Time information in CRD Ecal

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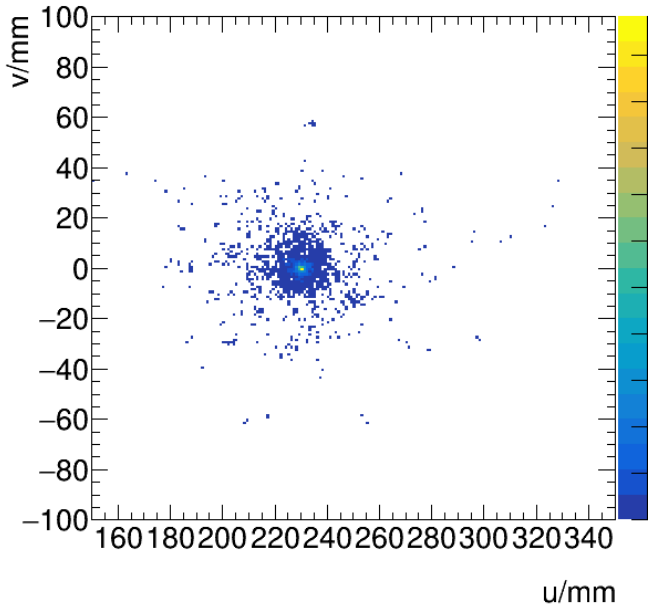
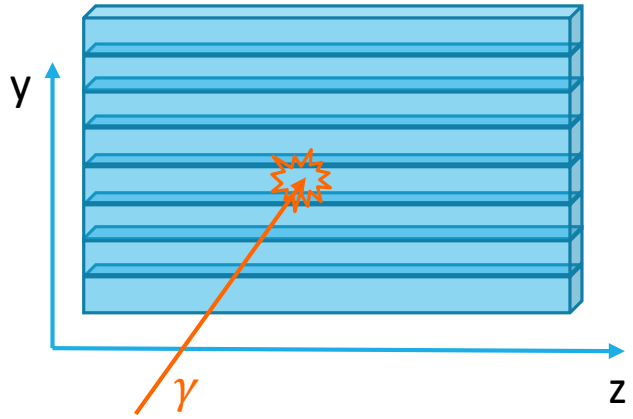
Introduction

Study the time information in one single layer:

- One layer with crystal bars along beam direction(z-direction).
- 30GeV photon, hit at (y, z) = (0, 230)mm.
- All plots are based on truth G4steps.

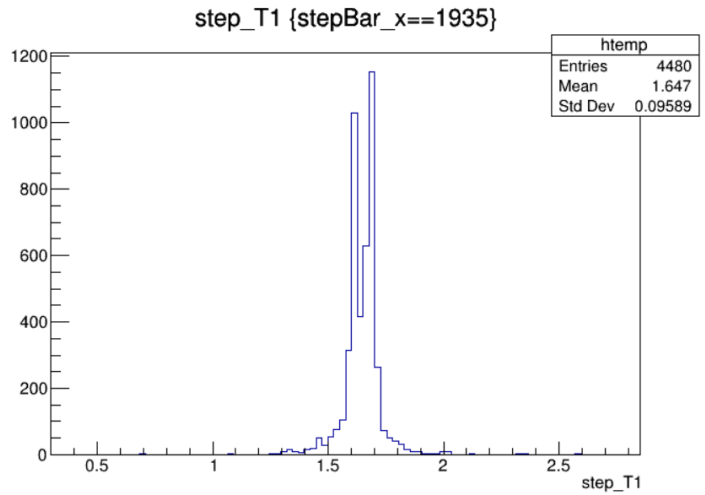


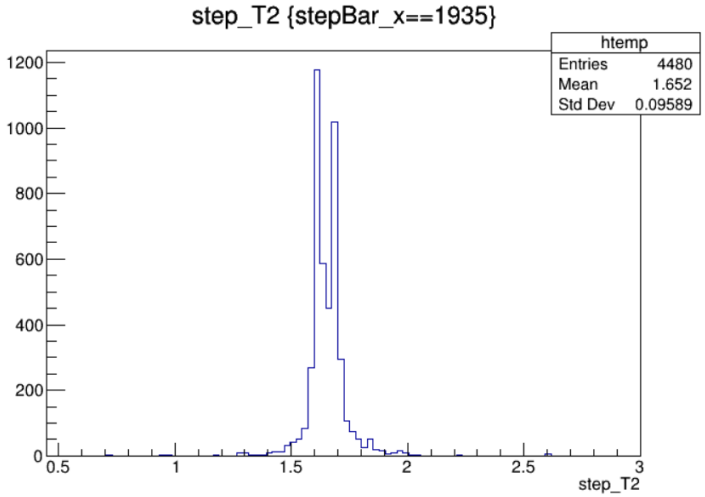


Time information

Time digitalization:

- For each step, $T_i^{\pm} = Gaus(z_{\pm}^i/v,\ \sigma_T)$. For the total bar, $T_{\pm} = \min(T_{\pm}^i)$.
- $\sigma_T = 0$ to have a clear scenery.
- A little bug(?) in code: $z_{\pm}^i \sim \left|\overrightarrow{r_{\pm}^i}\right| = \sqrt{{x_{\pm}^i}^2 + {y_{\pm}^i}^2 + {z_{\pm}^i}^2}$

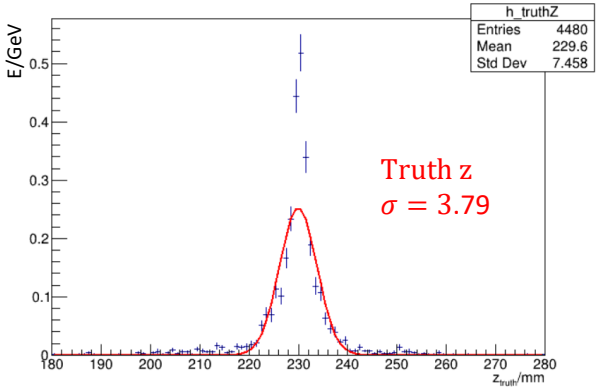


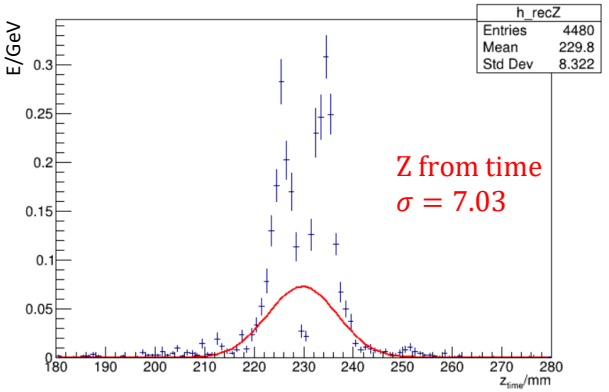


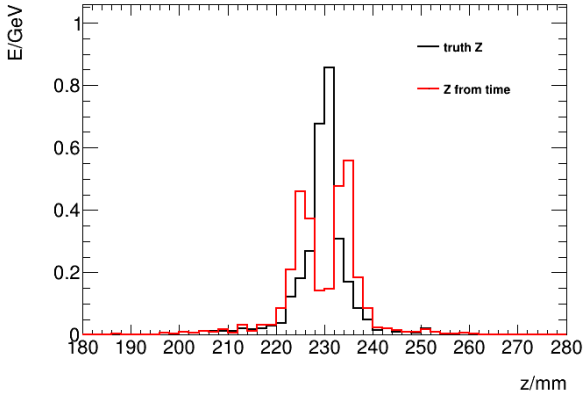
Time information

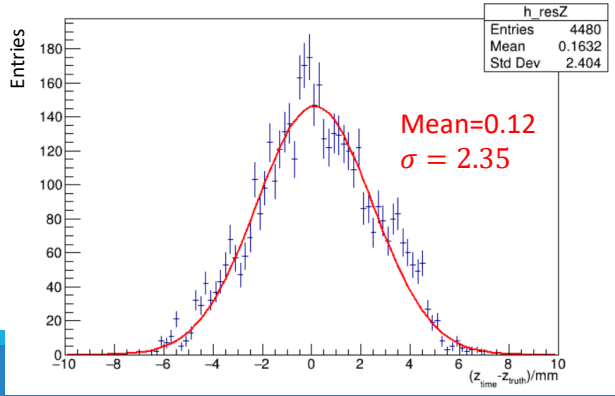
Reconstructed position from time

- $z_T = z_{bar} + \frac{T1-T2}{2} v$









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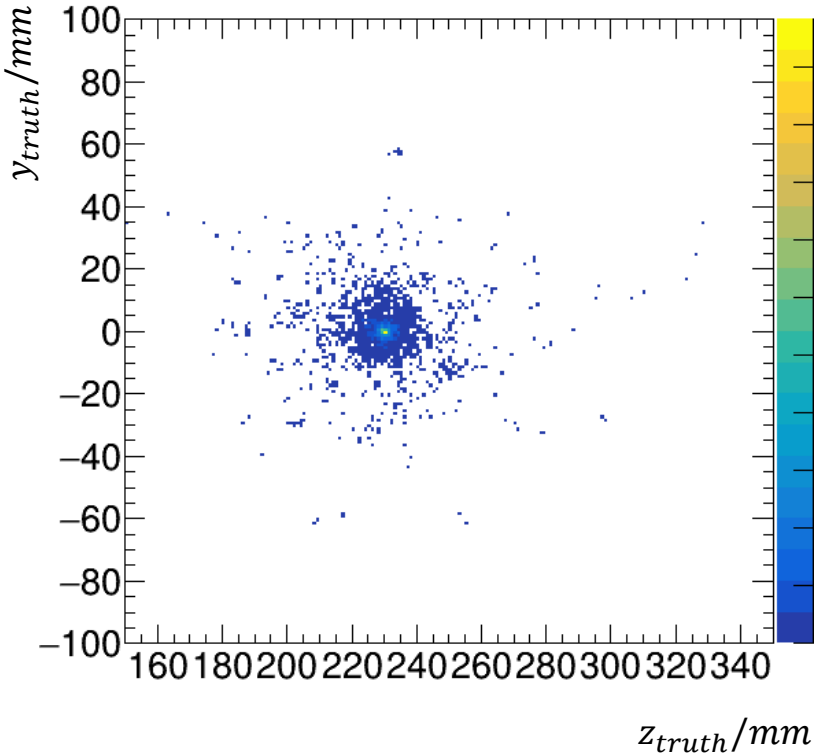
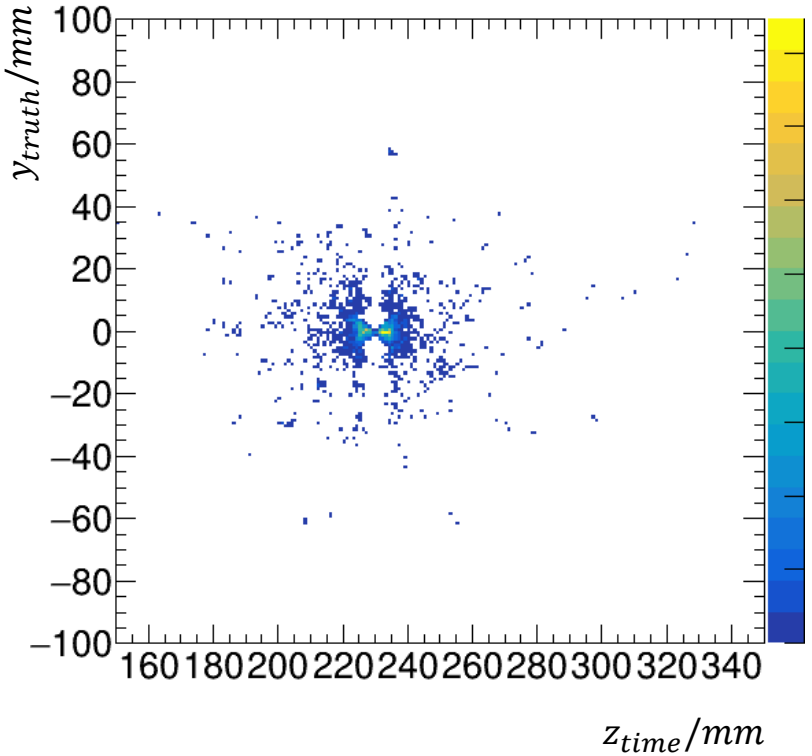
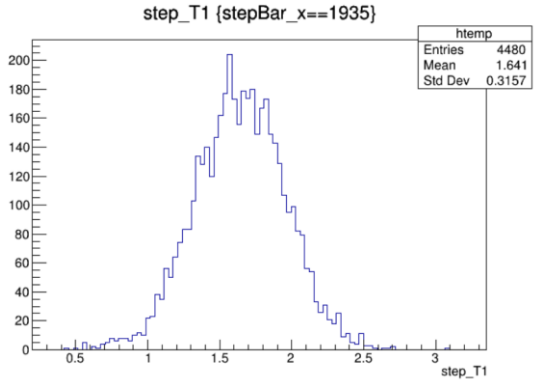
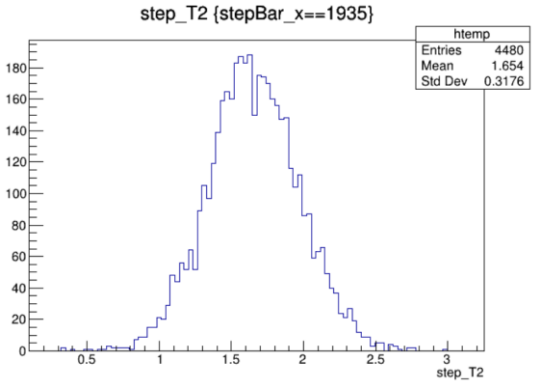


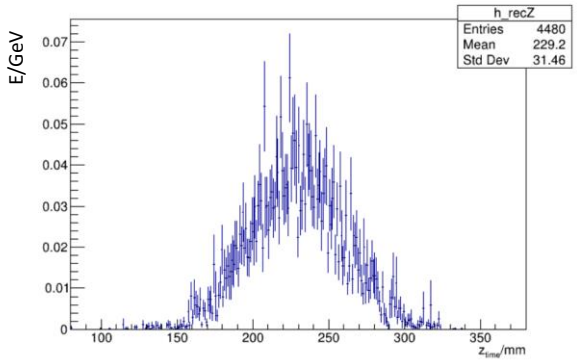


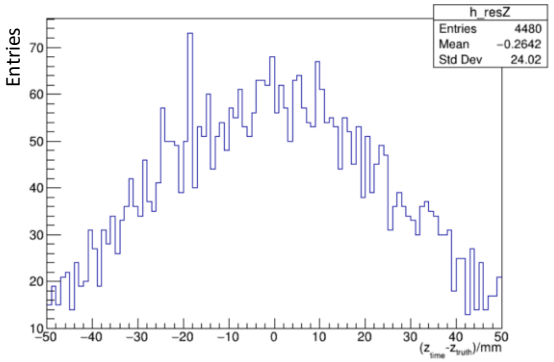
Time information

Set time resolution $\sigma_T = 300ps,\ \sigma_x = \frac{\sigma_T}{\sqrt{2}} v = 64mm.$









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