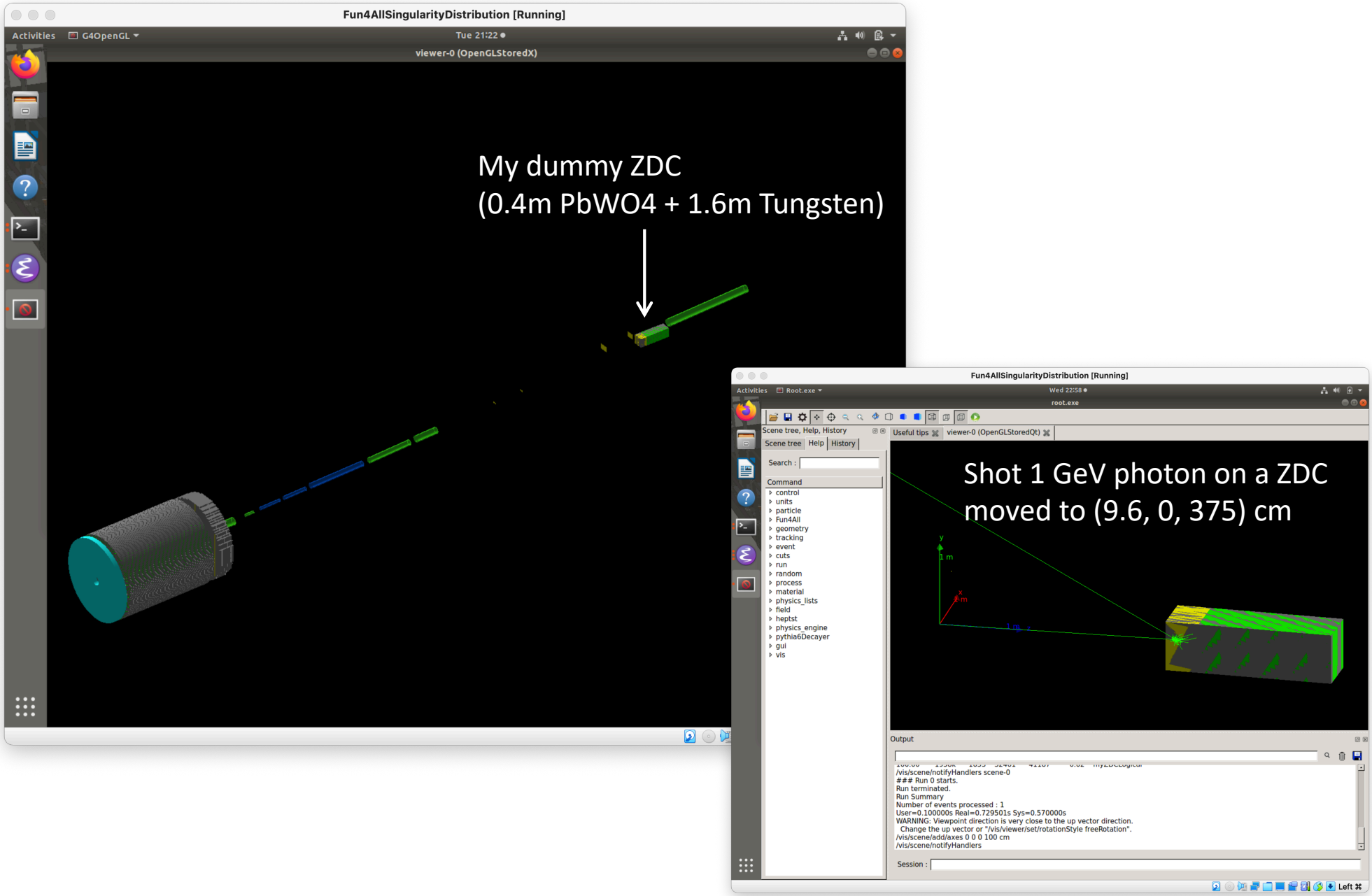
- So far: g4e framework.
- Move to Fun4All:
  - Install Virtual Box on my Mac. https://github.com/ECCE-EIC/Singularity/blob/master/VirtualBox.md
  - Download the distribution of the EIC Ubuntu Virtual Machine, where CVFMS and Singularity are pre-installed.

  → Run EIC singularity container.
- Learning how to work on Fun4All:
  - Managed to put a dummy ZDC in the ECCE.
  - Once ZDC is moved closer to the main detector, I managed to shoot a photon interactively.

    snapshots are on next page.
  - **Current:** Try to understand how to dump variables into a root file.

- Plan:
  - Put PbWO4 + FoCal geometry there.
  - Need to learn:
    - How to make the simulation works in the far forward region.
    - How to dump the variables.

Snapshots


Fun4AllSingularityDistribution [Running]
Activities
G4OpenGL
Tue 21:22
viewer-0 (OpenGLStoredX)
My dummy ZDC
(0.4m PbWO4 + 1.6m Tungsten)
Fun4AllSingularityDistribution [Running]
Activities
Root.exe
Wed 22:58
root.exe
Scene tree, Help, History
Scene tree
Help
History
Search :
Command
control
units
particle
Fun4All
geometry
tracking
event
cuts
run
random
process
material
physics_lists
field
heptst
physics_engine
pythia6Decayer
gui
vis
Useful tips
viewer-0 (OpenGLStoredQt)
Shot 1 GeV photon on a ZDC
moved to (9.6, 0, 375) cm
Output
/vis/scene/notifyHandlers scene-0
Run 0 starts.
Run terminated.
Run Summary
Number of events processed : 1
User=0.100000s Real=0.729501s Sys=0.570000s
WARNING: Viewpoint direction is very close to the up vector direction.
Change the up vector or "/vis/viewer/set/rotationStyle freeRotation".
/vis/scene/add/axes 0 0 0 100 cm
/vis/scene/notifyHandlers
Session :
Left