

ECal Simulations: CALICE sensor

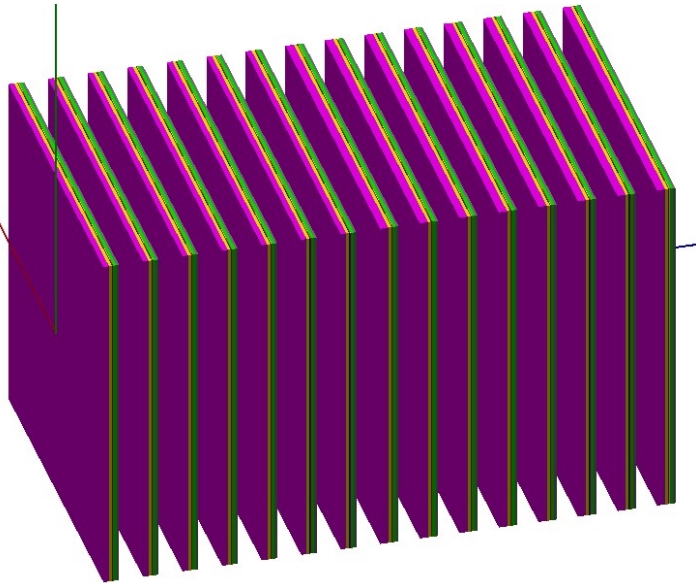
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Institute of Space Science, Bucharest

Geant4 Implementation

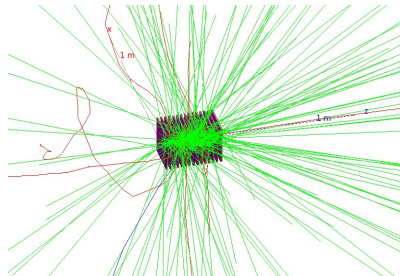
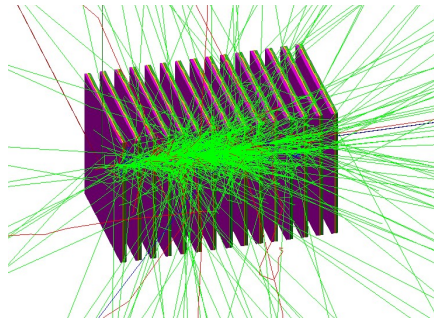
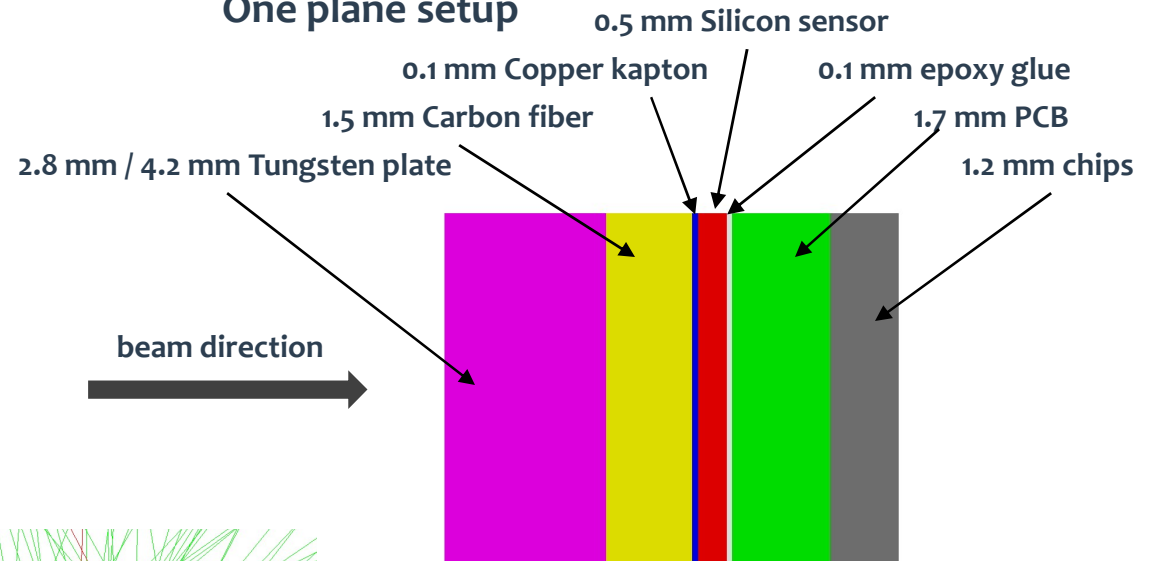
• Standalone application in Geant4

Geometry

- ❑ TB2022 DESY setup as indicated by Adrian
- ❑ 15 layers of tungsten:
 - 7 first layers with 2.8mm thickness
 - 8 last layers with 4.2mm thickness
- ❑ CALICE Sensor:
 - 15 sensors with 18 cm x 18 cm x 0.5 mm
 - homogeneous structure , NOT separated in pads
- ❑ Distance between layers: 15 mm



One plane setup



Beam setup

- e- with various energies
- punctual source
- 5000 events

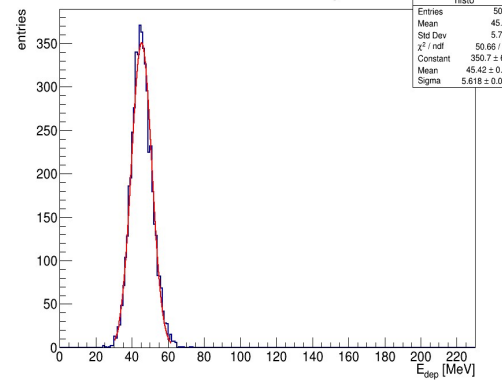
```
/gps/particle e-  
/gps/ene/type Mono  
/gps/ene/mono 2000 MeV  
/gps/pos/type Point  
/gps/pos/centre 0. 0. -1. cm  
/gps/direction 0 0 1  
  
/run/beamOn 5000
```

CALICE performance: energy deposition

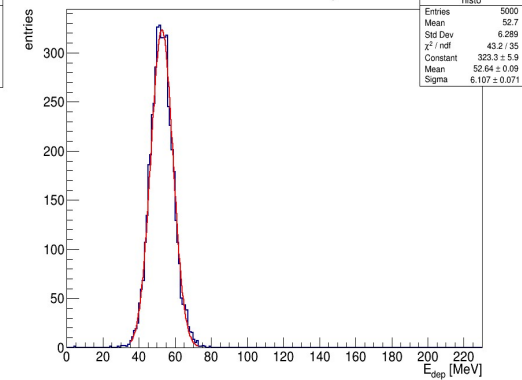
Beam setup

- primary particle: e^-
- energies from 3 GeV to 12.5 GeV with 0.5 GeV step
- 5000 events processed for each primary energy

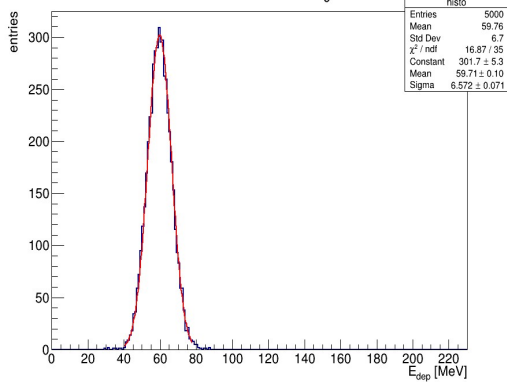
Edep on all planes for $E_0 = 3$ GeV



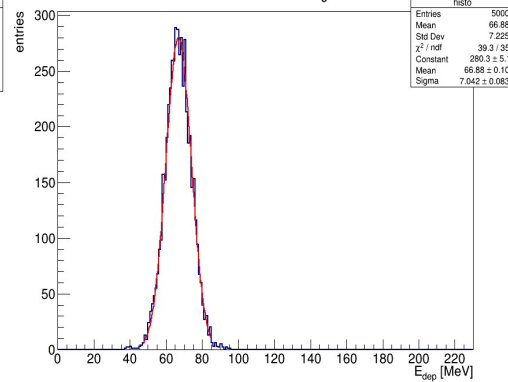
Edep on all planes for $E_0 = 3.5$ GeV



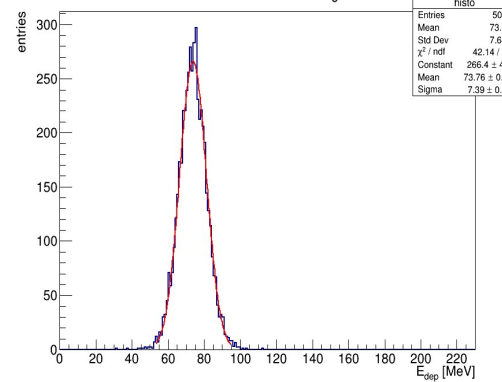
Edep on all planes for $E_0 = 4$ GeV



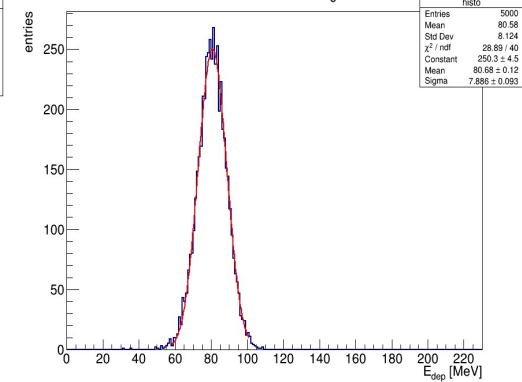
Edep on all planes for $E_0 = 4.5$ GeV



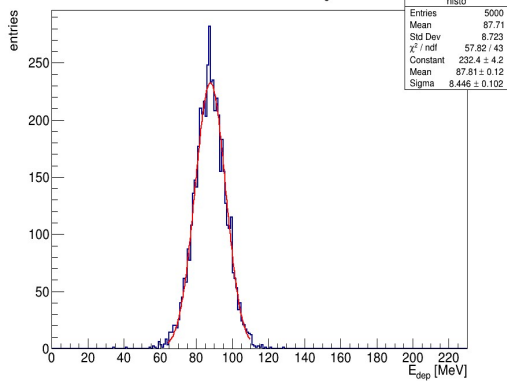
Edep on all planes for $E_0 = 5$ GeV



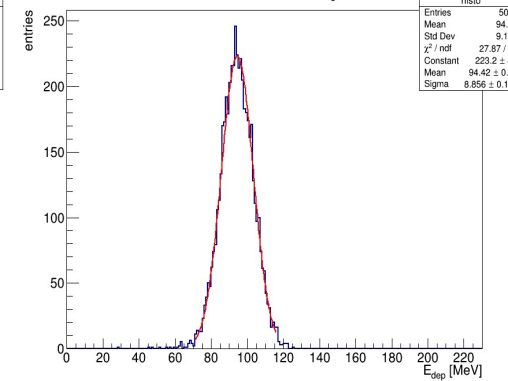
Edep on all planes for $E_0 = 5.5$ GeV



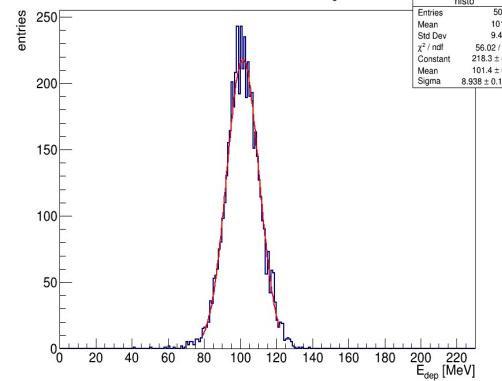
Edep on all planes for $E_0 = 6$ GeV



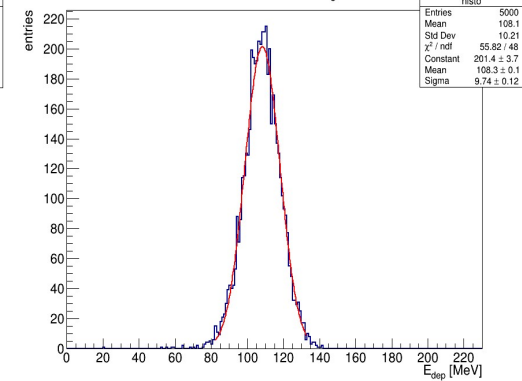
Edep on all planes for $E_0 = 6.5$ GeV



Edep on all planes for $E_0 = 7$ GeV



Edep on all planes for $E_0 = 7.5$ GeV

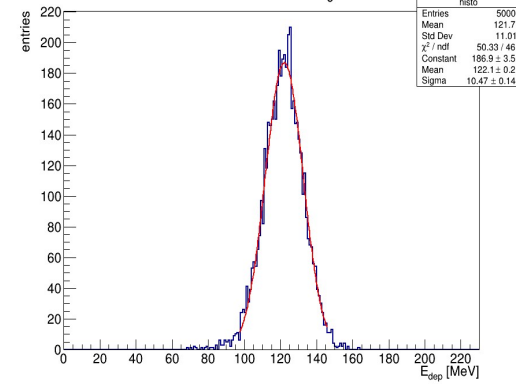


CALICE performance: energy deposition

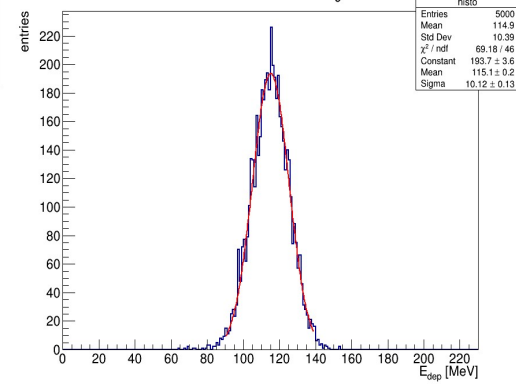
Beam setup

- primary particle: e-
- energies from 3 GeV to 12.5 GeV with 0.5 GeV step
- 5000 events processed for each primary energy

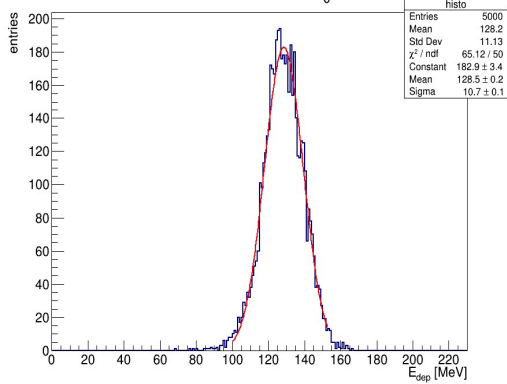
Edep on all planes for $E_0 = 8.5$ GeV



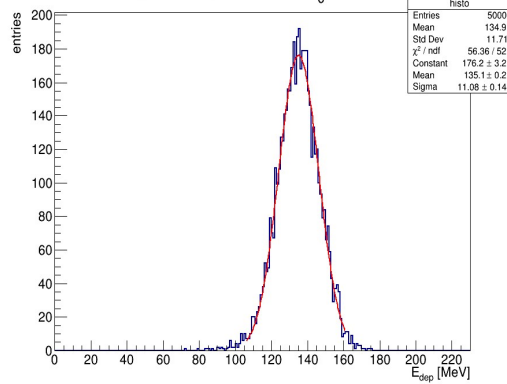
Edep on all planes for $E_0 = 8$ GeV



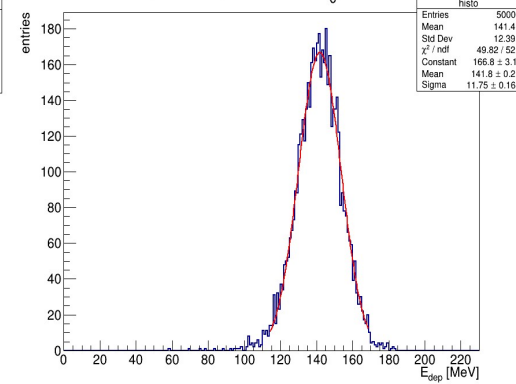
Edep on all planes for $E_0 = 9$ GeV



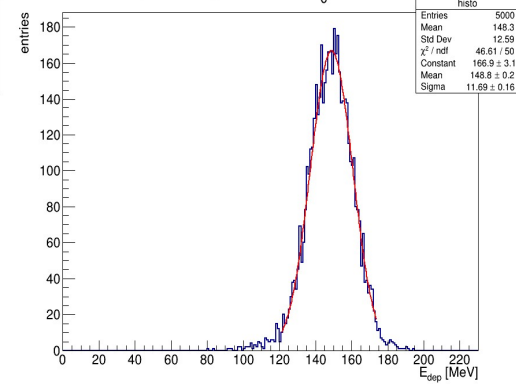
Edep on all planes for $E_0 = 9.5$ GeV



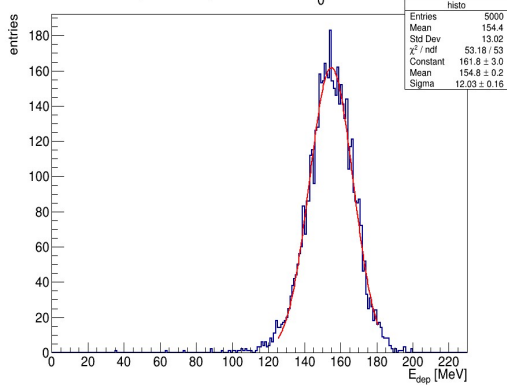
Edep on all planes for $E_0 = 10$ GeV



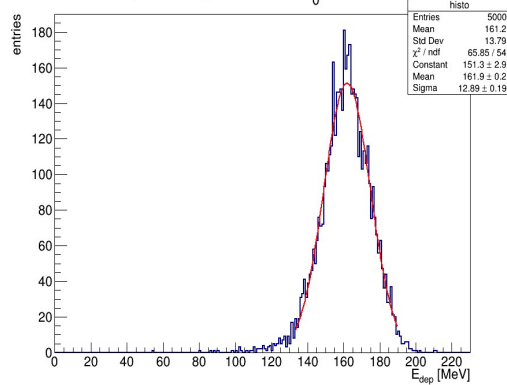
Edep on all planes for $E_0 = 10.5$ GeV



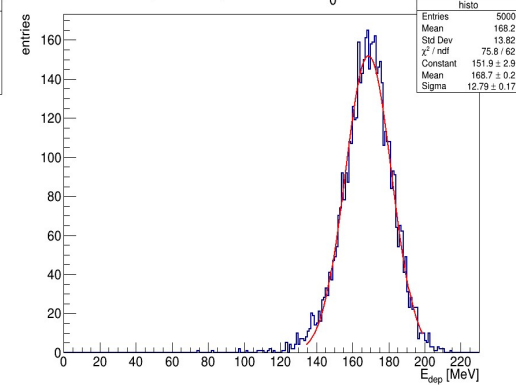
Edep on all planes for $E_0 = 11$ GeV



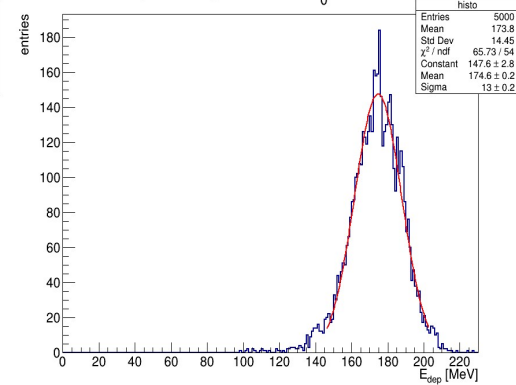
Edep on all planes for $E_0 = 11.5$ GeV



Edep on all planes for $E_0 = 12$ GeV

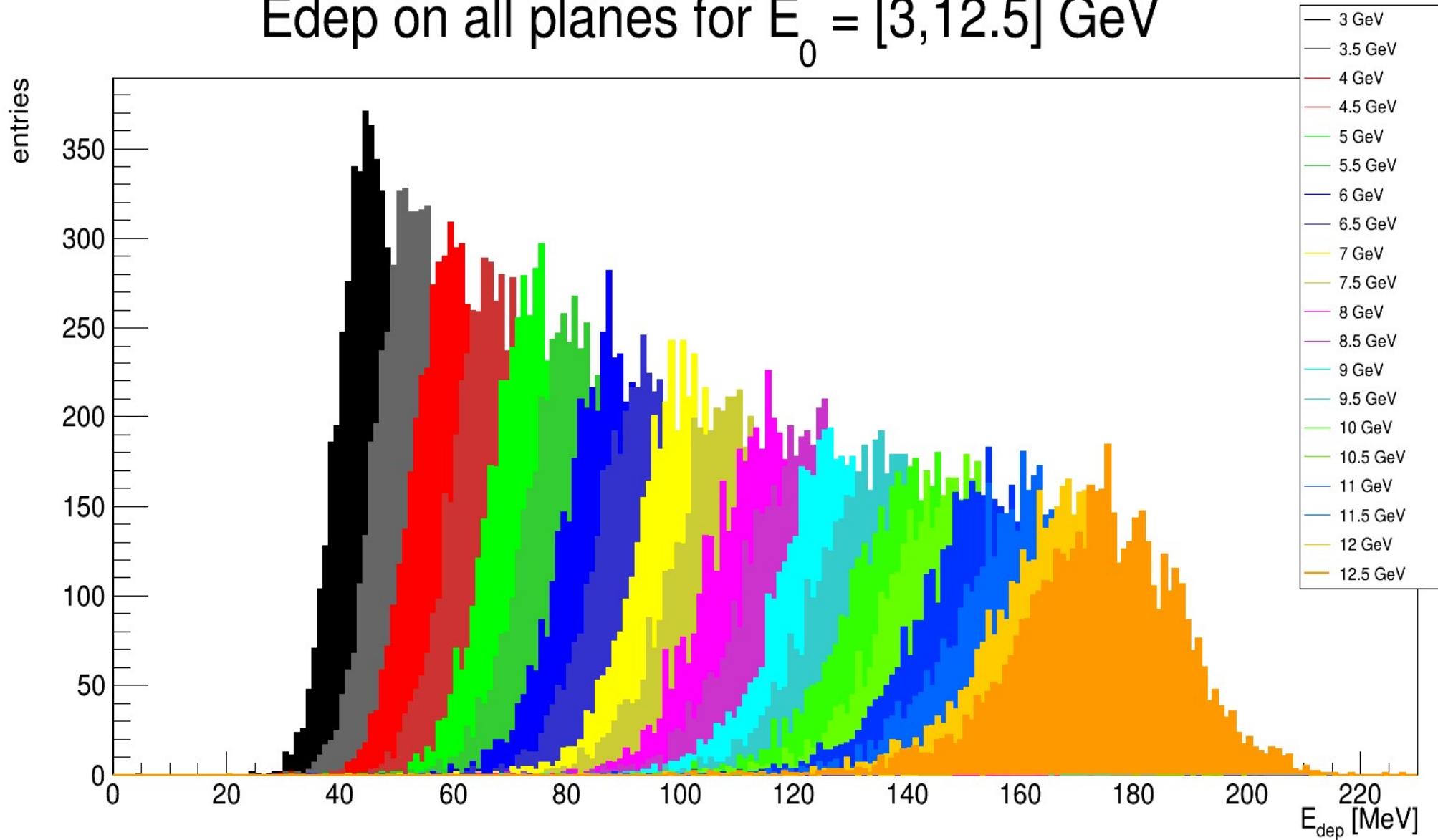


Edep on all planes for $E_0 = 12.5$ GeV

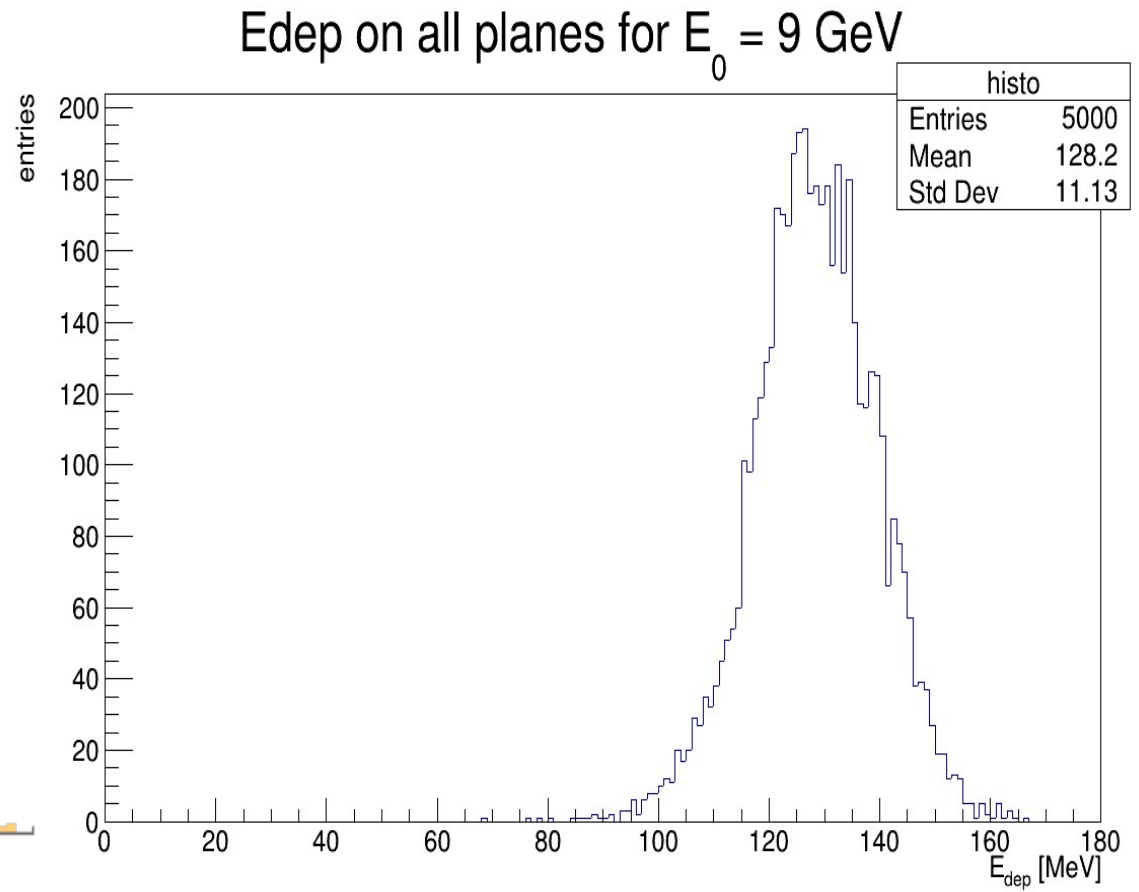
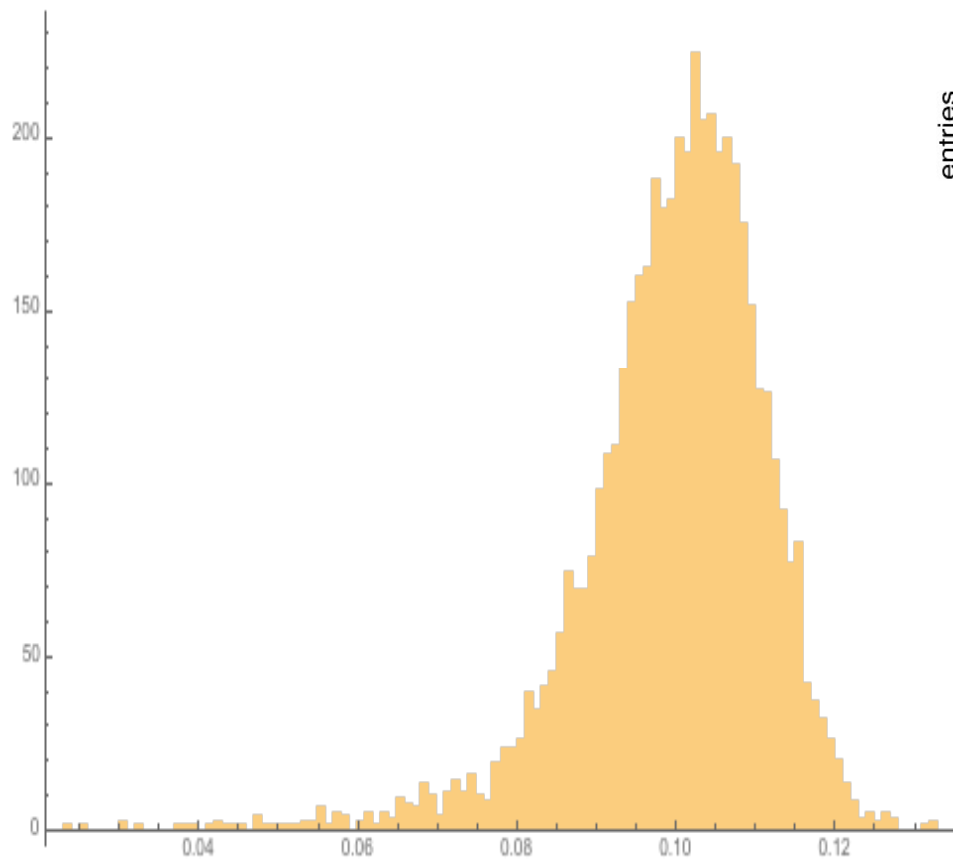


CALICE performance: energy deposition

Edep on all planes for $E_0 = [3, 12.5]$ GeV



CALICE performance: energy deposition at 9 GeV

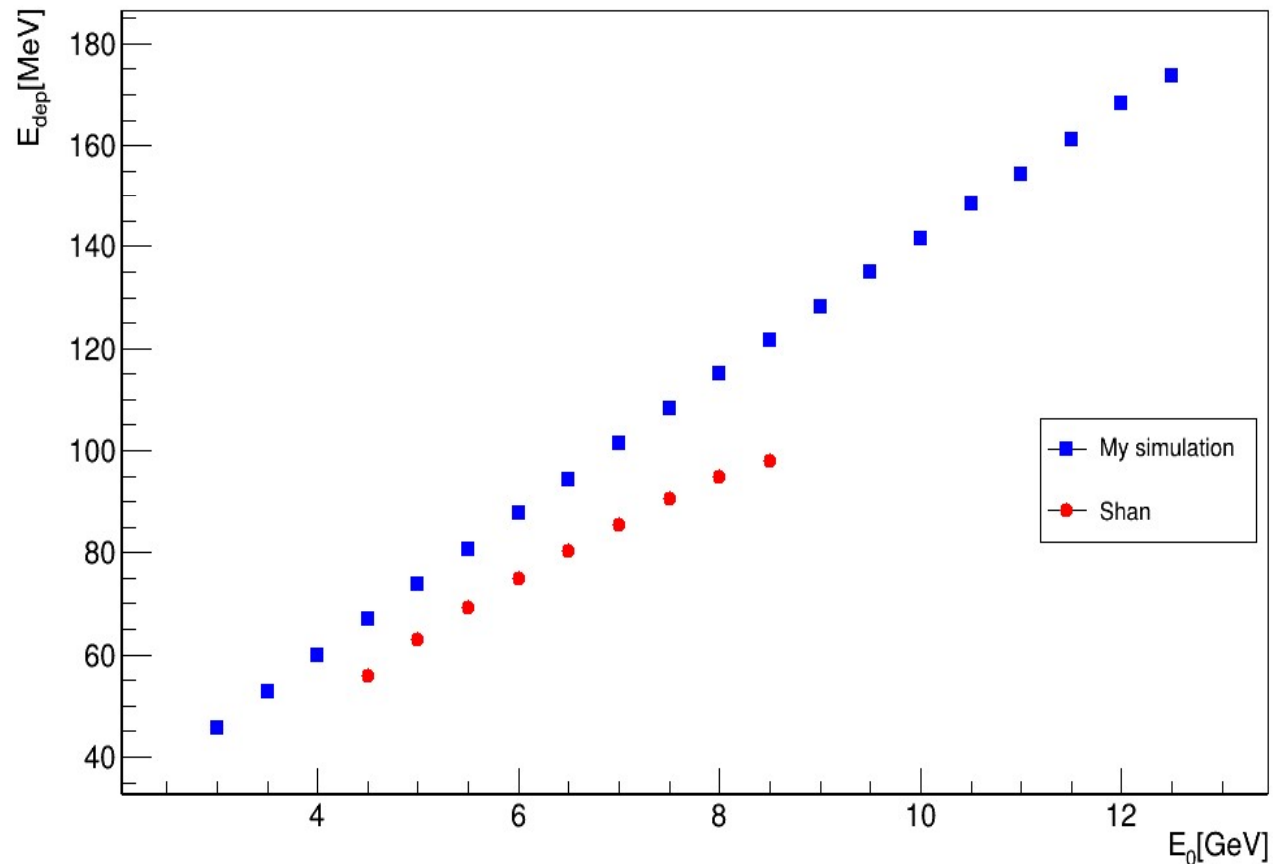
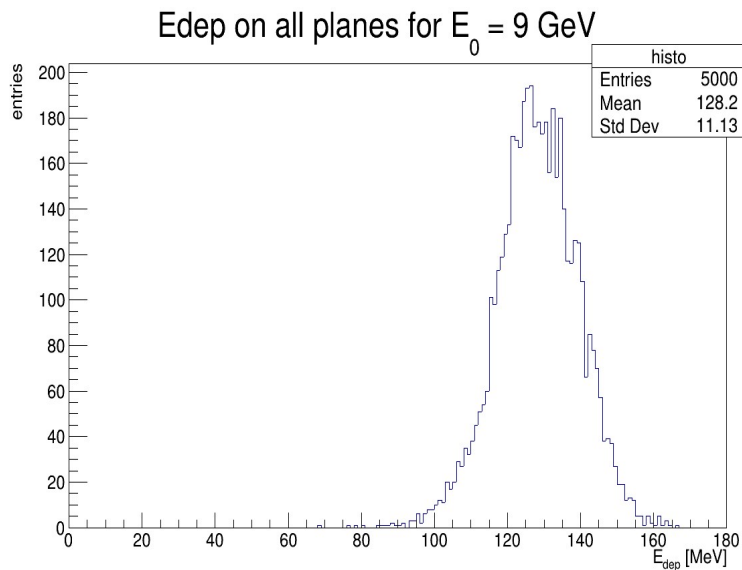


CALICE performance: average energy deposition

Beam setup

- primary particle: e⁻
- energies from 3 GeV to 12.5 GeV with 0.5 GeV step
- 5000 events processed for each primary energy

Average energy deposition per incident energy



CALICE performance: energy resolution

Beam setup

- primary particle: e-
- energies from 3 GeV to 12.5 GeV with 0.5 GeV step
- 5000 events processed for each primary energy

Total energy deposition

