

Multiple Scattering

4/15/2021

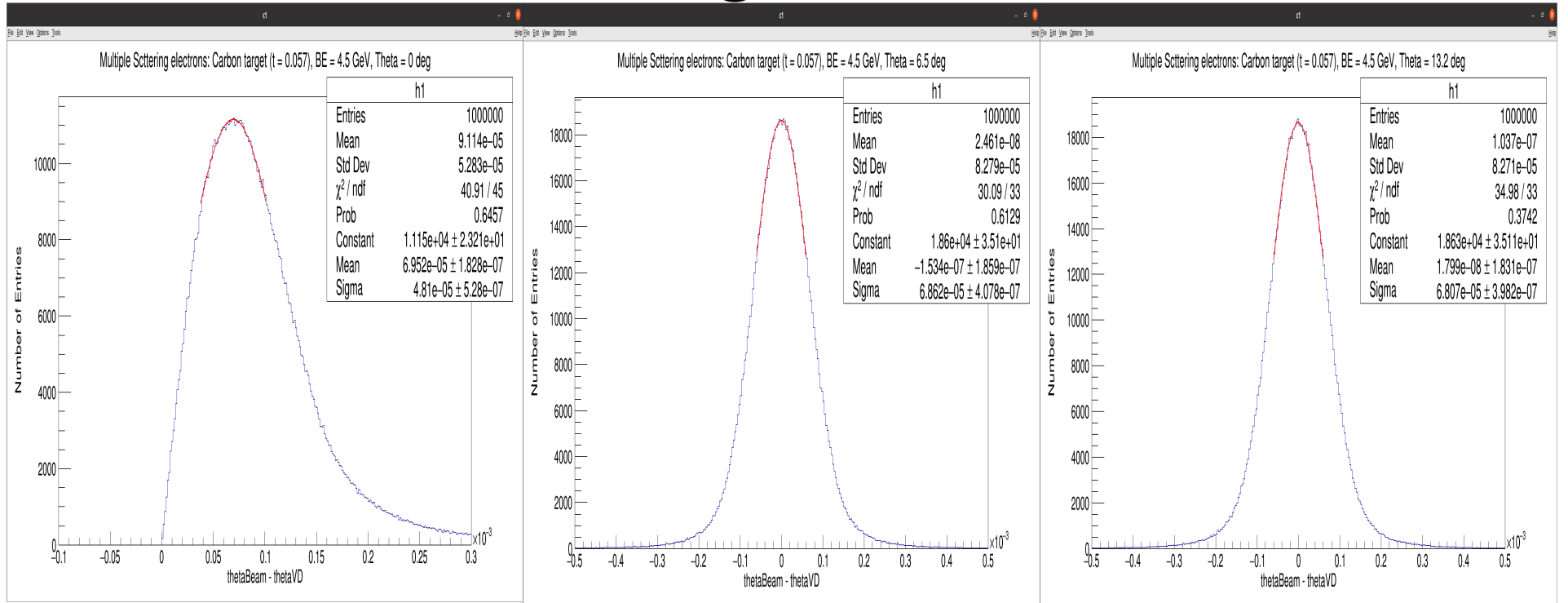
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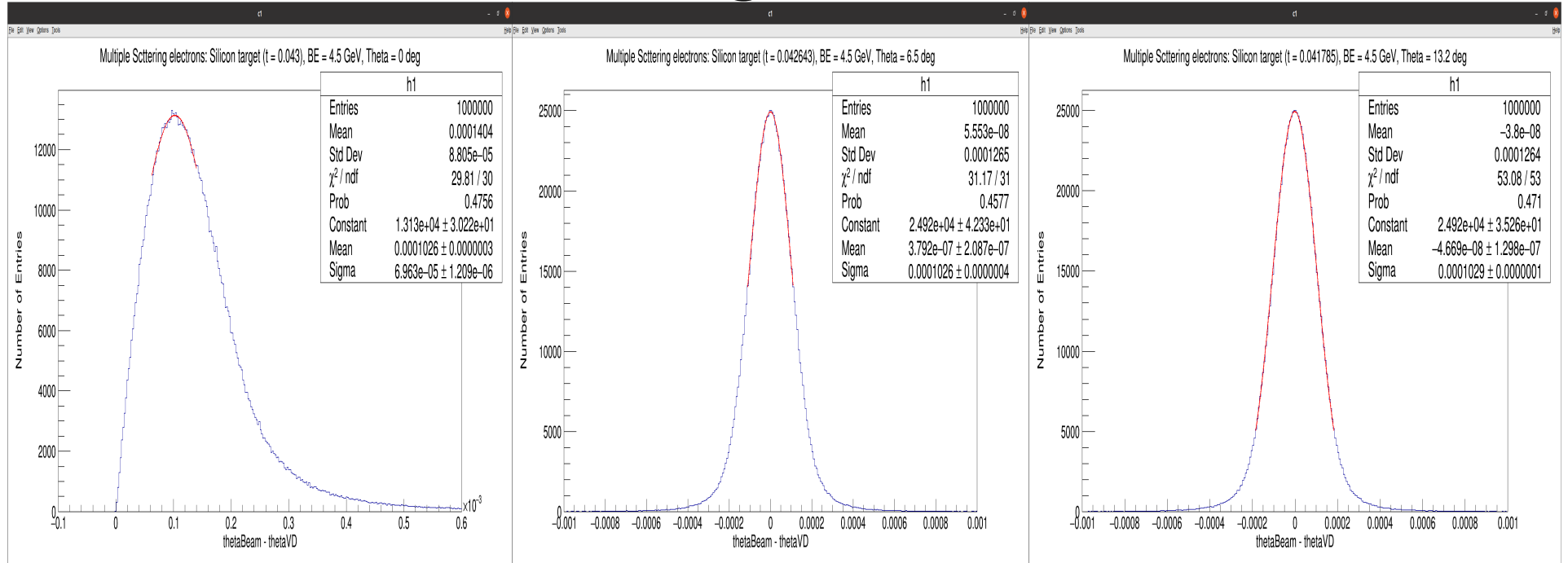
Multiple scattering

- Multiple scattering effect of electrons through various targets; Carbon, Silicon, Aluminum.
- Lengths used for each target were; C: 0.057 cm, S: 0.043 cm, Al: 0.15 cm & 0.03 cm.
- With angled beam the target length was adjusted to maintain same path length.
- Same energy was used for each target 4.5 GeV/c.
- Values calculated from the multiple scattering equation from the PDG book are shown at the end.

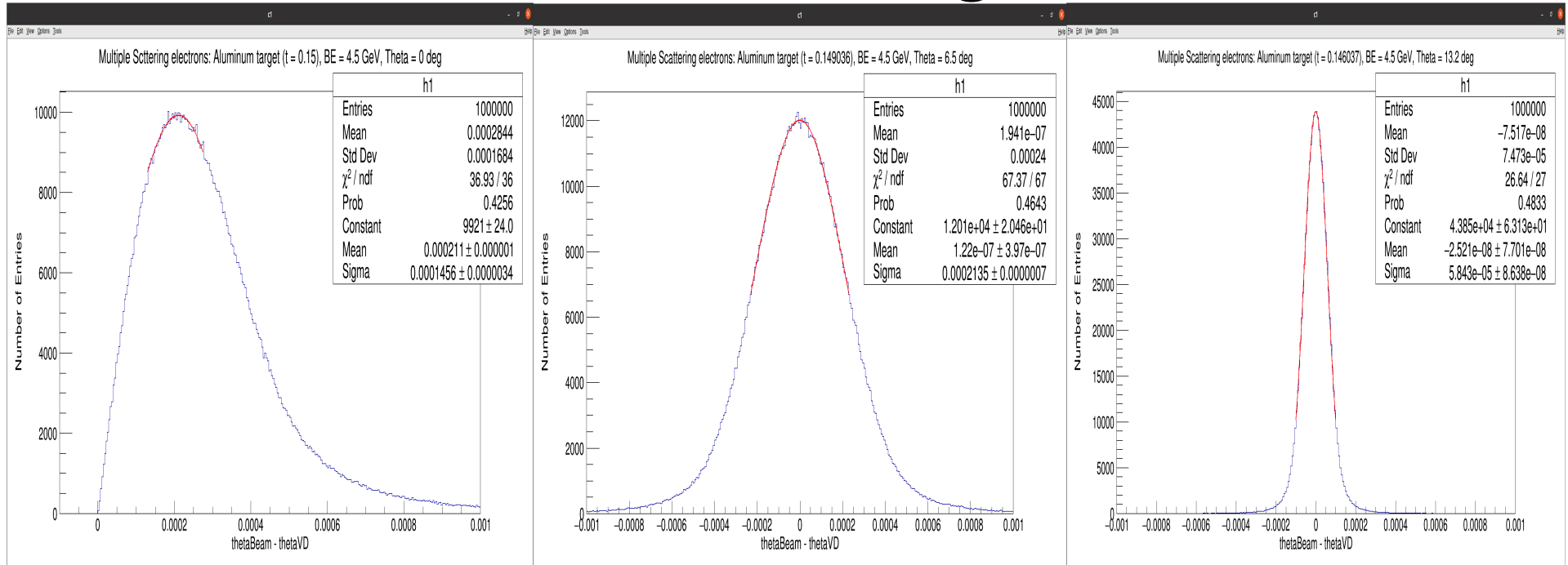
Electron MS Carbon 0/6.5/13.2 degrees



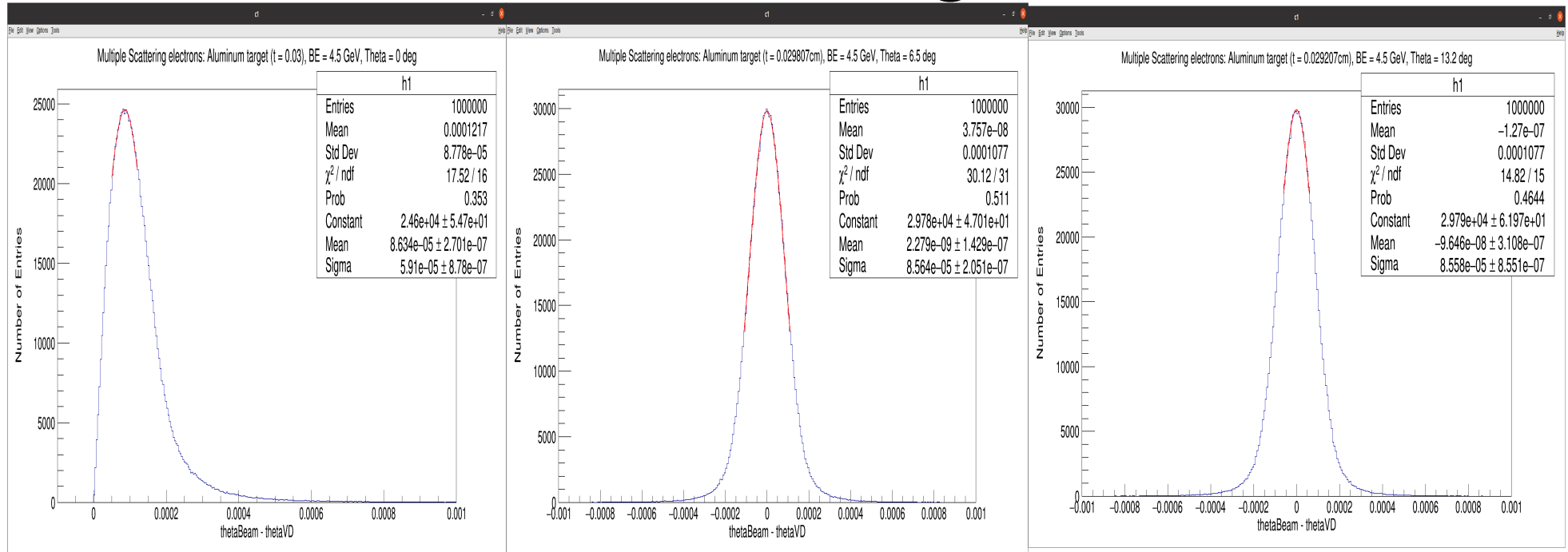
Electron MS Silicon 0/6.5/13.2 degrees



Electron MS Aluminum (0.15cm) 0/6.5/13.2 degrees

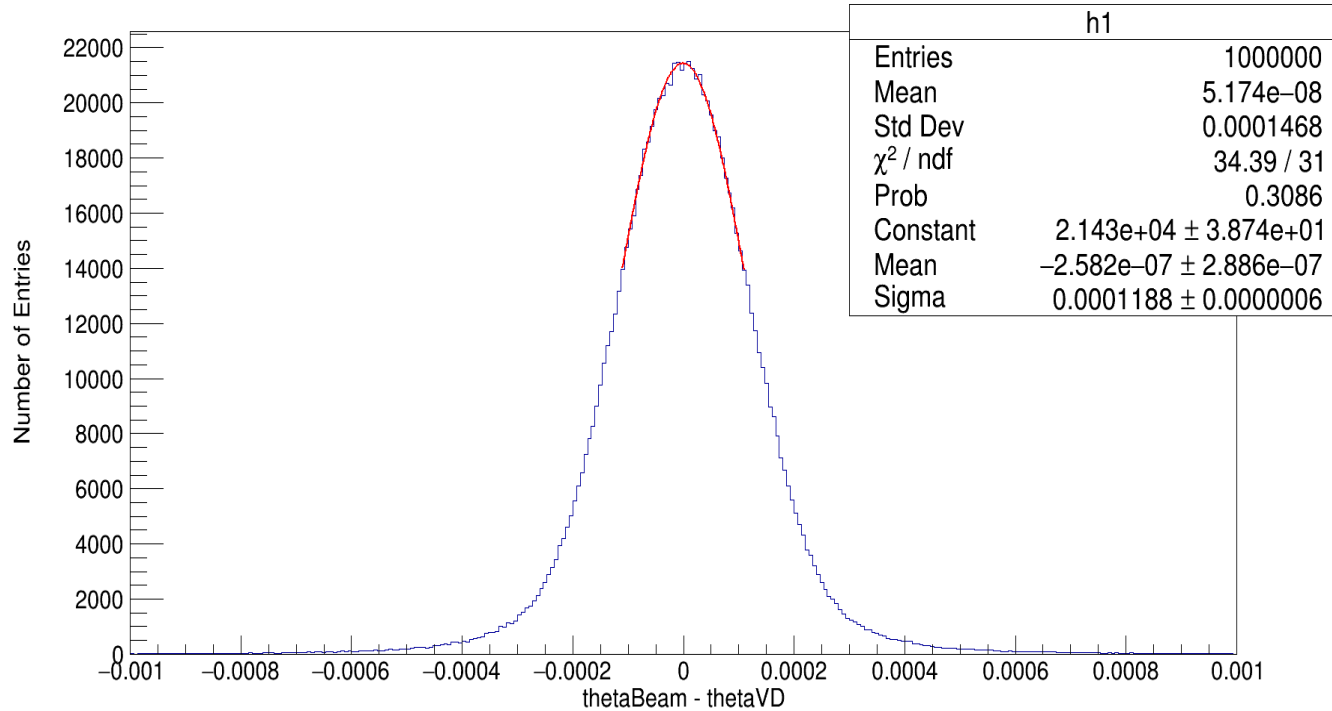


Electron MS Aluminum (0.03cm) 0/6.5/13.2 degrees



Electron MS Aluminum (0.15cm / 13.2 degrees / 2.2 GeV)

Multiple Scattering electrons: Aluminum target (t = 0.0146037 cm), BE = 2.2 GeV, Theta = 13.2 deg



Geant4 Summary

4.5 GeV	Carbon 100 mg/cm ²	Silicon 100 mg/cm ²	Aluminum 0.15 cm	Aluminum 0.03 cm
0 Degrees	4.81e-2 mrad	6.963e-2 mrad	1.456e-1 mrad	5.91e-2 mrad
6.5 Degrees	6.862e-2 mrad	1.026e-1 mrad	2.135e-1 mrad	8.564e-2 mrad
13.2 Degrees	6.807e-2 mrad	0.029e-1 mrad	5.843e-2 mrad	8.558e-2 mrad
2.2 GeV				
13.2 Degrees			1.188e-1 mrad	

MS calculation updated

PDG Book	Carbon 100 mg/cm ²	Silicon 100 mg/cm ²	Aluminum 1.5 mm	Aluminum 0.3 mm
2016	1.12467e-1 mrad	1.63119e-1 mrad	3.32022e-1 mrad	1.37737e-1 mrad
2018	1.12467e-1 mrad	1.63119e-1 mrad	3.32022e-1 mrad	1.37737e-1 mrad