2019.12.04.

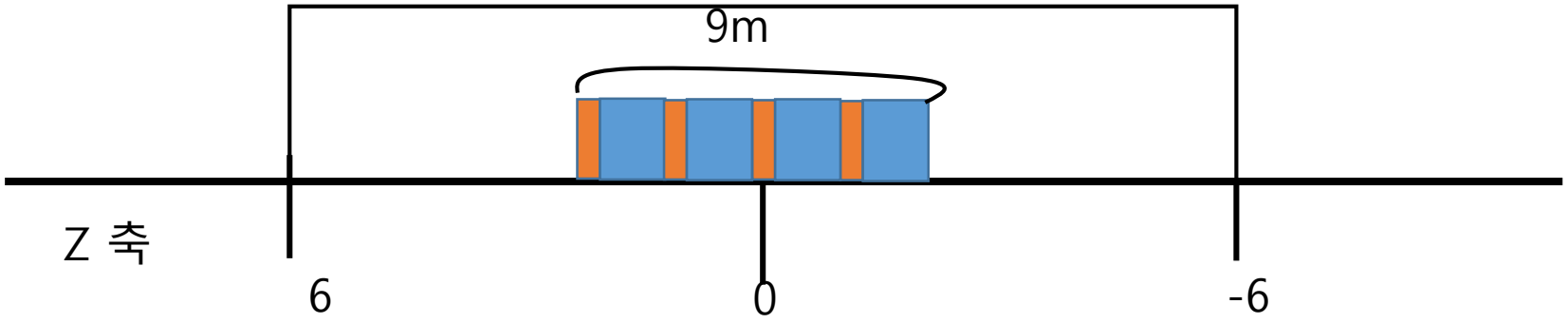
Sora Oh

Change volume size(Axis-Z)

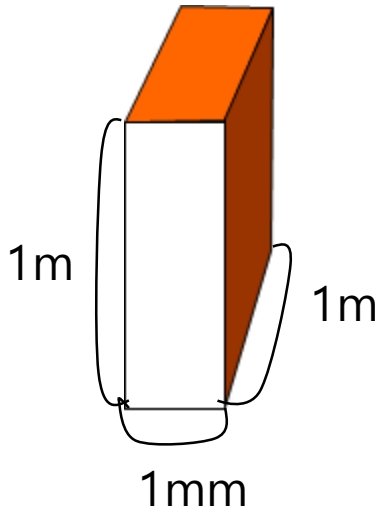
- World: 20m->40m
- Second arm: 10m->14m
- Second arm chaged placement: 5m->8m
- Hadron calorimeter: 12m
- Sandwiches: 9m

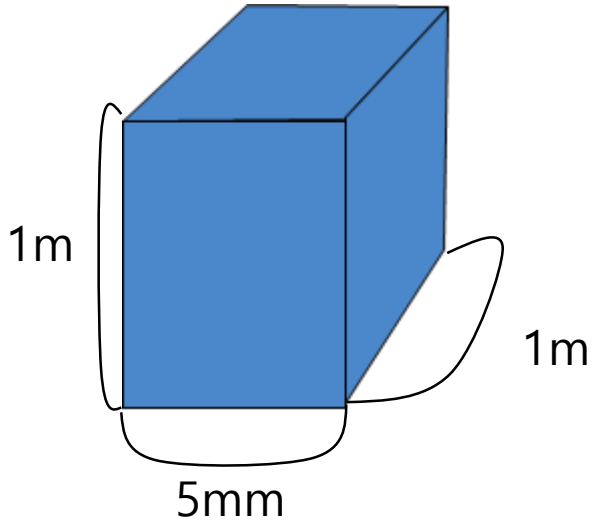
Hadron calorimeter

- Second arm's

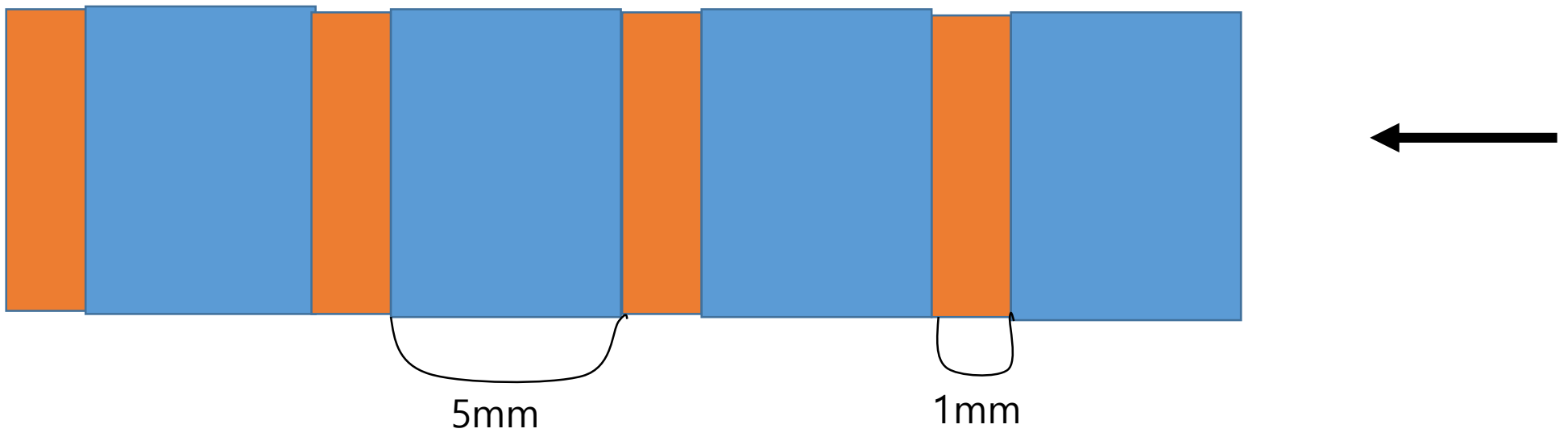


Scintillator and lead





Scintillator and lead



Hadron calorimeter

- //hadron calorimeter

- auto hadCalorimeterSolid = new G4Box("HadCalorimeterBox",1.*m,1.*m,6.*m);
- auto hadCalorimeterLogical = new G4LogicalVolume(hadCalorimeterSolid,air,"HadCalorimeterLogical");
- new G4PVPlacement(0,G4ThreeVector(0.,0.,0.*m),hadCalorimeterLogical, "HadCalorimeterPhysical",secondArmLogical,false,0,checkOverlaps);

Scintillator

- auto HadCalScintiSolid = new G4Box("HadCalScintiSolid",50.*cm,50.*cm,2.5*mm);
- auto HadCalScintiLogical = new G4LogicalVolume(HadCalScintiSolid,scintillator,"HadCalScintiLogical");

- G4VPhysicalVolume* HadCalScintiPhysical[1500];
- G4VPhysicalVolume* HadCalLeadPhysical[1500];
- for (G4int i=0;i<1500;i++)
- {
- G4double z1 = -5000+0.6*i*cm;
- HadCalScintiPhysical[i] = new G4PVPlacement(0,G4ThreeVector(0.,0.,z1),HadCalScintiLogical,"HadCalScintiPhysical",hadCalorimeterLogical, false,0,checkOverlaps);

lead

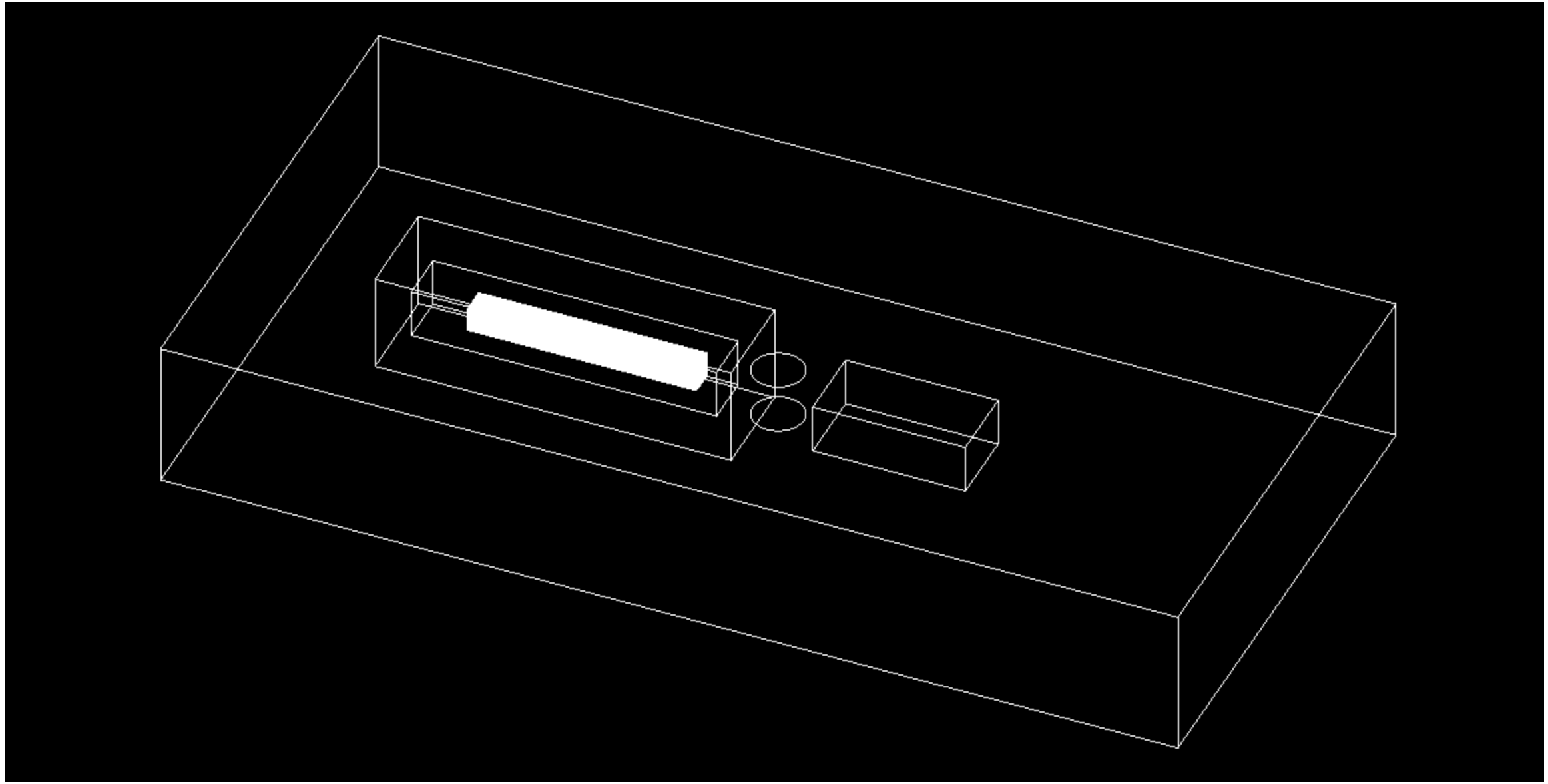
- auto HadCalLeadSolid = new G4Box("HadCalLeadSolid",50.*cm,50.*cm,0.5*mm);
- auto HadCalLeadLogical = new G4LogicalVolume(HadCalLeadSolid,lead,"HadCalLeadLogical");
-
- for (G4int i=0;i<1500;i++)
- {
- G4double z2 = 5000.3+0.6*i*cm;
- HadCalLeadPhysical[i] = new G4PVPlacement(0,G4ThreeVector(0.,0.,z2),HadCalLeadLogical,"HadCalLeadPhysical",hadCalorimeterLogical, false,0,checkOverlaps);

Number of sandwiches

- 20 radiation length
- 1 radiation length : The mean distance over which a high-energy electron loses all but 1/e of its energy.
- $X_0 = 716.4g\ cm^{-2} * \frac{A}{Z(Z+1)ln\frac{287}{\sqrt{Z}}}$
- Lead's radiation length = 0.5612 cm
- Scintillator's radiation length = 42.4 cm
- Sandwich's radiation length = 43cm

Number of sandwiches

- Sandwiches's 20 radiation length = 43*20=860cm
- Make sandwiches 860/0.6=1434≈ 1500



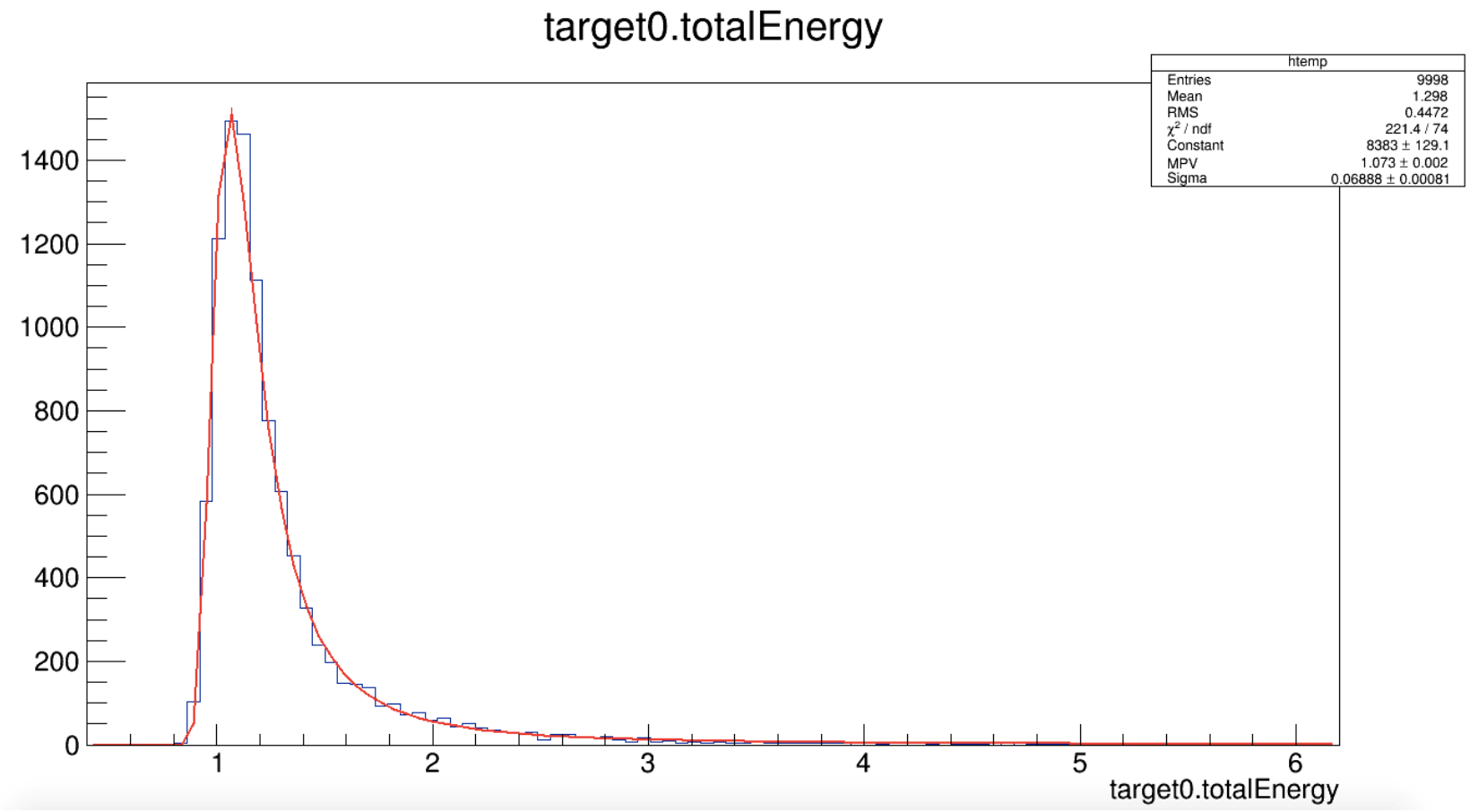
Calculate dE/dx lead

- $-\frac{dE}{dx} = 2\pi N_a r_e^2 m_e c^2 \rho \frac{Z}{A}\frac{z^2}{\beta^2}\left[\ln\left(\frac{2m_e\gamma^2 v^2 W_{max}}{I^2}\right) - 2\beta^2 - \delta - 2\frac{C}{Z}\right]$
- Z=82
- A=207.2
- ρ=11.35
- I=823eV

- $-\frac{dE}{dx} = 21.2\text{MeV}$

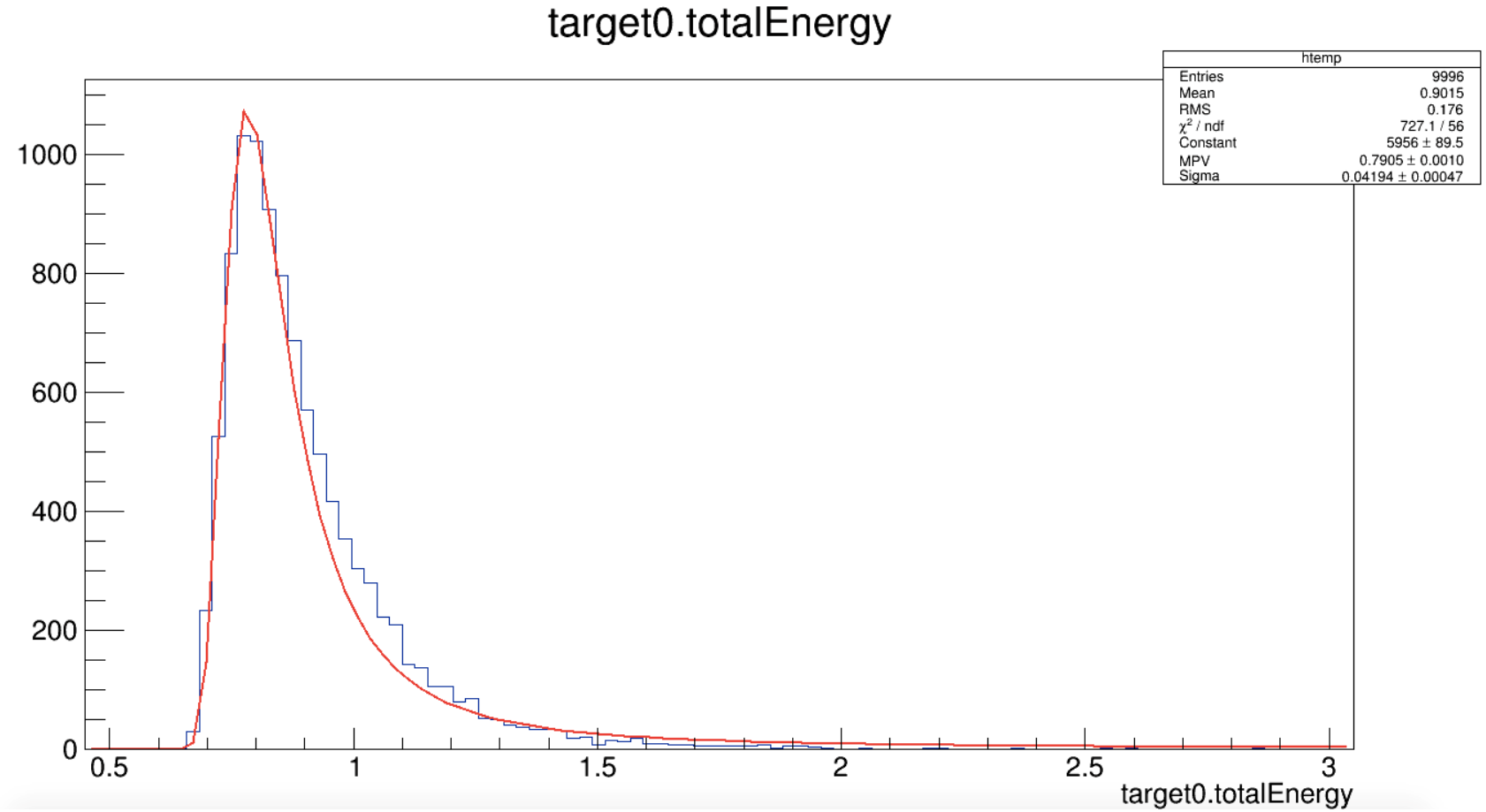
Simulation of lead (in sandwich)

- $-\frac{dE}{dx} = 1.298$

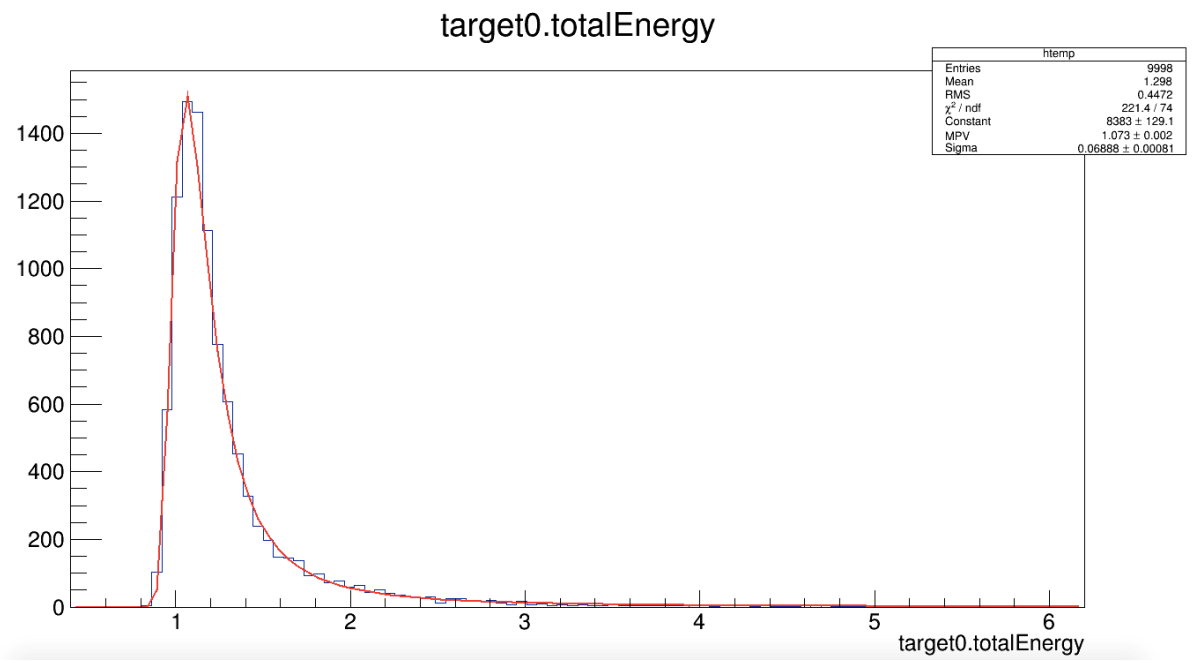


Simulation of scintillator (in sandwich)

- $-\frac{dE}{dx}$=0.901



Simulation of lead (in sandwich)



- $-\frac{dE}{dx} = 1.298$ (simulation)
- $-\frac{dE}{dx}$=21.2/0.1=2.1 ?

Things to do

- Understand measuring length and $-\frac{dE}{dx}$
- Make the beam run.
- Study Hands on4.
- Setup single photon.