

# GEANT4 Simulation

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# Set up the environment

Before using the geant4 to do simulation, we need to set up the environment for ROOT and geant4:

```
export ROOTSYS=/grid/software/root528
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/usr/local/lib/root:/usr/X11R6/lib
export LD_LIBRARY_PATH=$ROOTSYS/lib:$LD_LIBRARY_PATH
export PATH=$ROOTSYS/bin:$PATH
source /grid/software/geant4.9.4.p02/env.sh
```

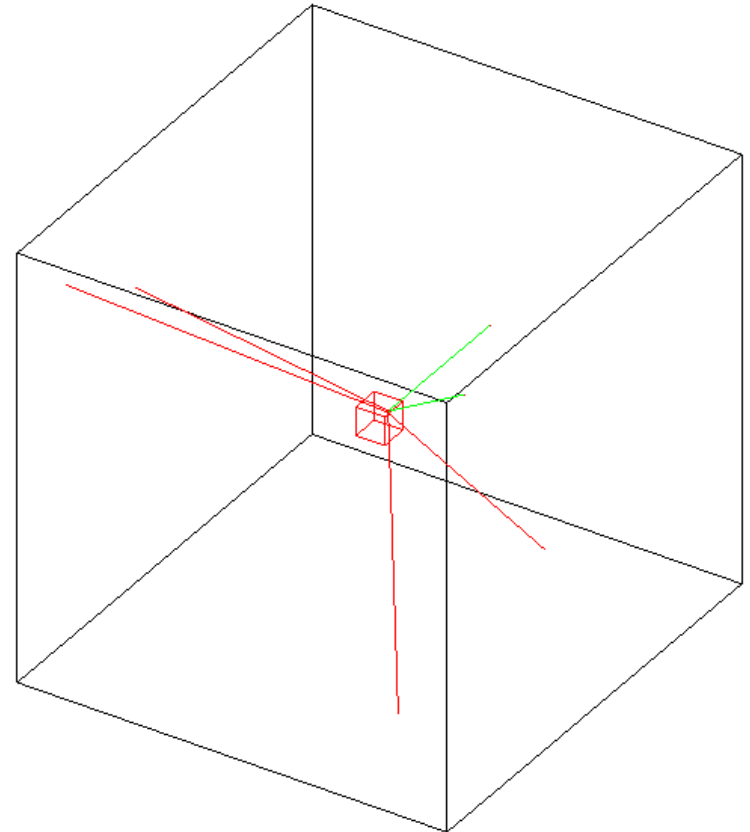
The following slides show some information about the codes I did before:

- Compton Scattering  
path: /users/xiandong/Compton
- Rutherford Scattering  
path: /users/xiandong/Rutherford

# Geant 4

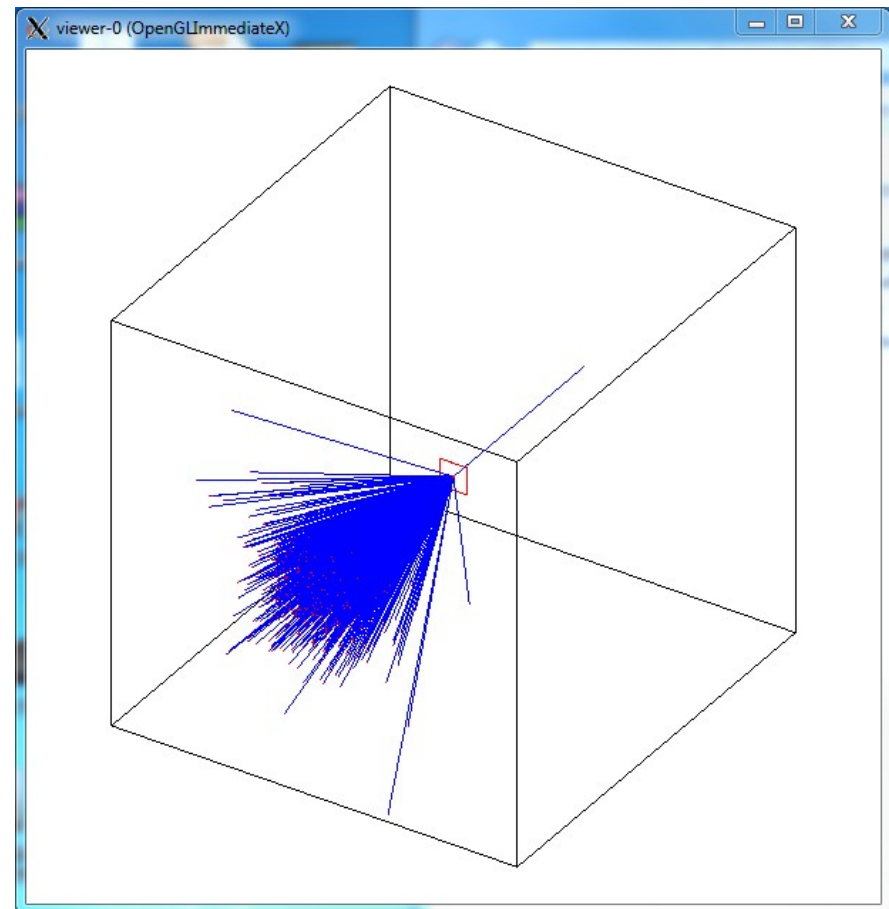
# Compton Scattering (Geant4 Simulation)

- Simulate Compton Scattering: It is an inelastic scattering of a photon by a free charged particle, usually an electron. This experiment further evidences the **wave-particle duality of photon**.
- Particle Gun:  
Gun → SetParticle("gamma")
- Secondary Particle:  
"electron"
- Runs: 1 Events
- Particle Initial State:  
SetParticleEnergy(0.66\*MeV)
- Physics Process:
  1. Transport Process
  2. ComptonScattering Process
- Target Matter:
  1. Graphite;
  2. Cube: 1m

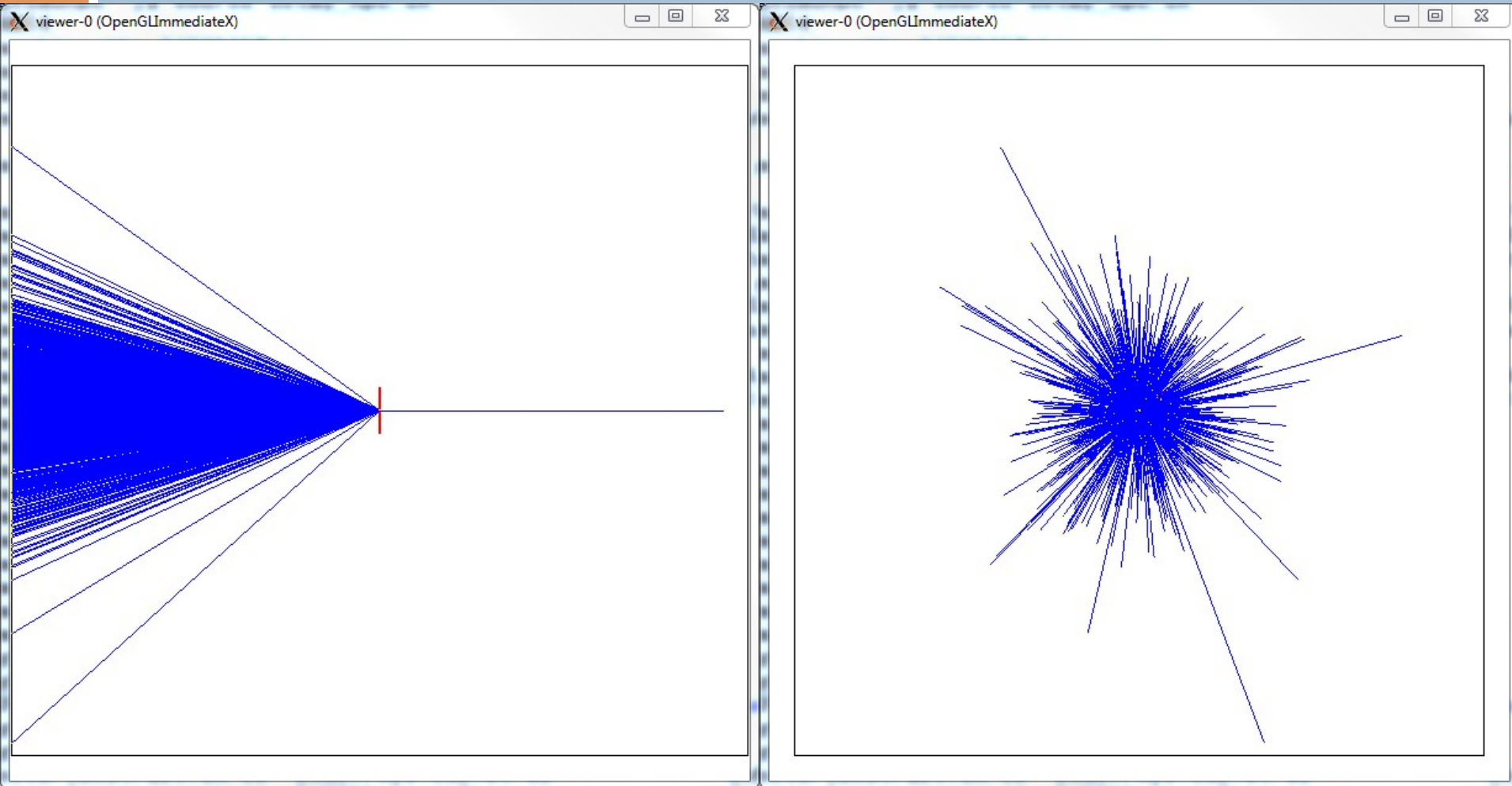


# Rutherford Scattering (Geant4 Simulation)

- ❑ Simulate Rutherford Scattering: Rutherford Scattering experiment is a very important and landmark experiment. Students should understand it to know the atomic structure.
  - Particle Gun:  
Gun → SetParticle("alpha")
  - Runs: 1000 Events
  - Particle Initial State:  
SetParticleEnergy(5.155\*MeV)
  - Physics Process:
    1. Transport Process
    2. Coulomb Scattering Process
  - Target Matter:
    1. Platinum;
    2. Thickness: 8  $\mu m$



# Rutherford Scattering (Geant4 Simulation)



The Side View

The Front View