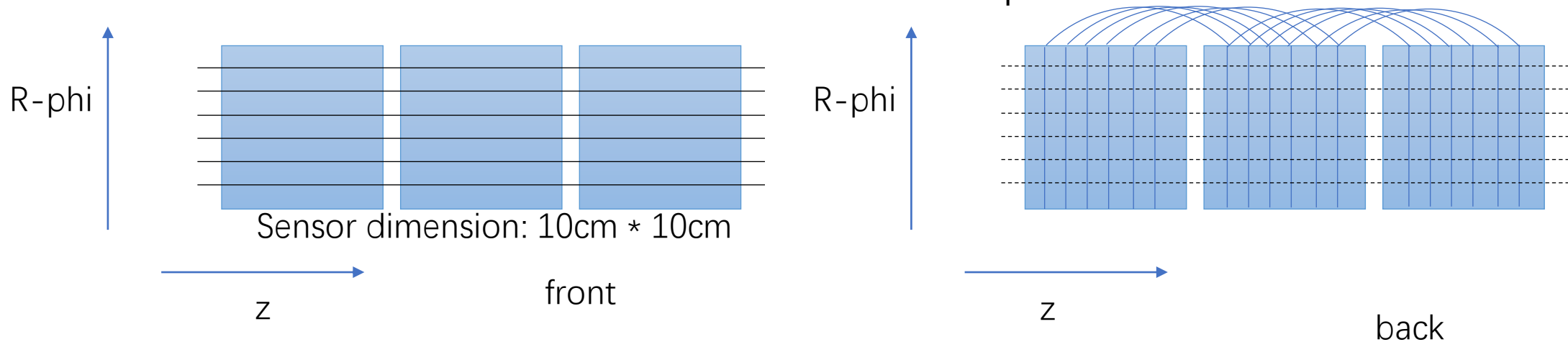# 2 Dimension LGAD Study

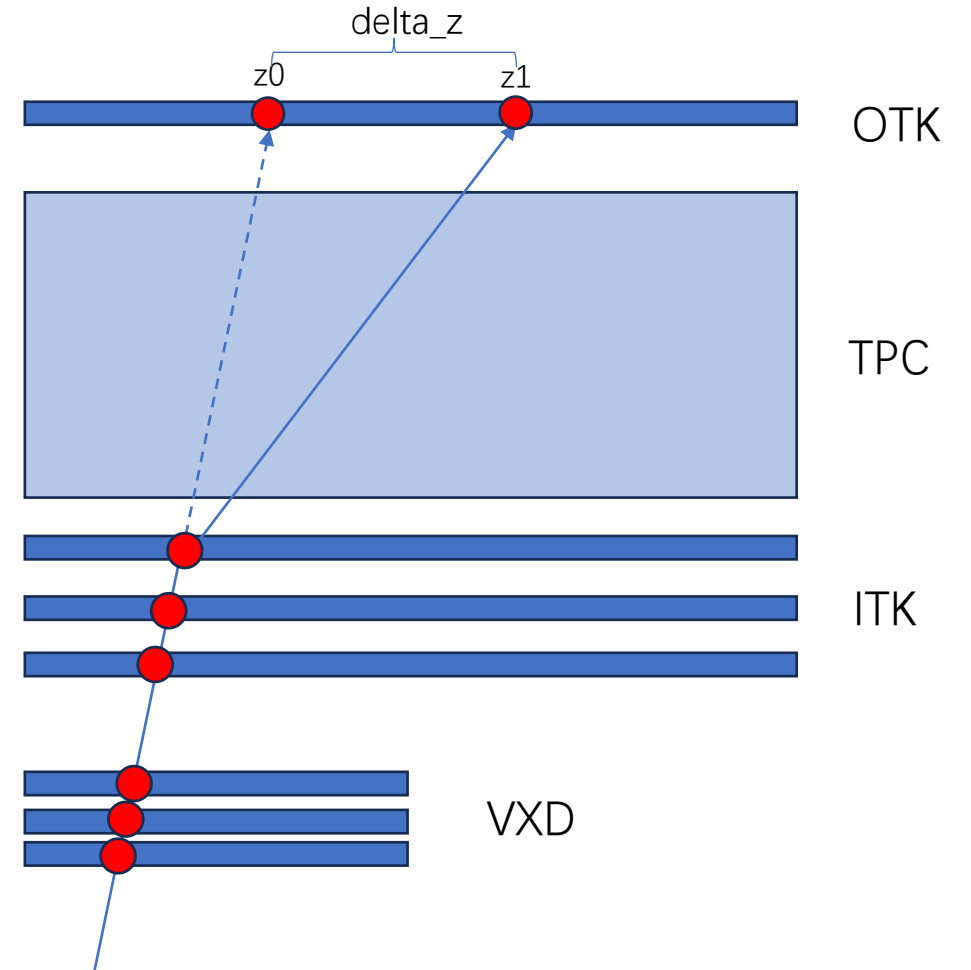Zhan Li, Qi Yan, Xin Shi

2024/06/26

Overview

- Motivation:
  - The loss of z information due to multiple scattering before OTk will bring reconstruction inaccuracy and result in mismatch with ECAL shower (cell).

- 2 Dimensional sensors in OTk can resolve this issue.
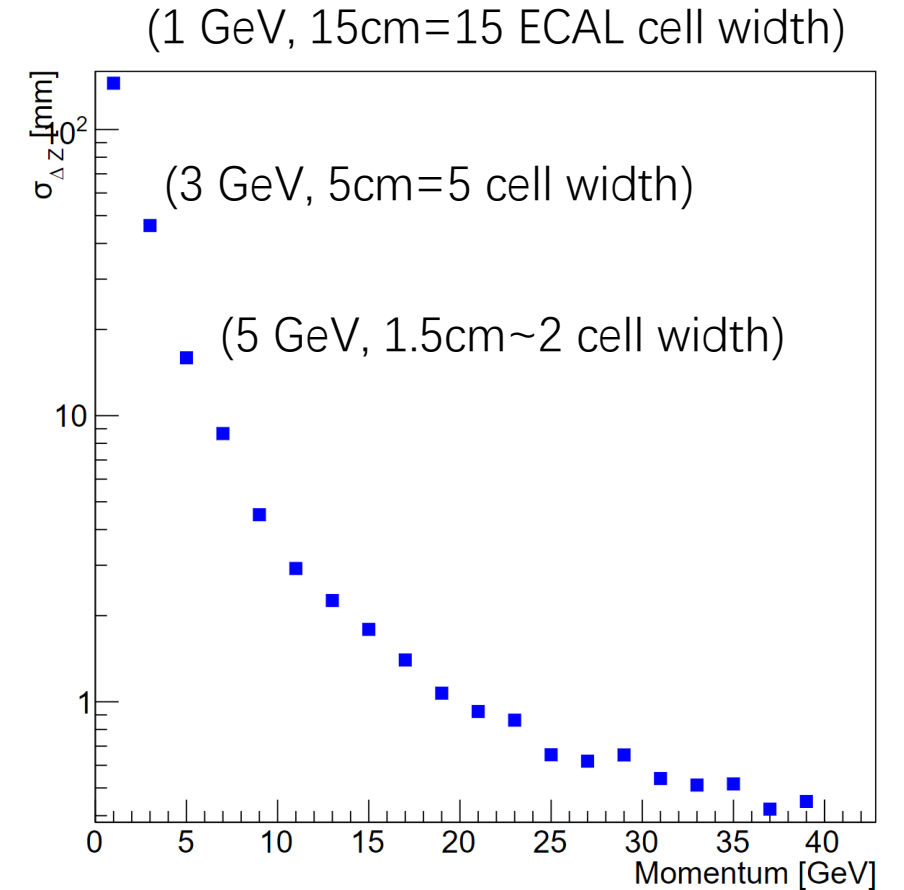 - Sensor with 2 sides and each side has strips

R-phi

Sensor dimension: 10cm * 10cm

front

z

R-phi

z

back

Steps to 2d sensor

- Use the hit of VTX and ITK to evaluate the hit on OTK, note the z position as z0

- The true hit on OTK, note the z position as z1. Get the deviation delta_z=z1-z0

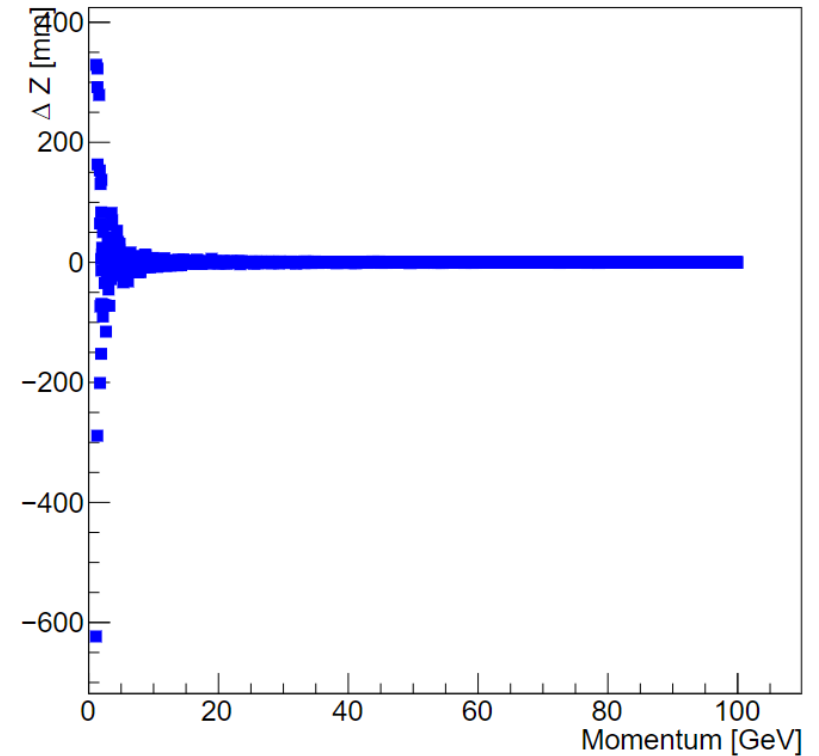- Study the delta_z can help understand the strips along the r-phi axis.

Results

- 10k muon used

- Exclude all events that has interacted with detector materials.

- Exclude all events that did not hit ITk and OTk

- After selection, about 4.9k events passed.

(1 GeV, 15cm=15 ECAL cell width)

(3 GeV, 5cm=5 cell width)

(5 GeV, 1.5cm~2 cell width)

$\sigma_{\Delta z}$ [mm]

Momentum [GeV]

Thank you!

Backup

- For p>40GeV, delta_z are almost 0

- Need to generate within a smaller scale

Δ Z distribution