

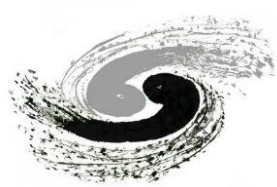
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# Preliminary results: layer-wise seed and center-of-gravity of gamma showers

Yong Liu

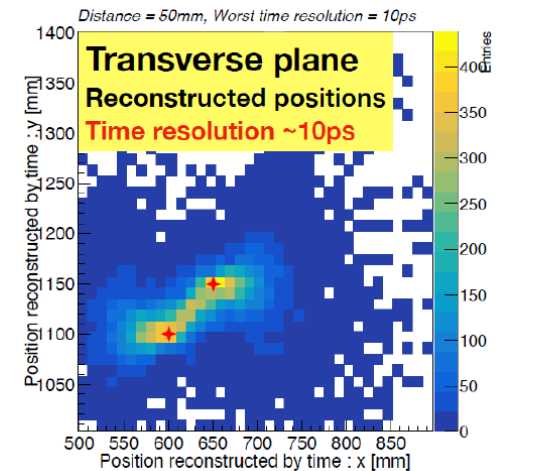
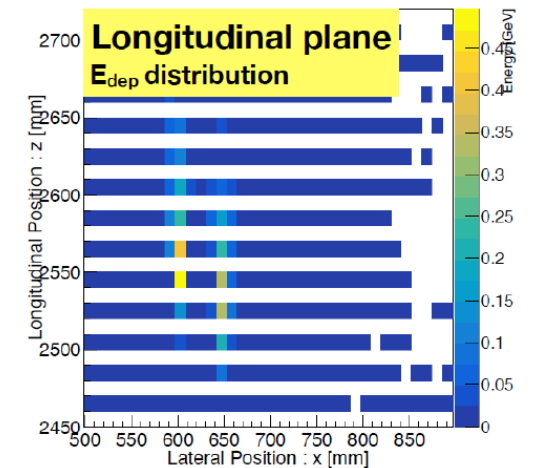
CEPC Calorimeter Software Weekly Meeting,

Dec. 9, 2020

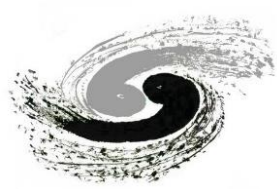


# Shower separation and energy reconstruction: reminder

1. BarID and LayerID -> crossed bars
2. Timing info at two ends -> positions (resolve ambiguity)
  - Rough separation of two particles for the Step 3
3. Shower longitudinal profile
  - Rough estimate of incident particle energy; shower maximum
4. Shower axis finding and connection
  - Seeds per layer
  - Connect seeds in layers around the shower maximum
5. Shower lateral profile
  - Use fitting/histogram info (as template) to determine weights of energy splitting: currently focus on EM showers
6. Clustering of bars with weights for energy reconstruction

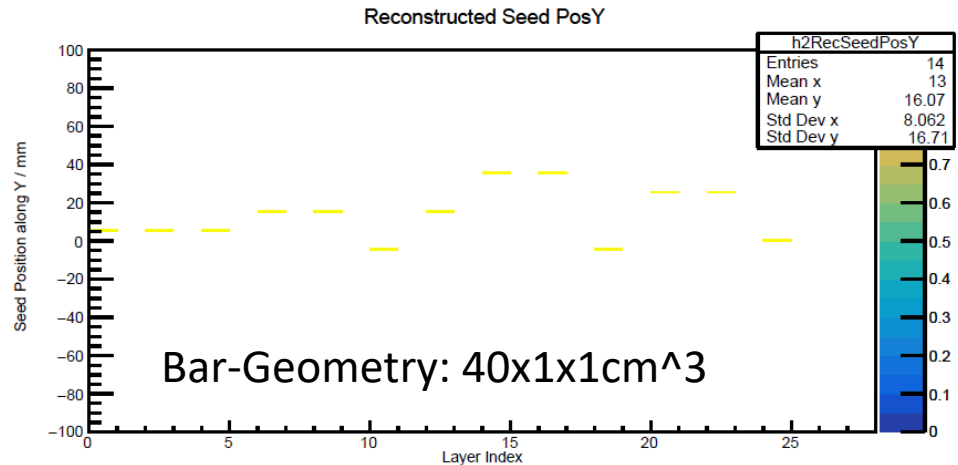
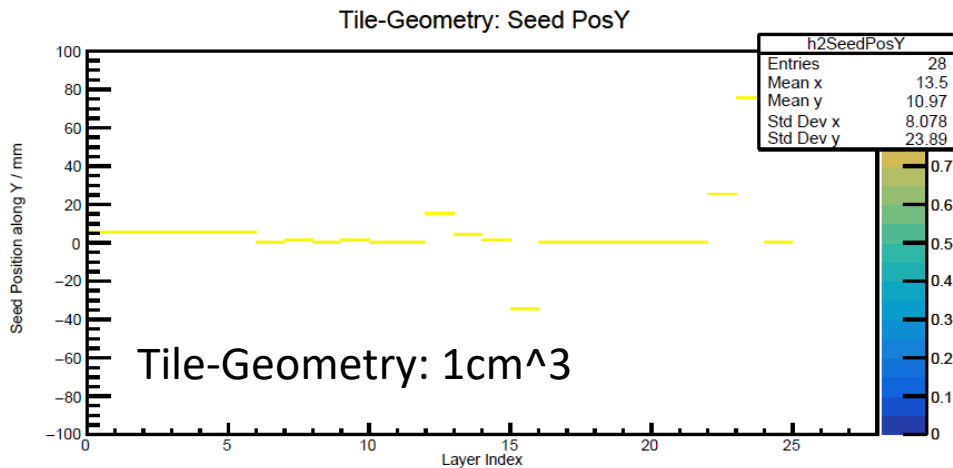
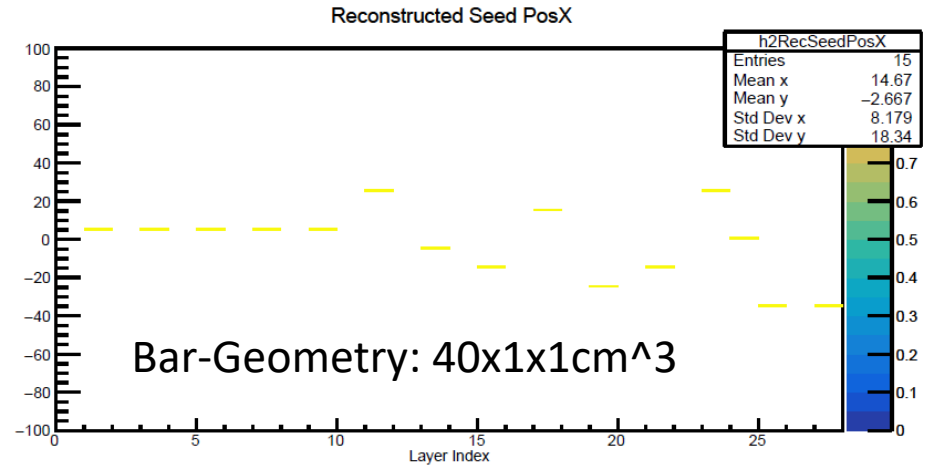
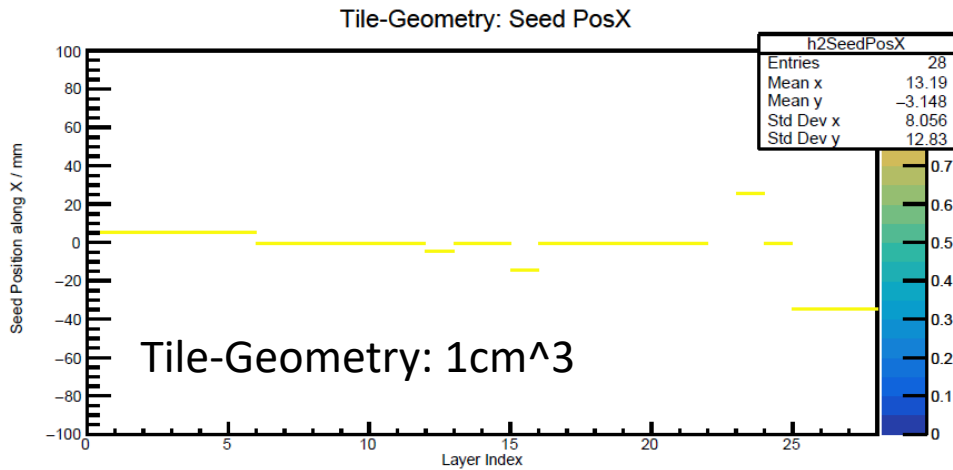


Presented in the weekly meeting on Nov. 11, 2020

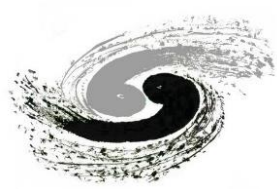


# Shower seed per layer

- The tile/bar with maximum energy deposition (per layer)

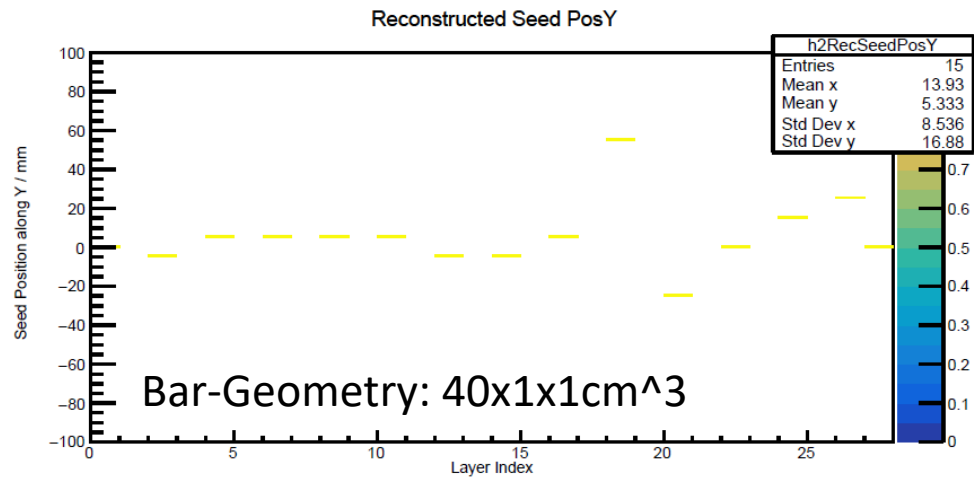
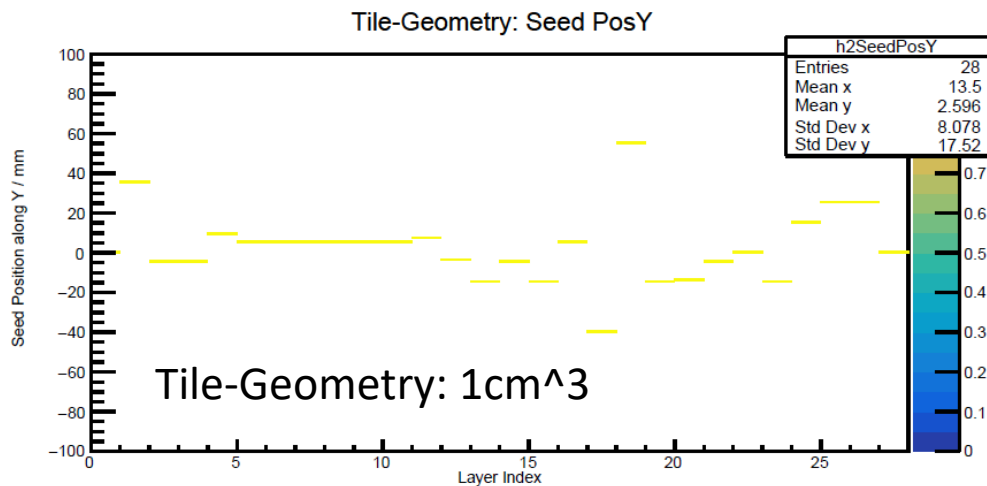
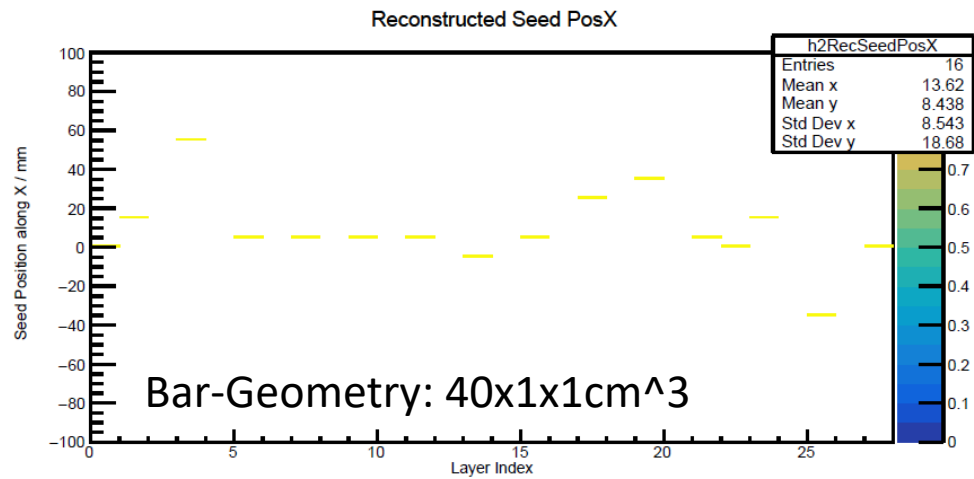
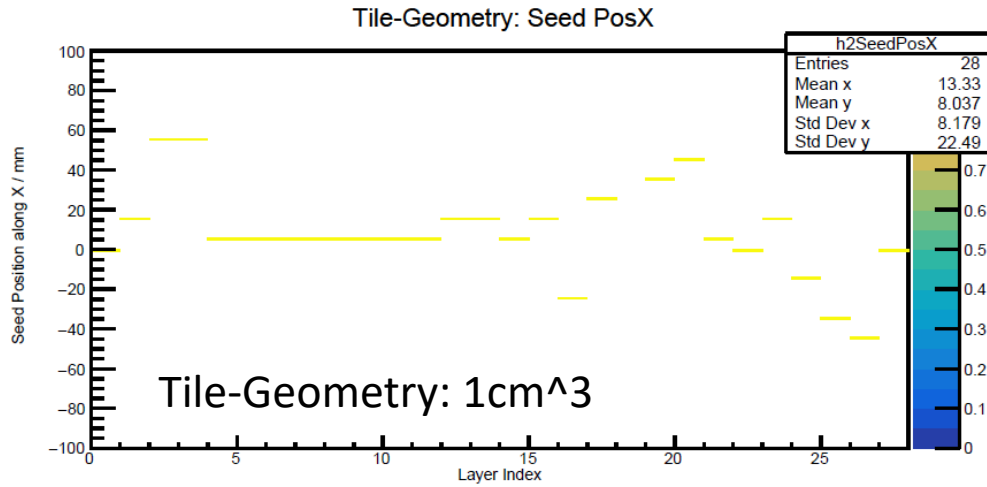


Event-2

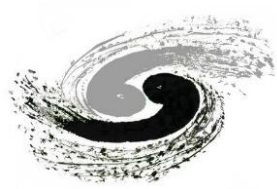


# Seed per layer

- The tile/bar with maximum energy deposition (per layer)

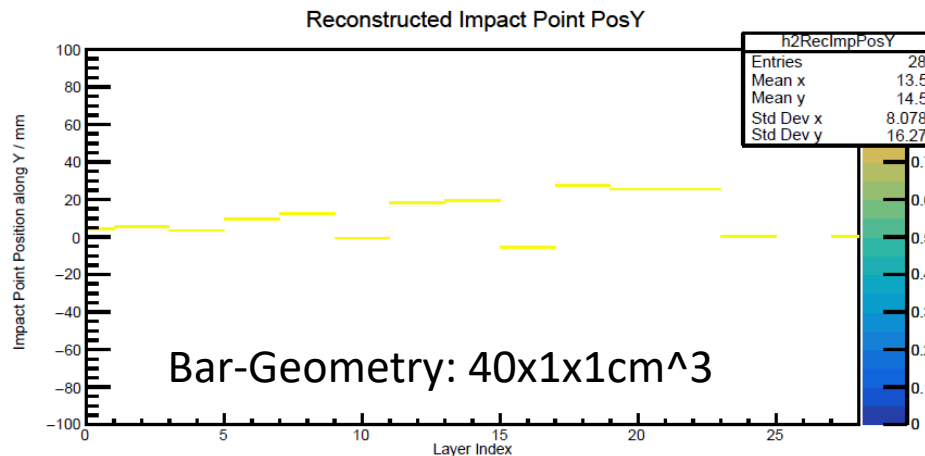
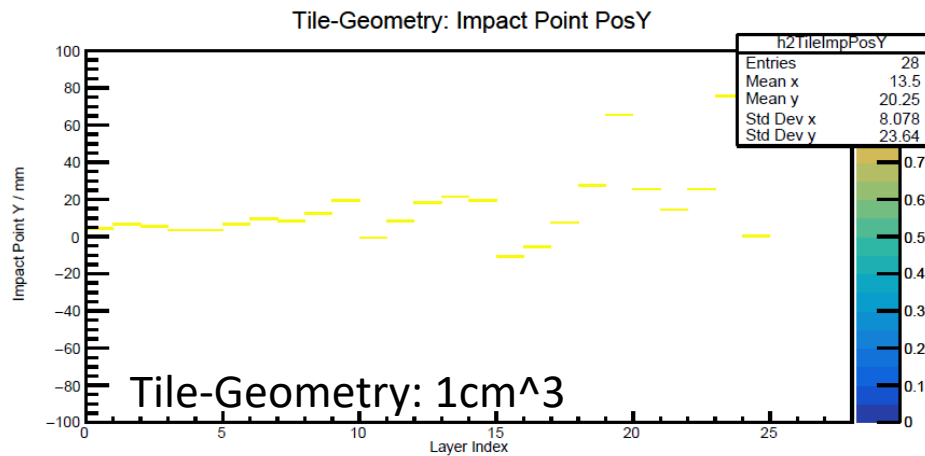
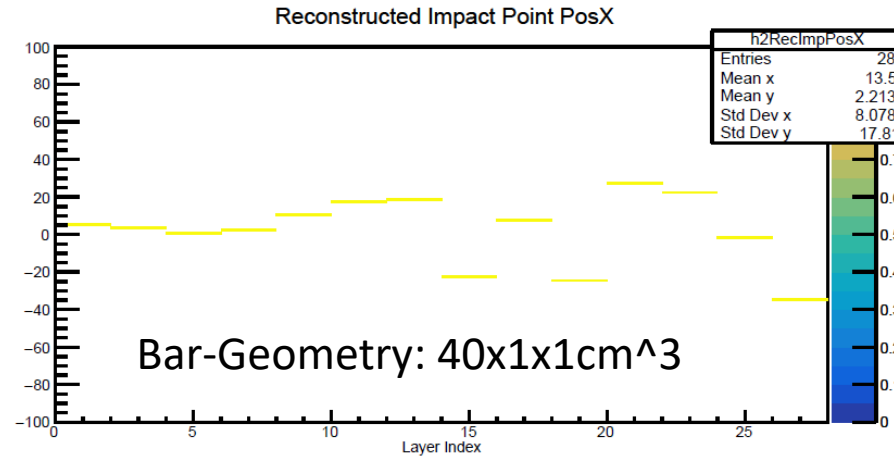
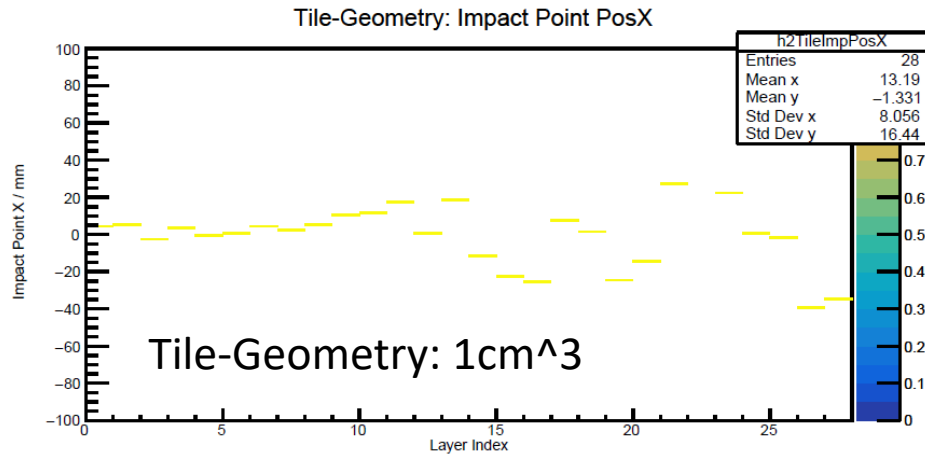


Event-1



# Center of gravity per layer

- Energy weighted positions along X and Y (in transverse plane)



$$COG_x = \sum_j w_j x_j$$

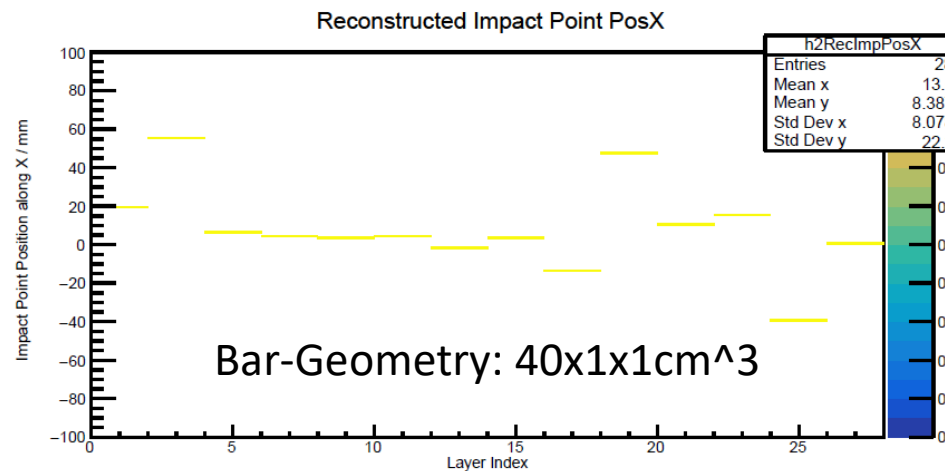
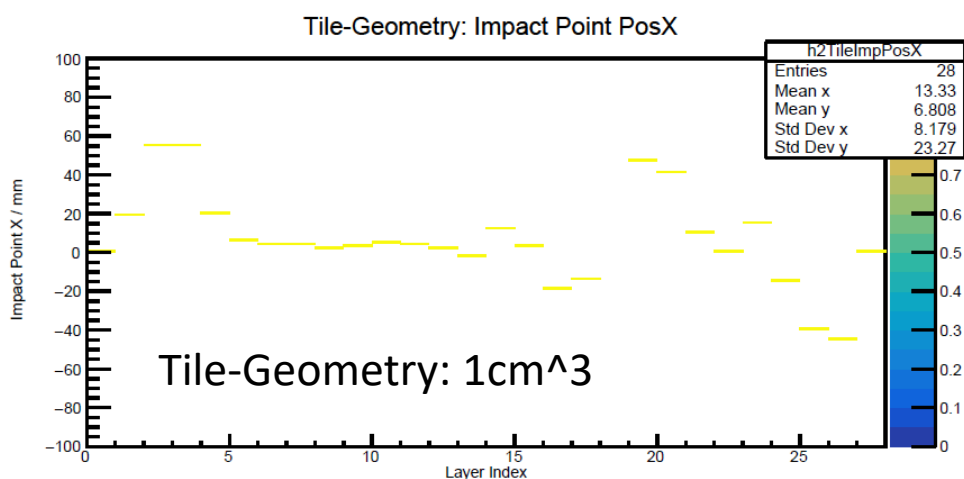
$$COG_y = \sum_j w_j y_j$$

Event-2



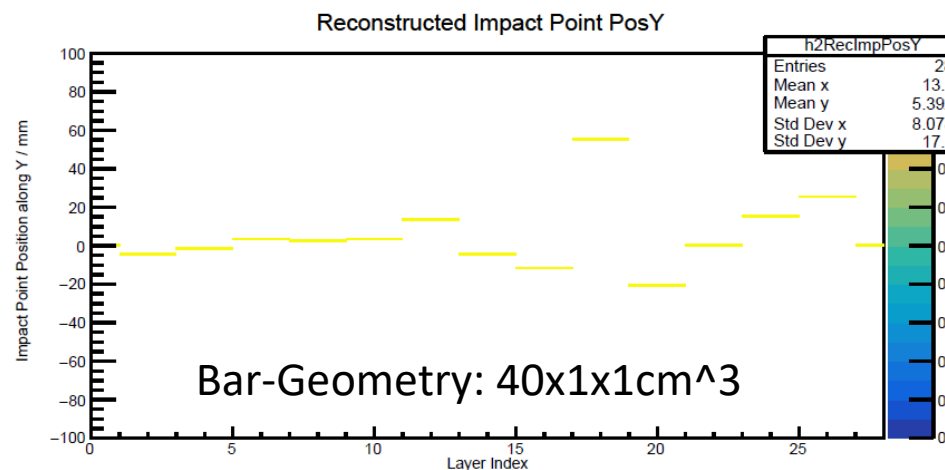
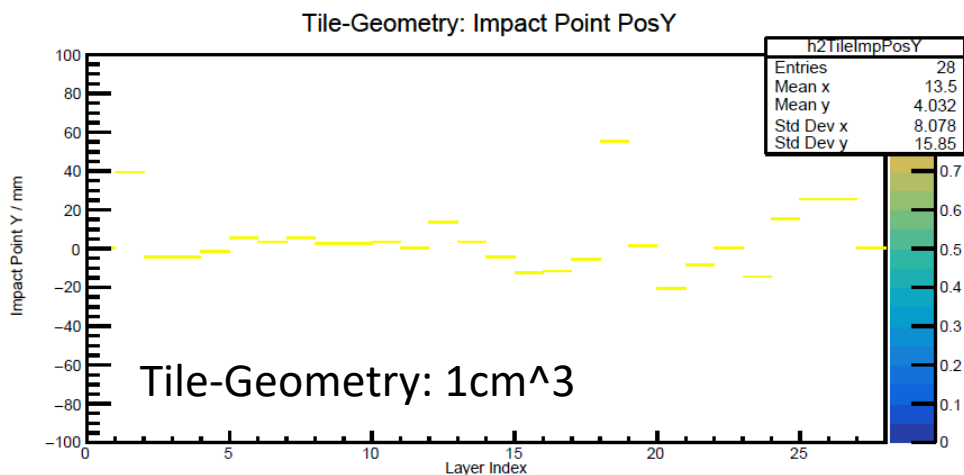
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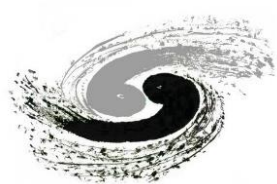


$$COG_x = \sum_j w_j x_j$$

$$COG_y = \sum_j w_j y_j$$



Event-1



# Reconstructed center-of-gravity

- COG in X and Y: in all 1000 events (1GeV photon)

