



中国科学院高能物理研究所  
Institute of High Energy Physics Chinese Academy of Sciences

# Analysis of Reconstructed Arbor PFO

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# BMR Simulation with MokkaC

## □ Setup

- A specific HCAL based on glass scintillator was implemented in the CEPC\_v4
- Primaries input: 240 GeV  $e^+e^- \rightarrow ZH$  ( $Z \rightarrow \nu\nu$ ,  $H \rightarrow gg$ )
- Glass composition: GS4 (density was set to 6 g/cm<sup>3</sup>)
- Cell size: 3x3x1 cm<sup>3</sup>
- Lambda of each layer: 0.124 (3mm PS+ 2cm Steel)
- Total Layers: 100

theoretical value

|            | Composition                    | Density<br>(g/cm <sup>3</sup> ) | MIP Edep<br>(MeV/mm) | NIL<br>(mm) |
|------------|--------------------------------|---------------------------------|----------------------|-------------|
| Simu1-GS1  | Gd-Al-Si-Ce <sup>3+</sup>      | 5.10                            | 0.5963               | 274.8       |
| Simu1-GS2  | Gd-B-Si-Ce <sup>3+</sup>       | 5.35                            | 0.6165               | 267.8       |
| Simu1-GS3  | Gd-B-Si-Ce <sup>3+</sup>       | 5.49                            |                      | 261.9       |
| Simu1-GS4  | Gd-B-Si-Ge-Ce <sup>3+</sup>    | 5.51                            | 0.6356               | 259.5       |
| Simu1-GS5  | Gd-Ga-Si-B-Ce <sup>3+</sup>    | 5.64                            |                      | 254.1       |
| Simu1-GS6  | Gd-Ge-B-Ce <sup>3+</sup>       | 5.68                            | 0.6560               | 251.3       |
| Simu1-GS7  | Gd-Ga-B-Ce <sup>3+</sup>       | 5.77                            |                      | 247.3       |
| Simu1-GS8  | Gd-Ga-Ba-B-Ce <sup>3+</sup>    | 5.78                            |                      | 249.6       |
| Simu1-GS9  | Gd-Ga-Ba-B-Si-Ce <sup>3+</sup> | 5.81                            | 0.6699               | 250.5       |
| Simu1-GS10 | Gd-Ga-Ge-B-Si-Ce <sup>3+</sup> | 6.03                            | 0.6987               | 241.0       |

# BMR Analysis with Marlin

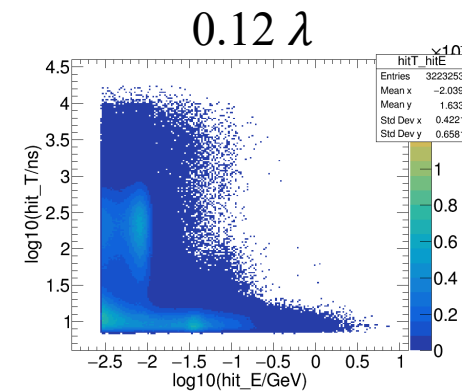
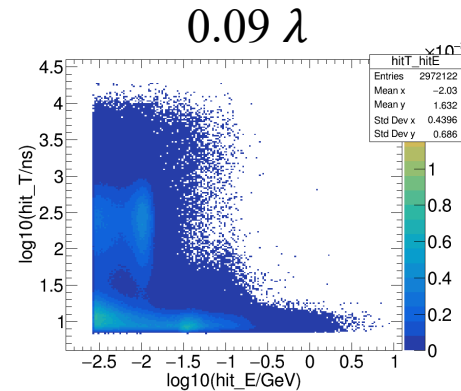
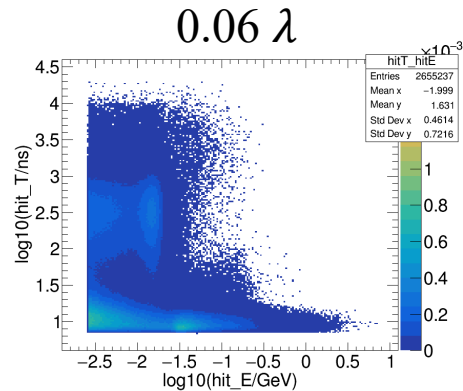
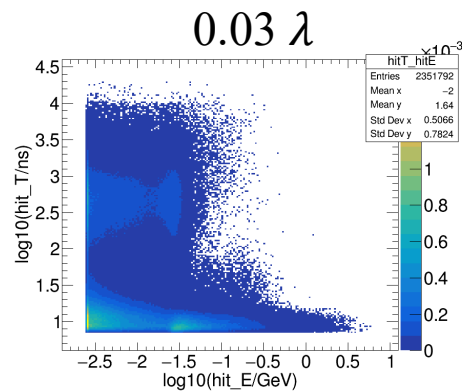
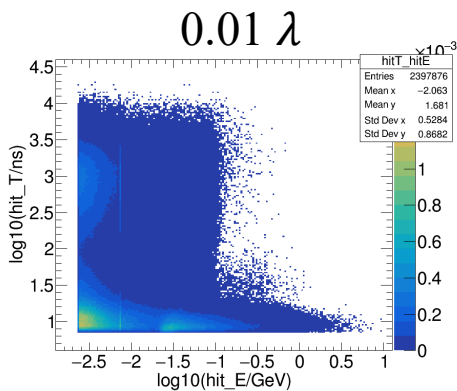
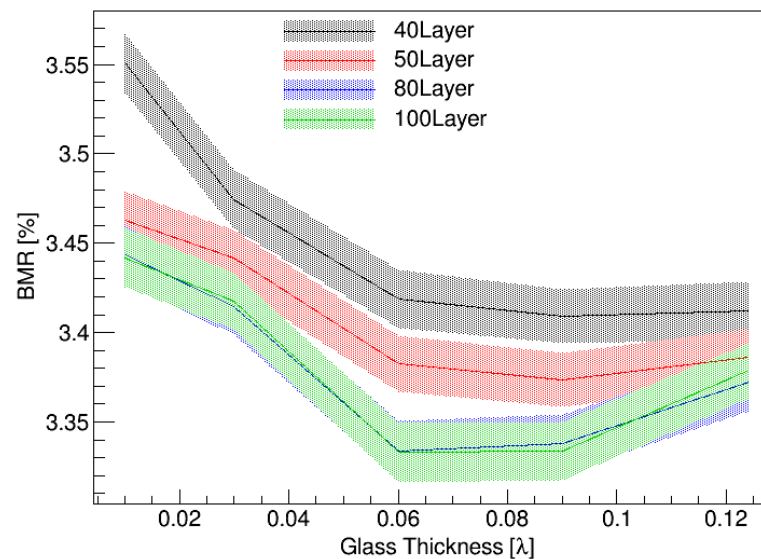
## □ Setup

- Edep threshold in HCAL cell was set to 0.1 MIP
- Edep in each sampling layer of HCAL was based on sampling fraction  $f$  and calibration coefficient  $k$  (i.e.  $Edep_{digi} = k \times Edep_{raw} / f$ )
- BMR Cut:  $Pt\_ISR < 1 \text{ GeV} \ \&\& \ Pt\_neutrino < 1 \text{ GeV} \ \&\& \ |Cos(Theta\_Jet)| < 0.8$

- All reconstructed ArborPFOs are classified to ChP (Charged particles), KSPF (kaon), PhP (gamma), NeP (neutron), UdP (Other particles)

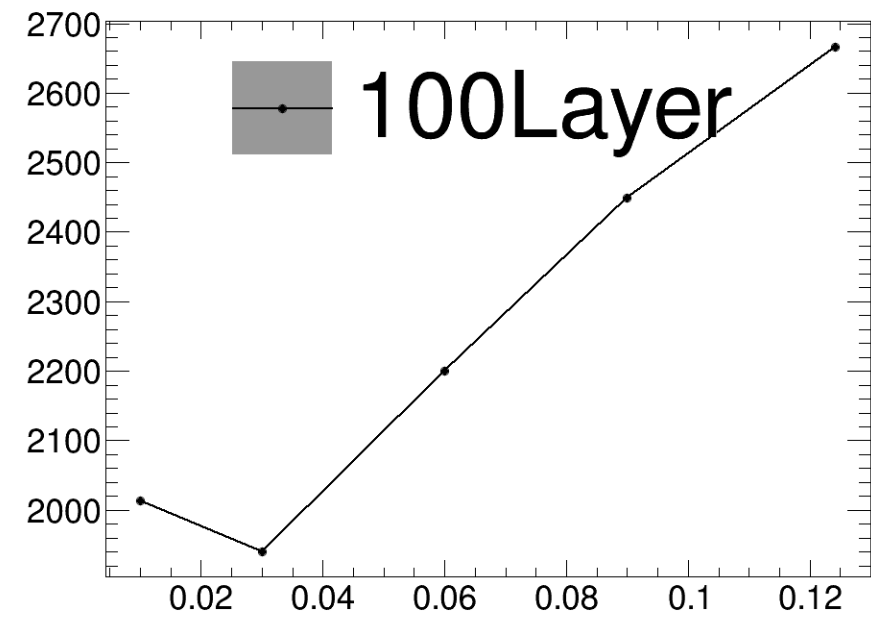
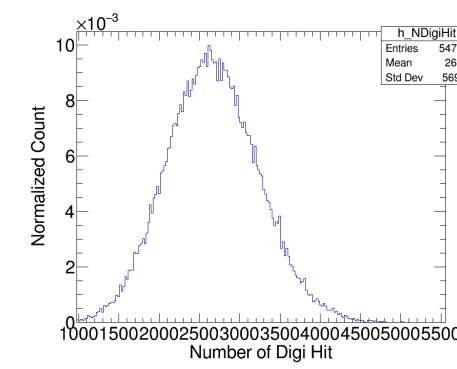
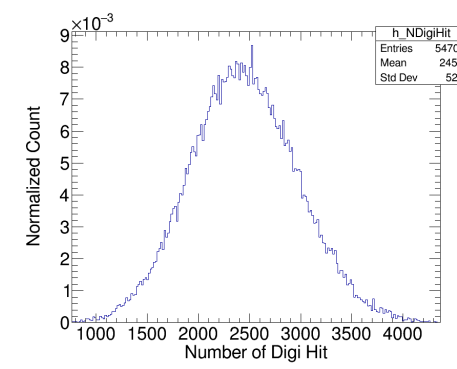
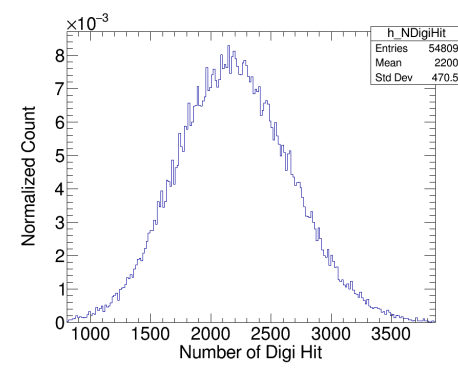
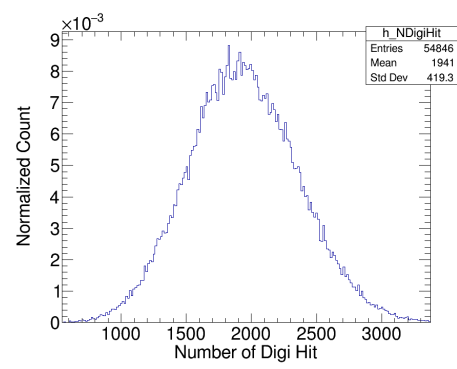
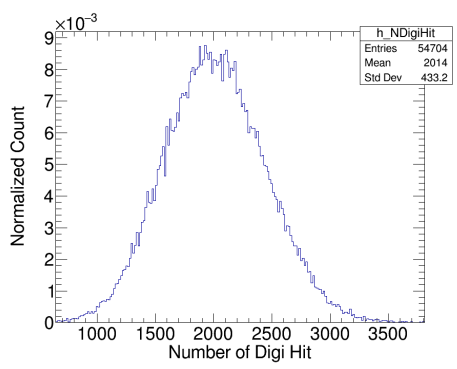
# HitT vs HitE

- Investigating the “abnormal” behavior in the case of 100 layer

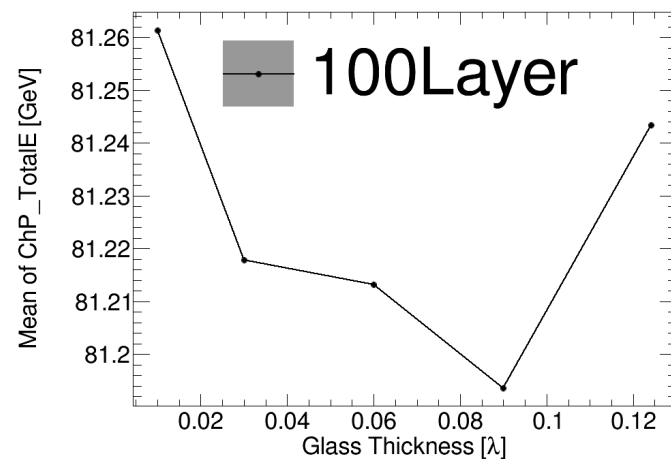
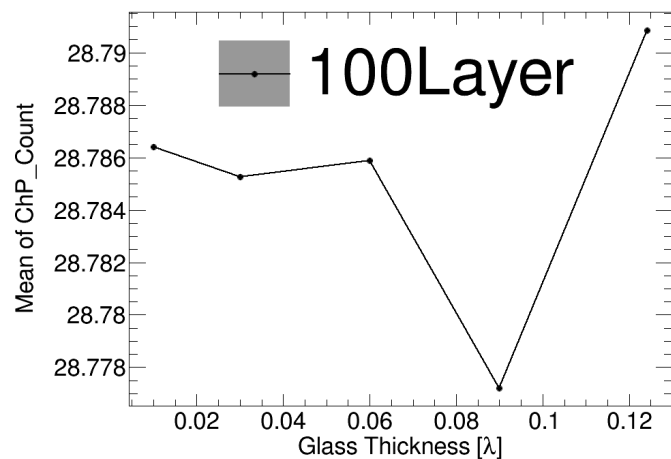
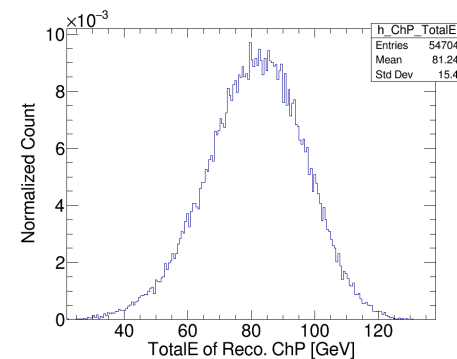
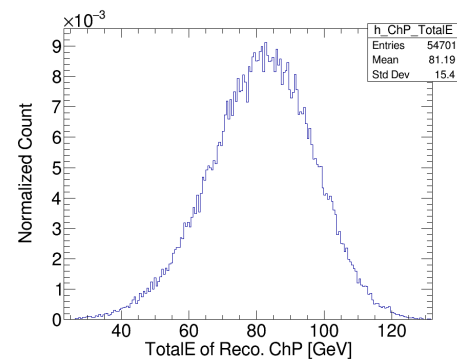
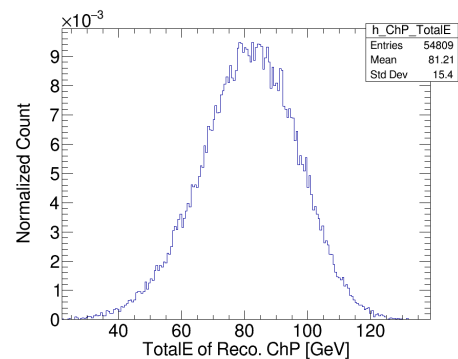
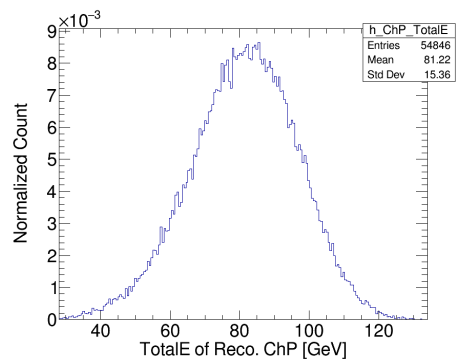
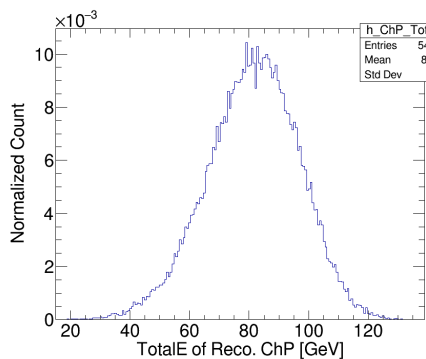
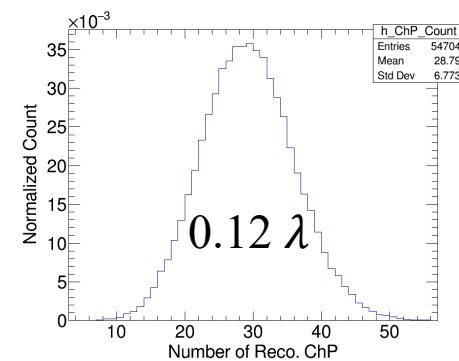
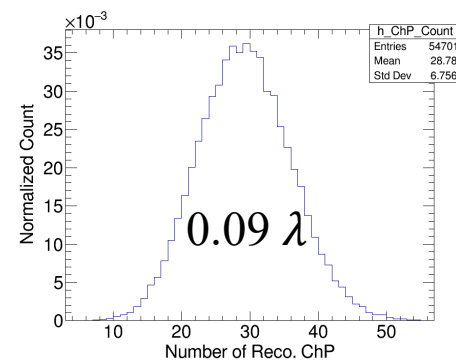
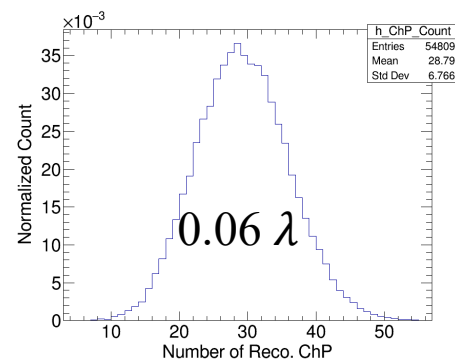
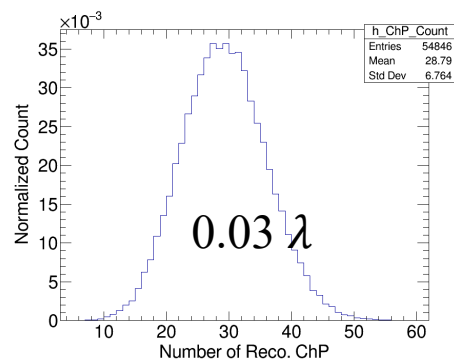
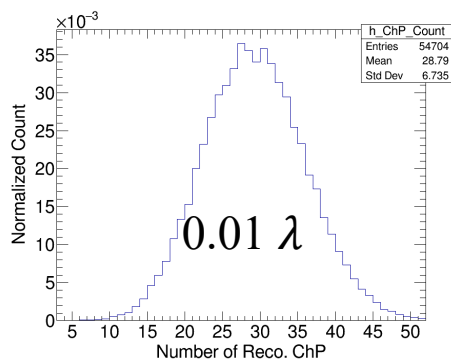


HitT and HitE are obtained from DigiHit

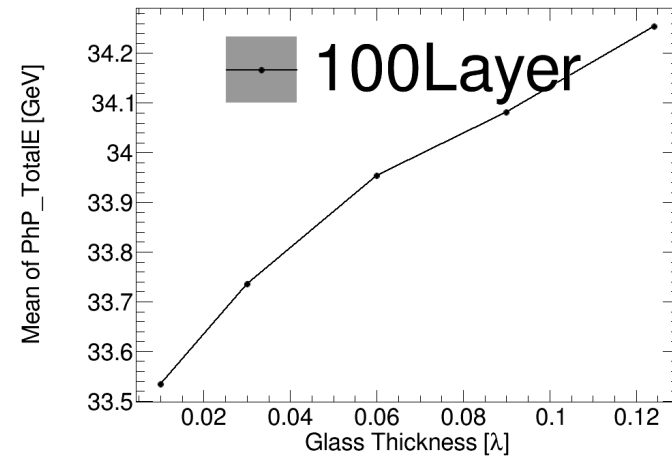
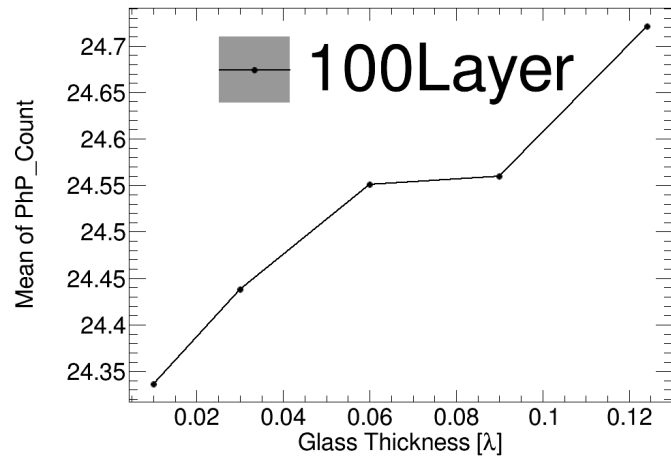
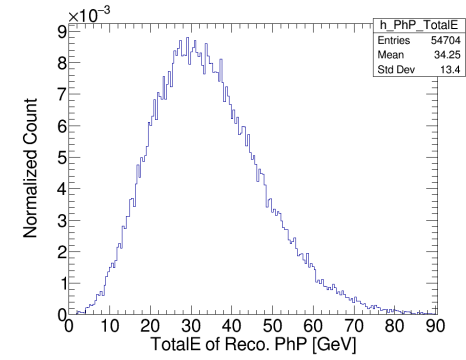
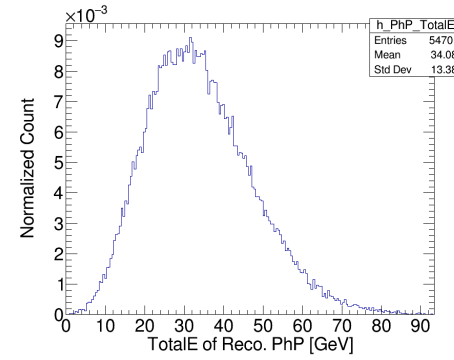
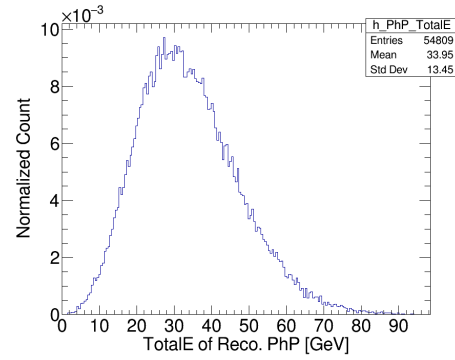
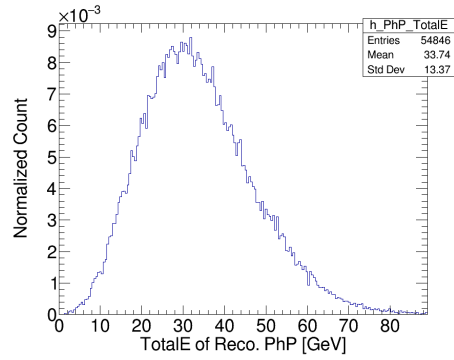
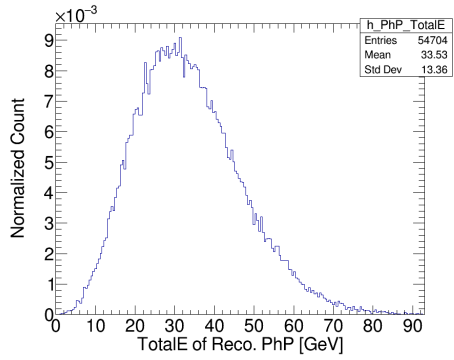
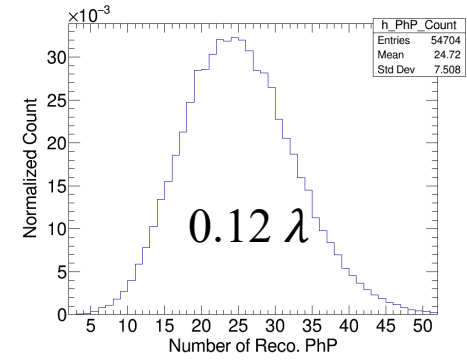
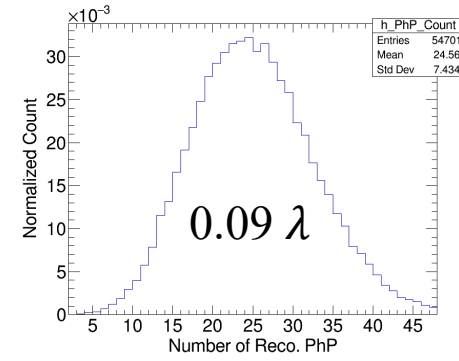
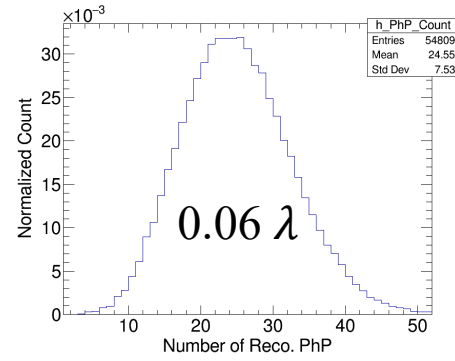
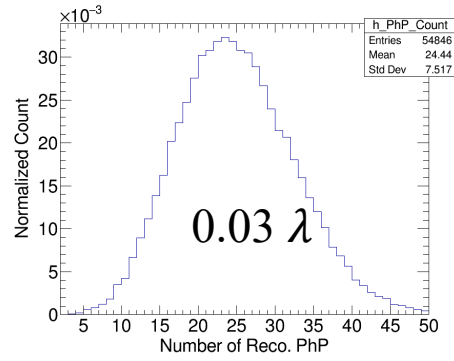
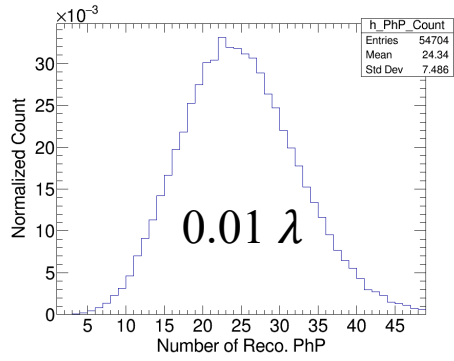
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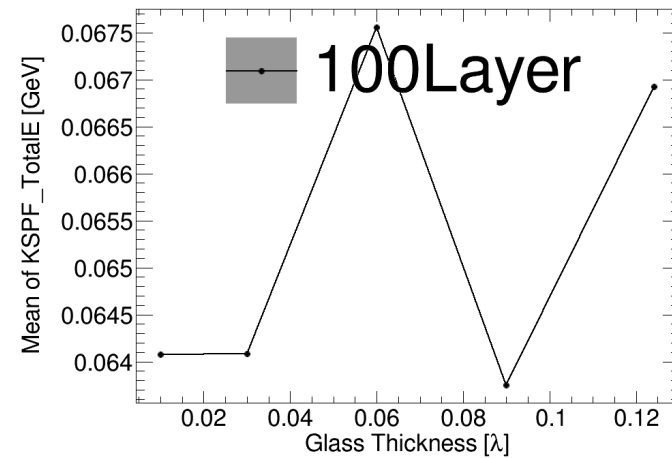
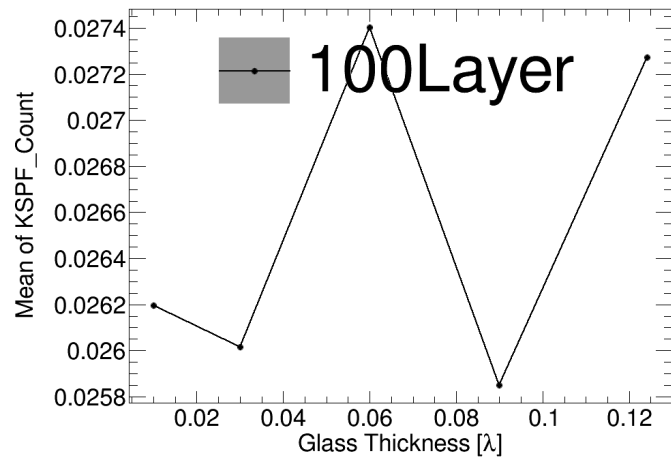
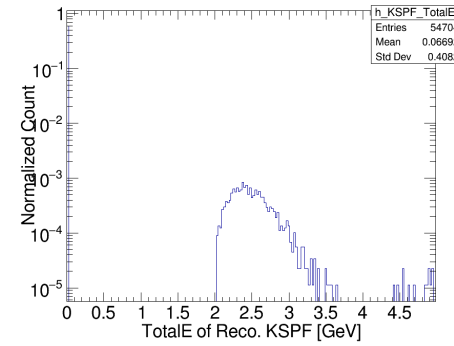
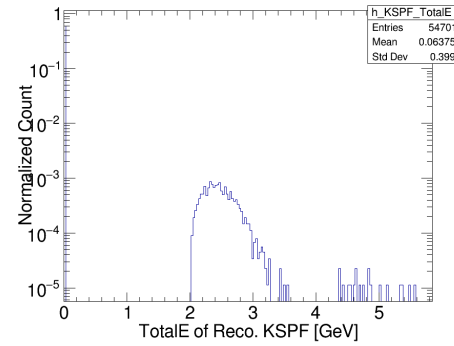
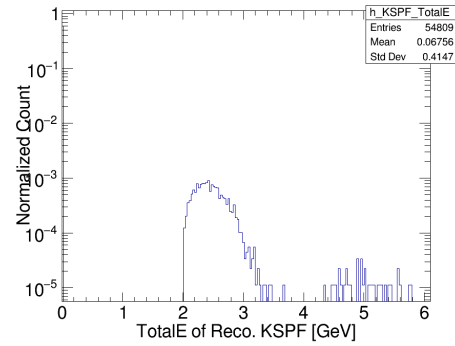
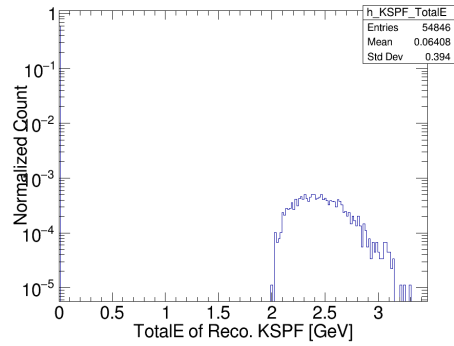
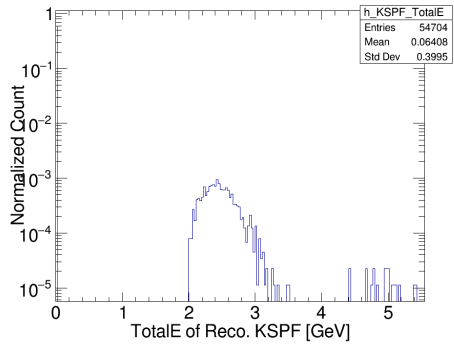
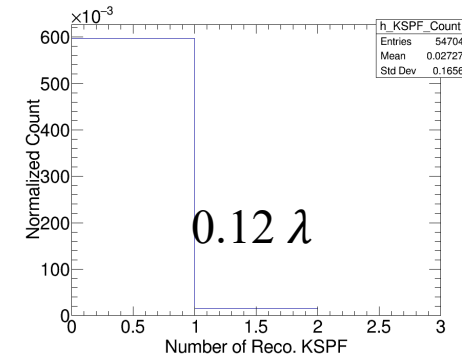
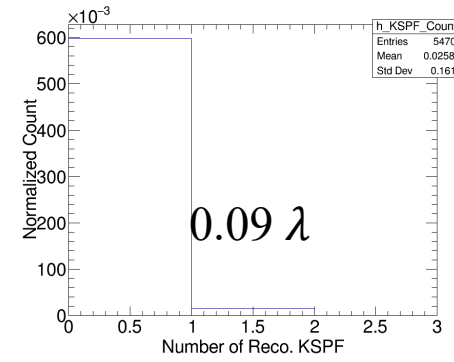
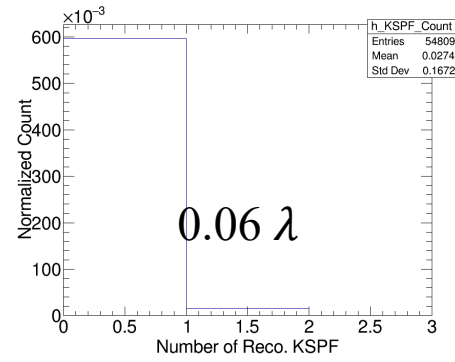
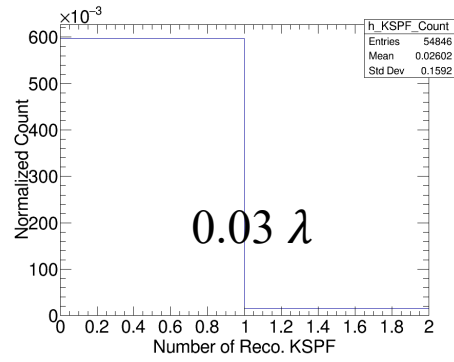
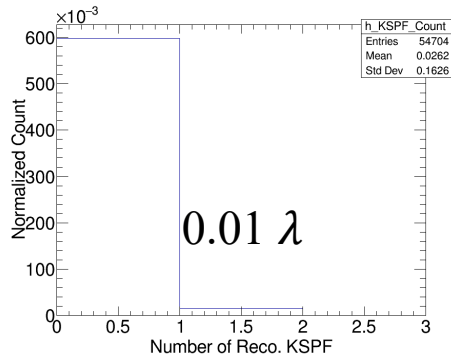
# Reconstructed Charged Particles



# Reconstructed Gamma

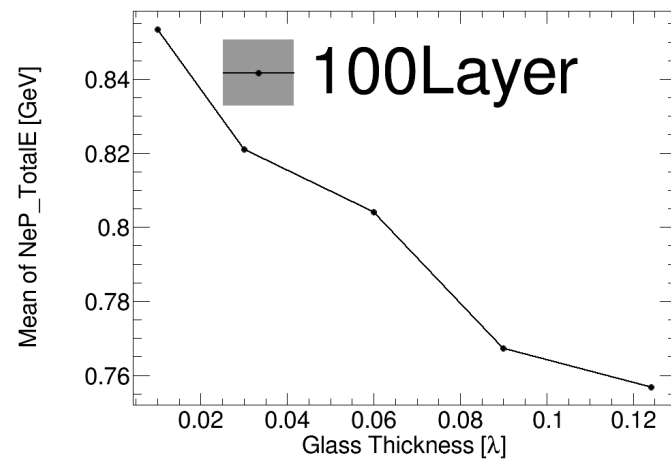
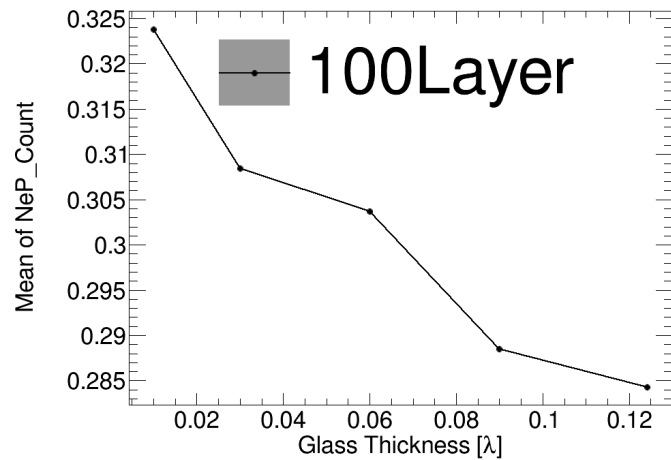
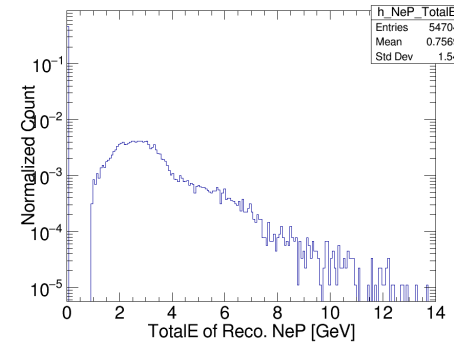
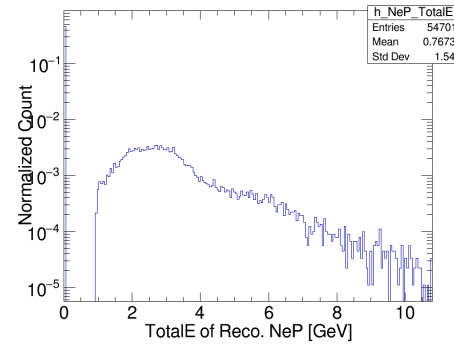
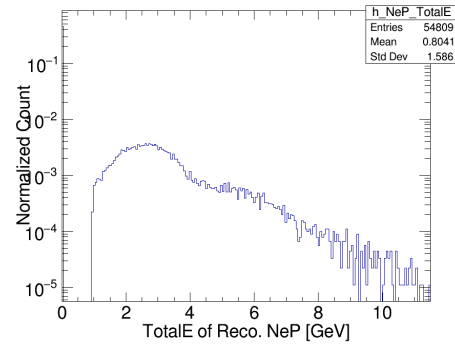
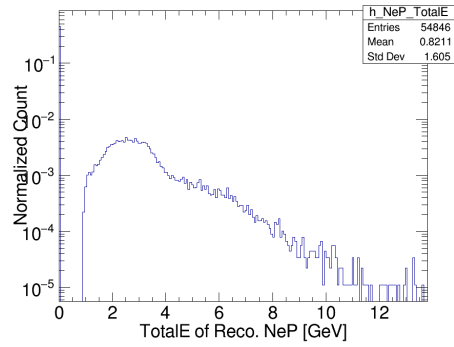
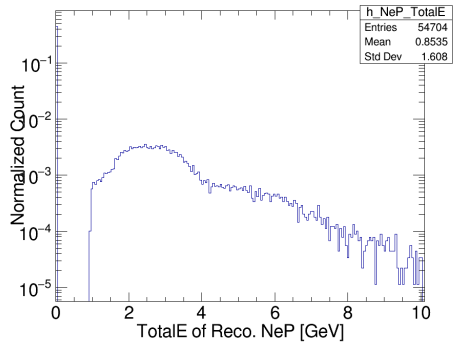
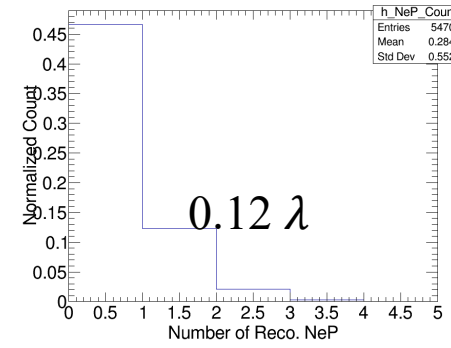
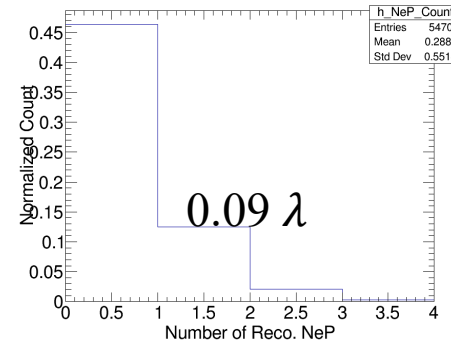
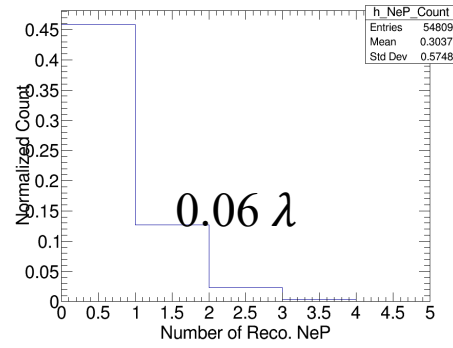
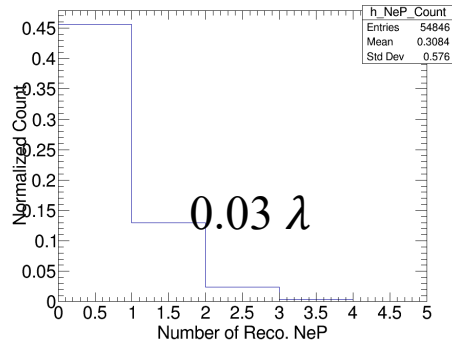
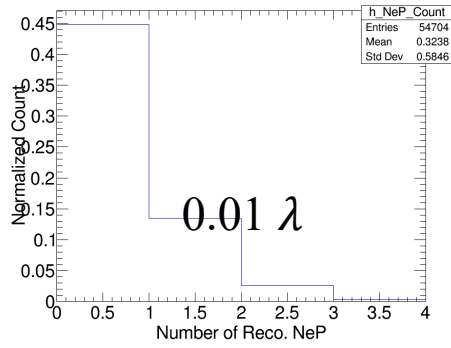


# Reconstructed Kaon

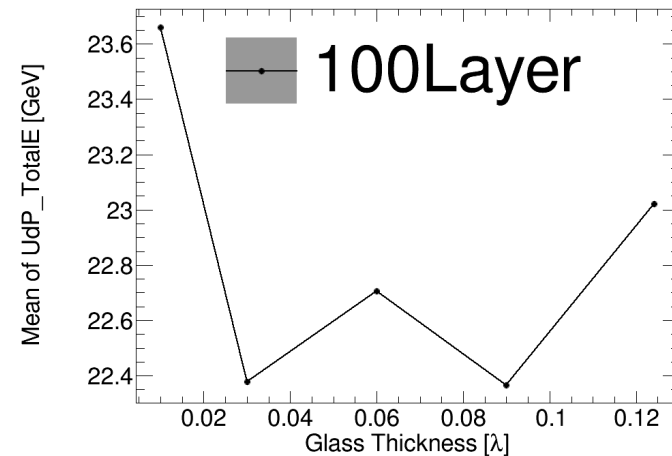
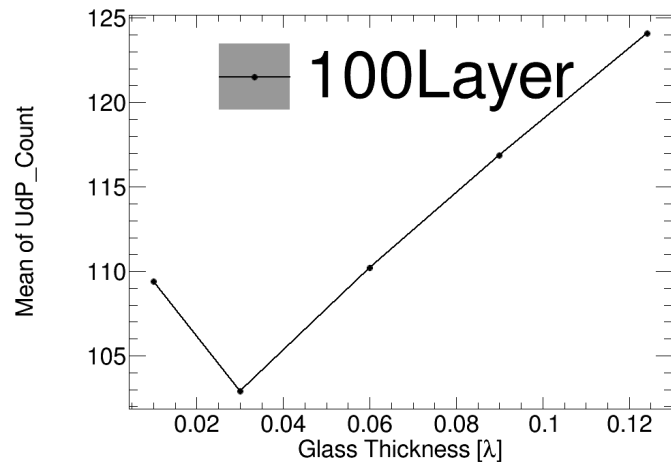
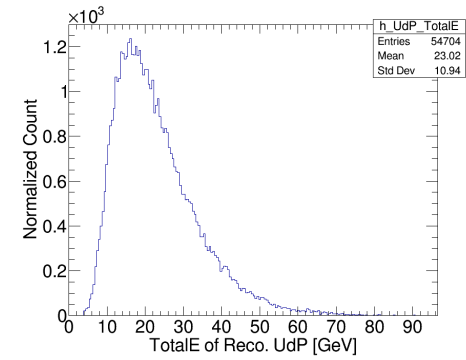
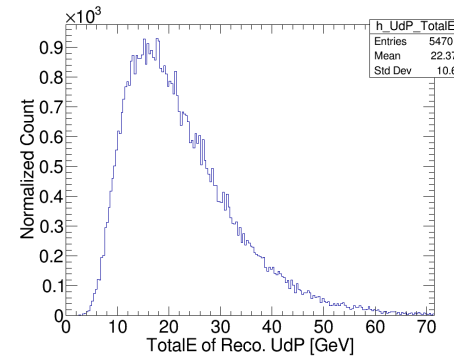
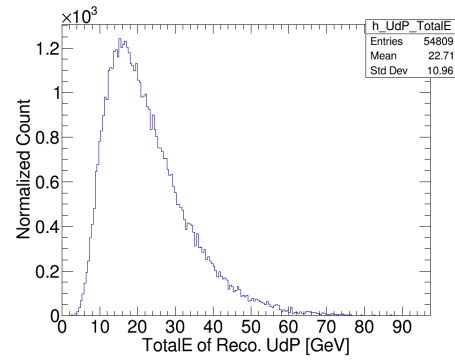
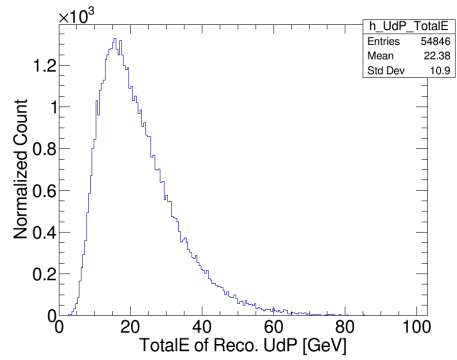
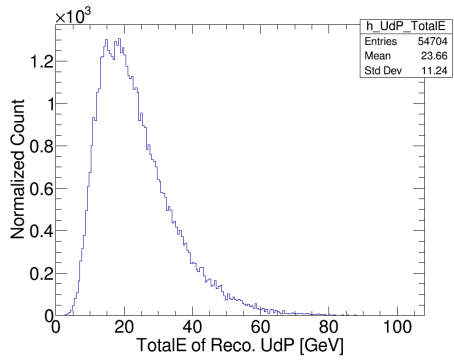
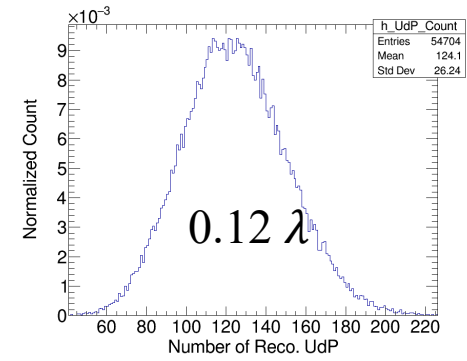
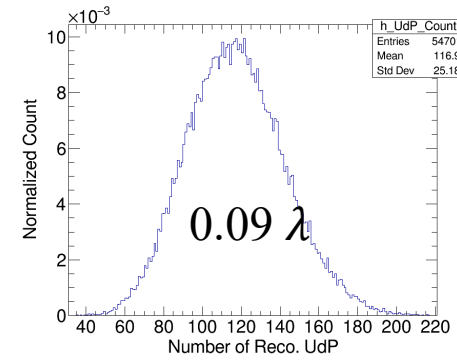
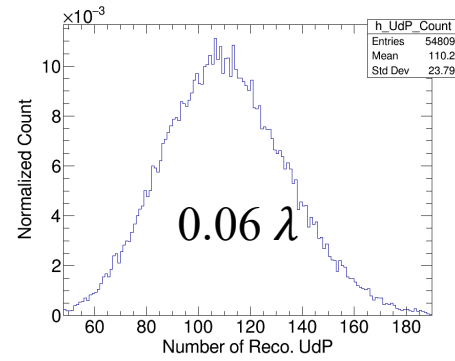
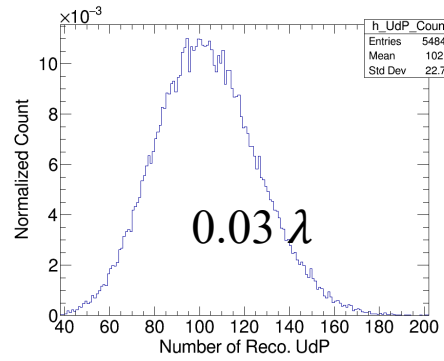
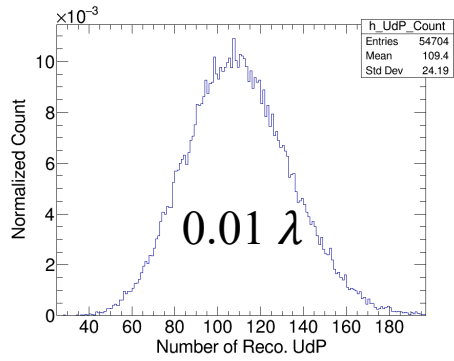




# Reconstructed Neutron



# Other Reconstructed Particle



# The Impact of Fitting Range

