Electron Radiation Lengths

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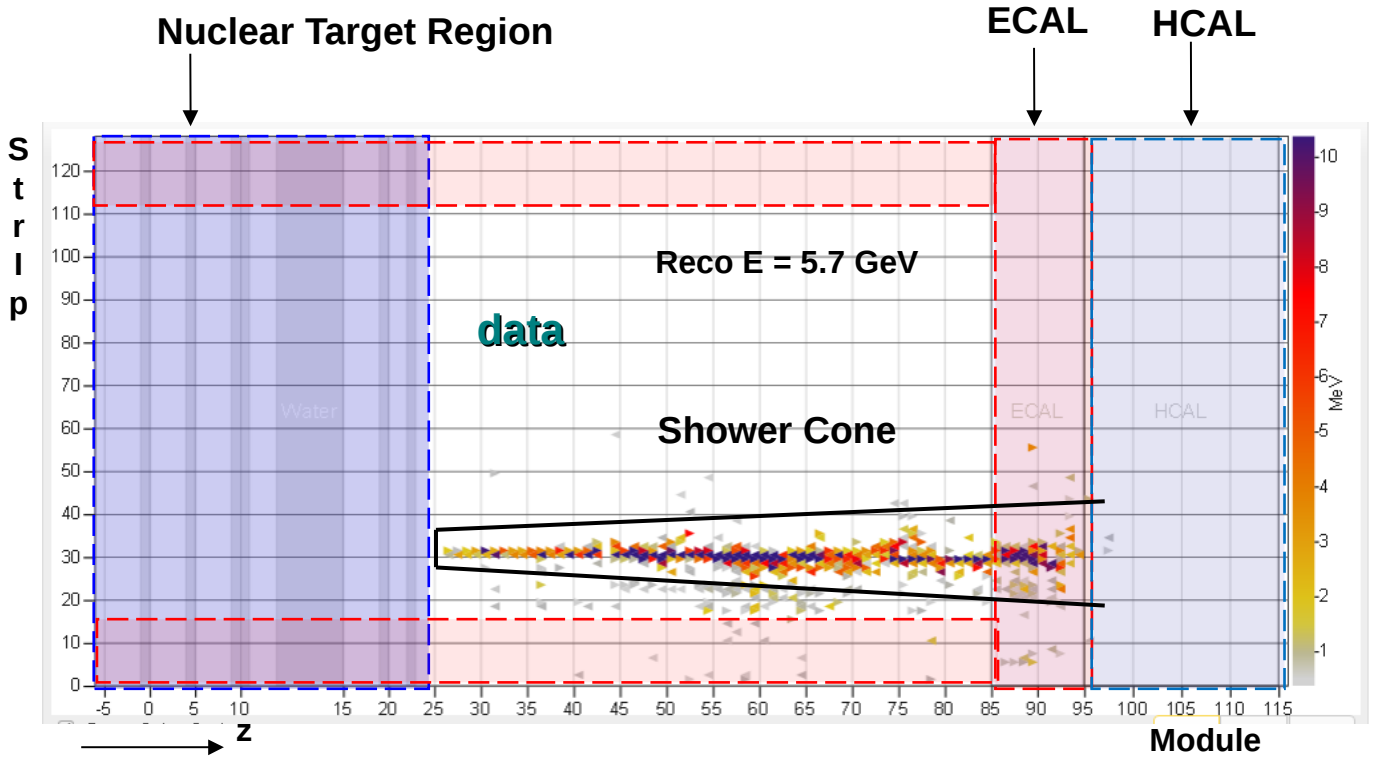
WILLIAM & MARY

CHARTERED 1693

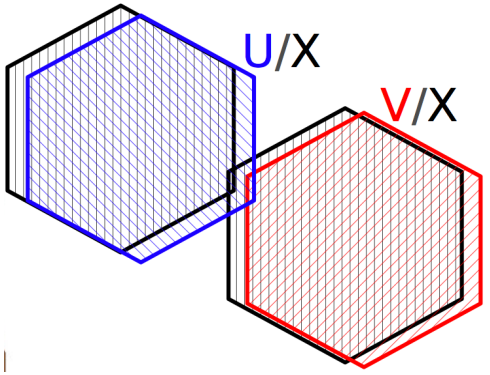
The Sample
Neutrino Electron Elastic Scattering

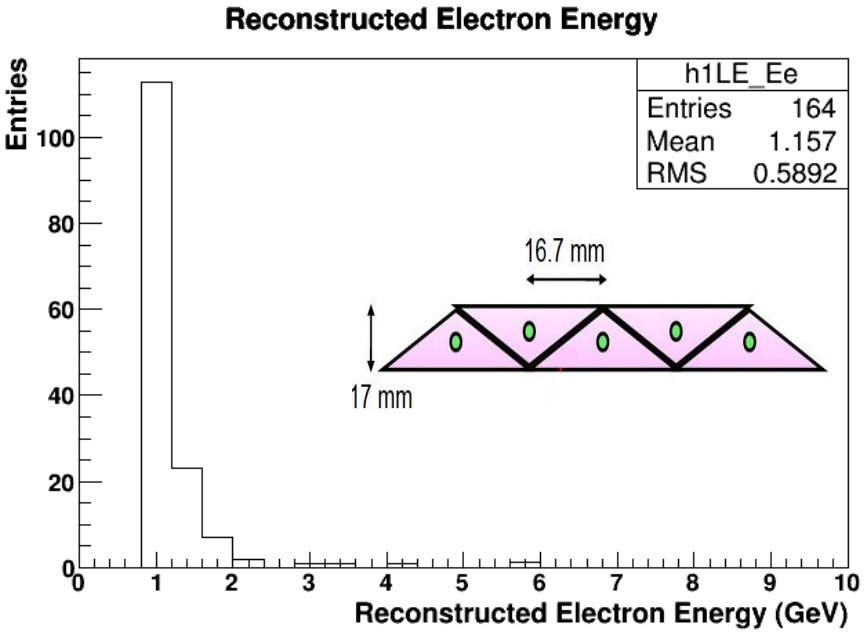


- **Electrons comes from NuEElastic Process, using the Flux for NuMI beamline in the Medium Energy configuration.**
- **The signature of Nu+e is a very forward electron.**
- **Several cuts are been applied to isolate the fully contained electrons in the tracker region:**
  - **Shower should don't touch the Side Ecal.**
  - **Shower should start and end in the tracker region**

Method
Cuts Applied

3 strip orientations
-60°, 0°, +60°

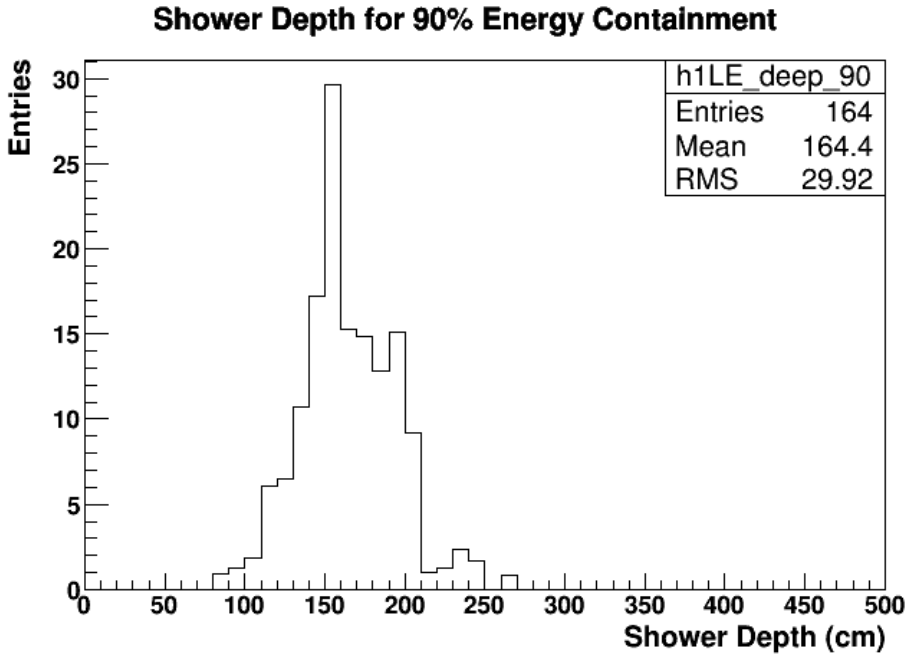


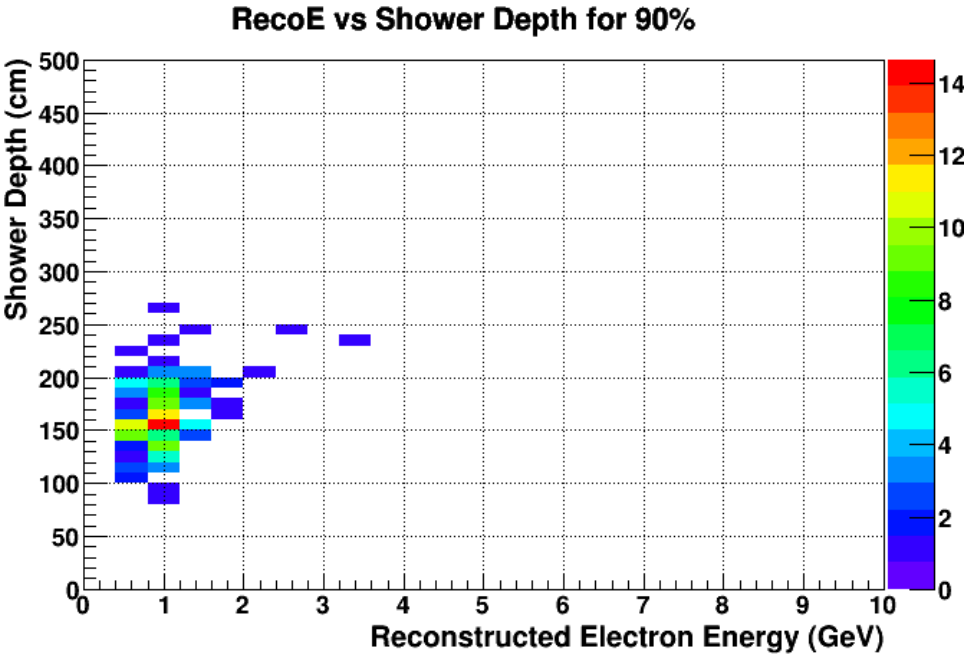


- **MINERvA's Tracker Planes made with Scintillator strips at 3 orientation.**
- **Taking the energy deposited on each strip and module.**
- **Adding the energy hits inside the reconstruction cone, until get some ratio between energy from hits and the total reconstructed energy energy.**
- **Then, look for the latest module/plane, and get the distance from vertex**
  - **In modules**
  - **In cm**
- **Reconstructed energy of events that meet the requirement**

Scintillator Plastic
Shower Depth

- **Getting the depth for electrons in only in plastic, when the it has 90 of the total energy.**

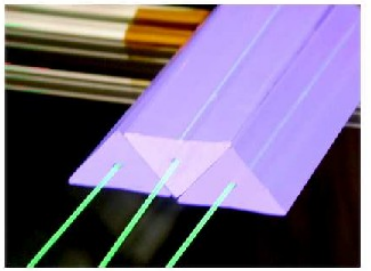




Number of Radiation Lengths
Scintillator Plastic

- **Considering previous studies of the the Minerva Detector**
  - **Density**
  - **Composition**
  - **Radiation length of the components**

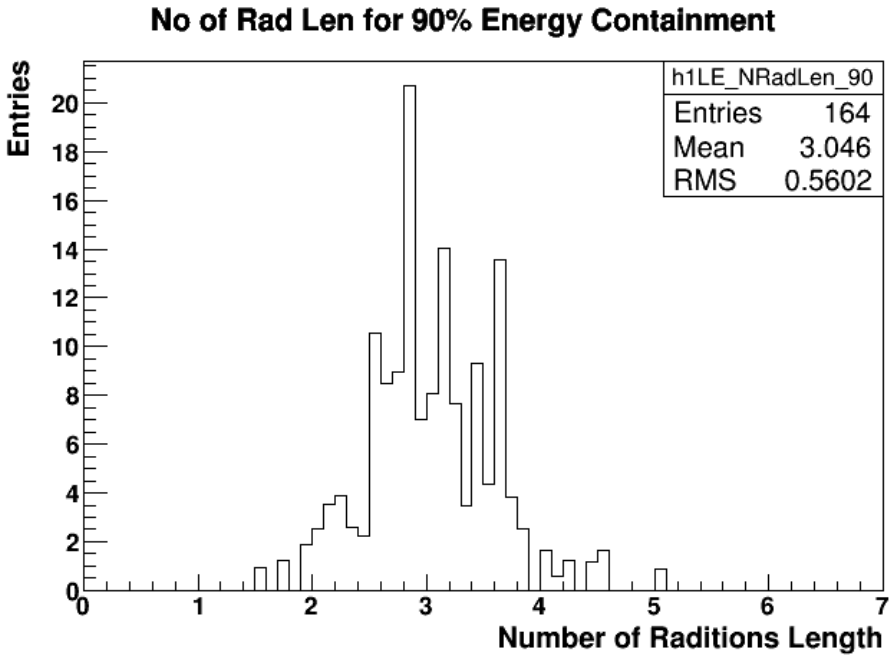
Comp	%	Atomic Mass	Radiation Lenght	
C	87.62	12.01107	42.70	3.520
H	7.42	4.002602	63.04	0.071
O	3.18	15.999	34.24	1.141
Ti	0.69	47.867	16.16	4.540
Al	0.26	26.9815385	24.01	2.699
Si	0.27	28.0855	21.82	2.329
Cl	0.55	35.453	19.28	1.574

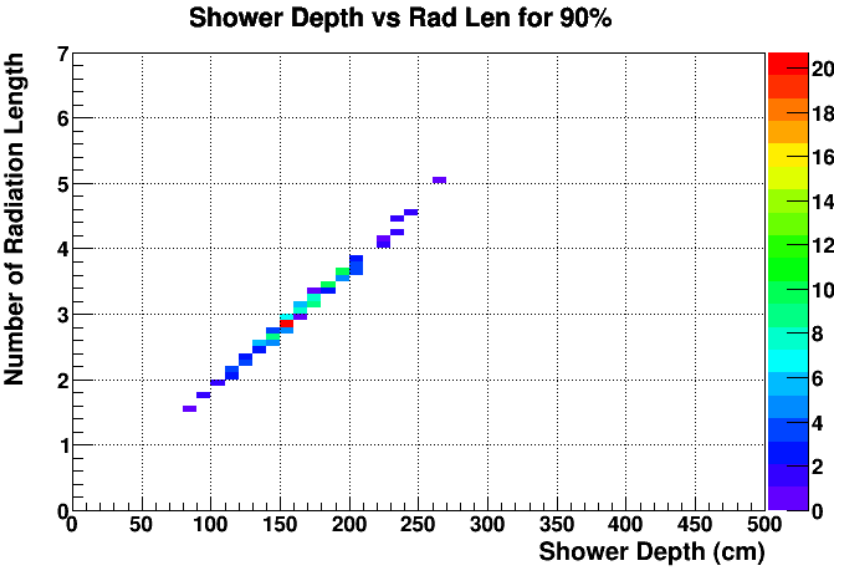


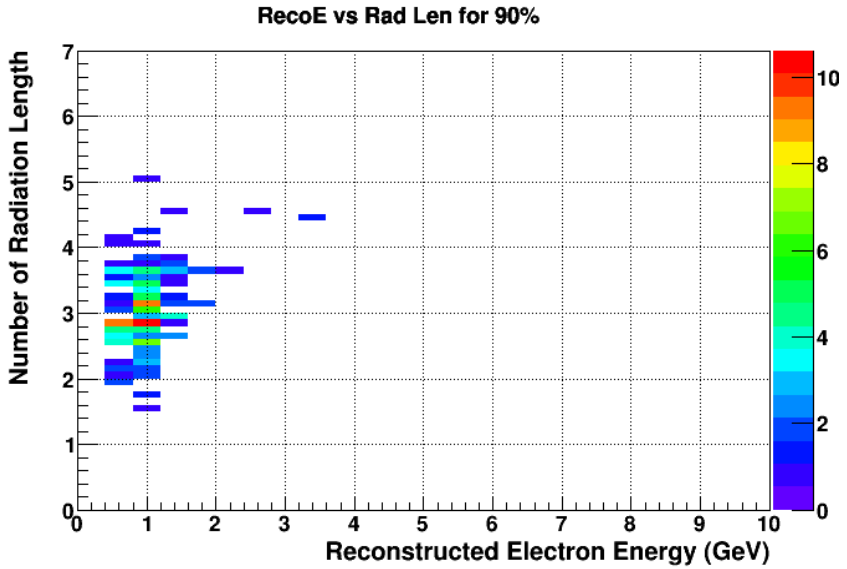
- **Radiation length of scintillator: 42.4269 g/cm^2**

Number of Radiation Lengths

90% of Energy Containment







Backup