Report on KOTO EMCal Study
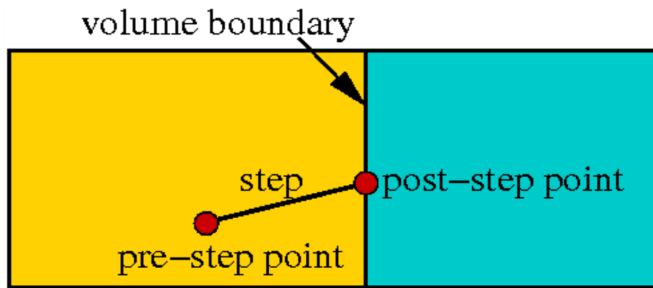
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Github for Simulation

- `https://github.com/kyj0118/work`
- `git clone https://github.com/kyj0118/work`
    - To download the code
- Note that
    - Current CMake only available on Linux.

Hit definition in the simulation
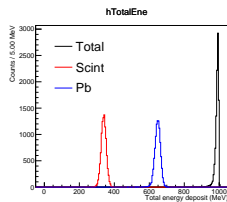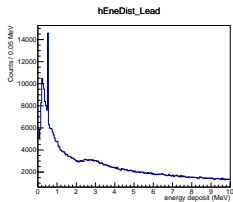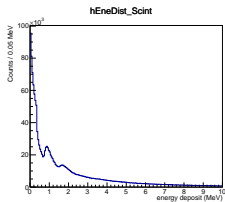

- ▶ Each step has two end-points
    - ▶ Energy deposit during the step $= e_i$
    - ▶ Hit position and time of the **step** are defined as
    $$x_i = \frac{x_i^{\text{pre}} + x_i^{\text{post}}}{2}$$
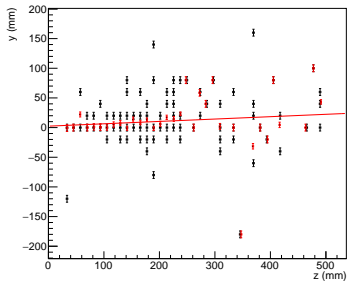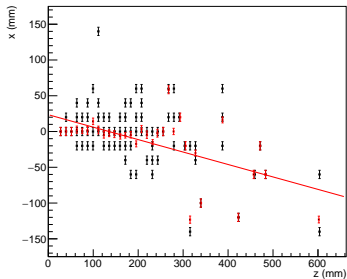- ▶ Hit position and time of the **detector** are defined as
$$x = \frac{\sum_i x_i e_i}{\sum_i e_i} \text{ (current GEANT4 output)}$$
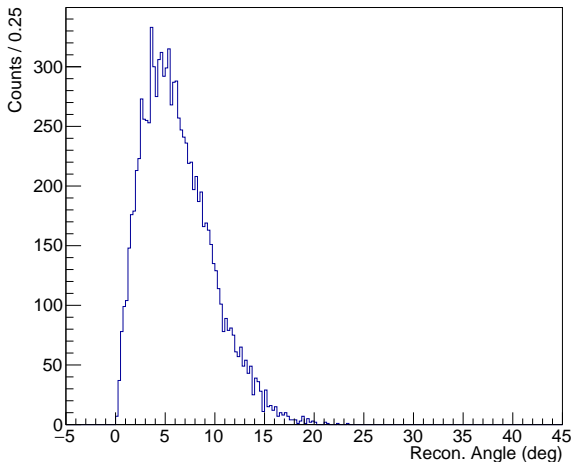
energy distribution

▶ Beam direction as $(0, 0, 1)$

Tracking(revisited)

- $x_{\mathrm{mean}} = \dfrac{\sum_s x_s e_s}{\sum_s e_s}$ energy weighted average over segments in a given layer.
  - Black → Red
- Only geometric intrinsic uncertainty considered.

Reconstructed angle

hSlope_proc1

- $\theta = \mathrm{atan}(\Delta z / \sqrt{\Delta x^2 + \Delta y^2})$

Outlook

- ▶ Check timing distribution
- ▶ Consider energy weighted uncertainty
- ▶ Usage of time difference?