Double-side strip LGAD Study

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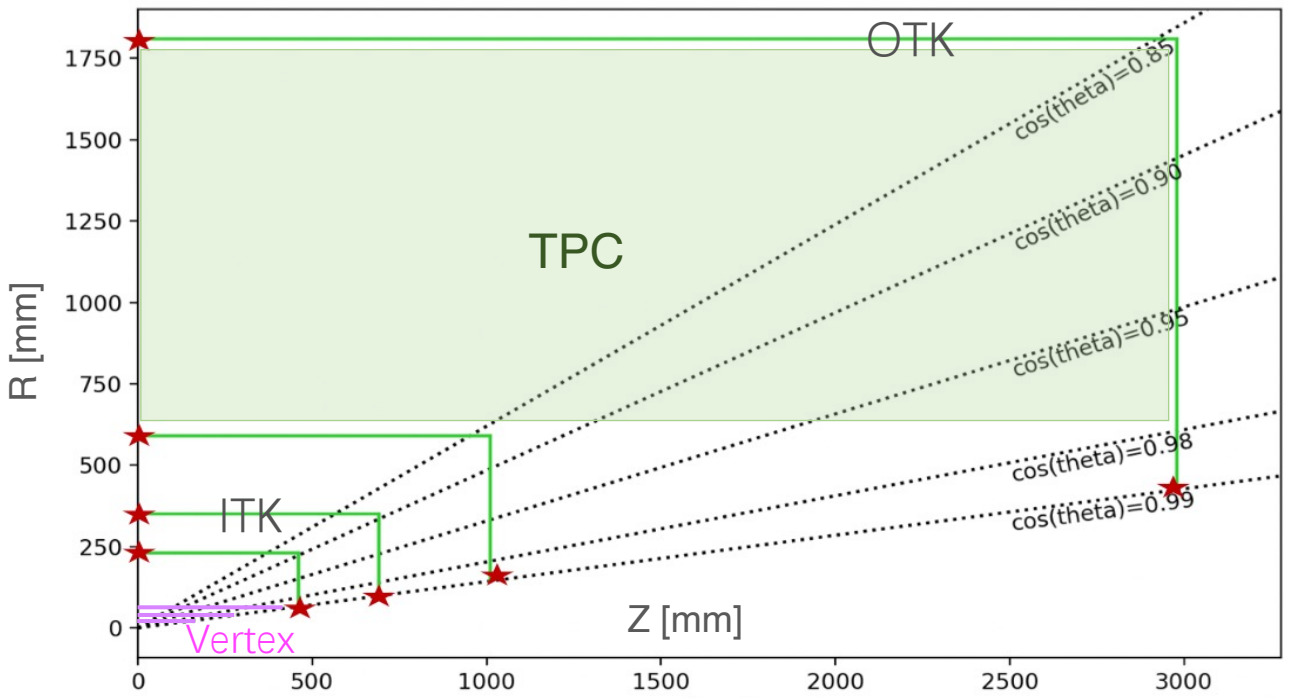
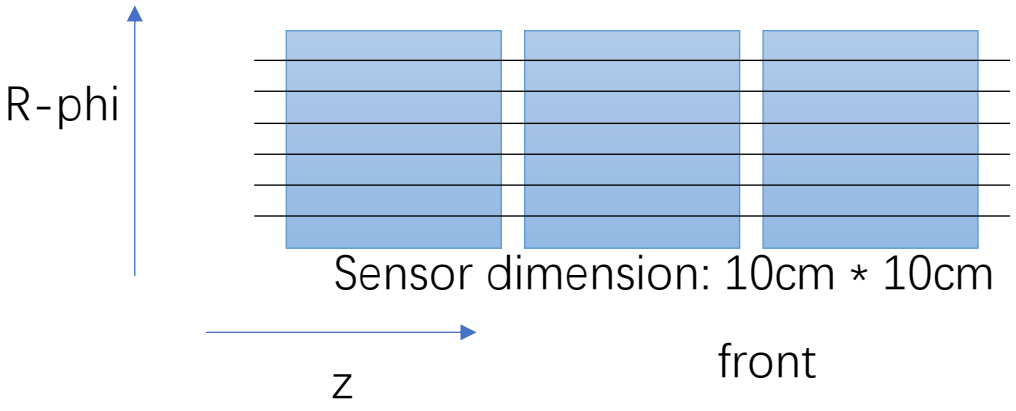
2024/07/03

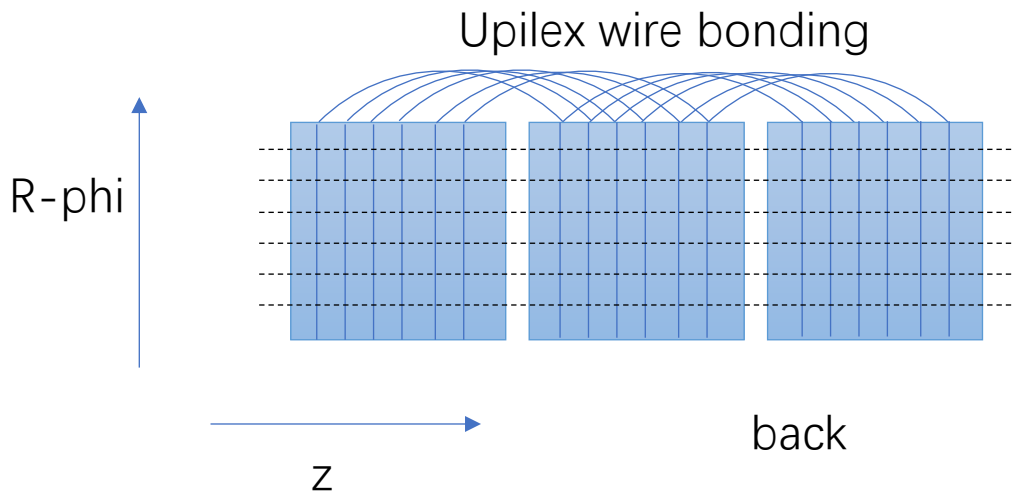
Overview

- Motivation:
  - The smearing of the z-position due to multiple scattering before the OTK will result in inaccuracy of track extrapolation position and mismatch with ECAL shower (or cells).

- Double-side strip sensors instead of the current single-side strip sensors in OTK can resolve this issue:
  - Sensors implanted with 2 side strips and readout on both sides.

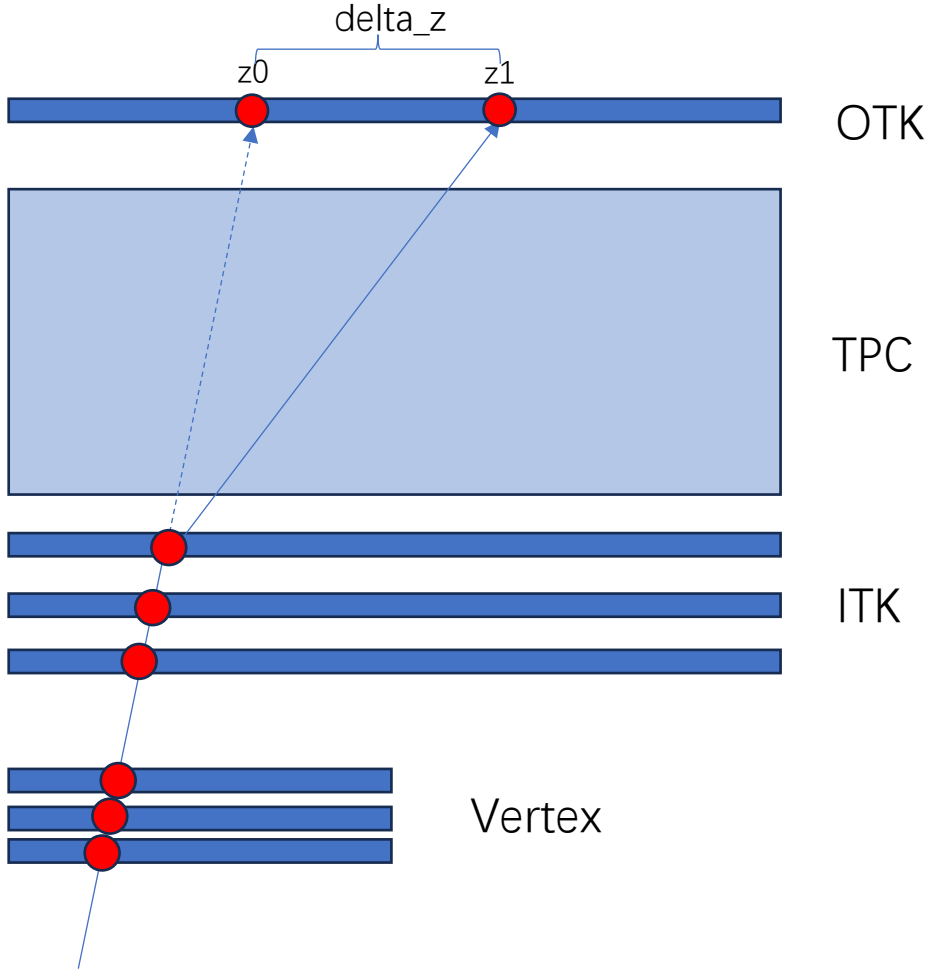






Steps to double-side strip LGAD

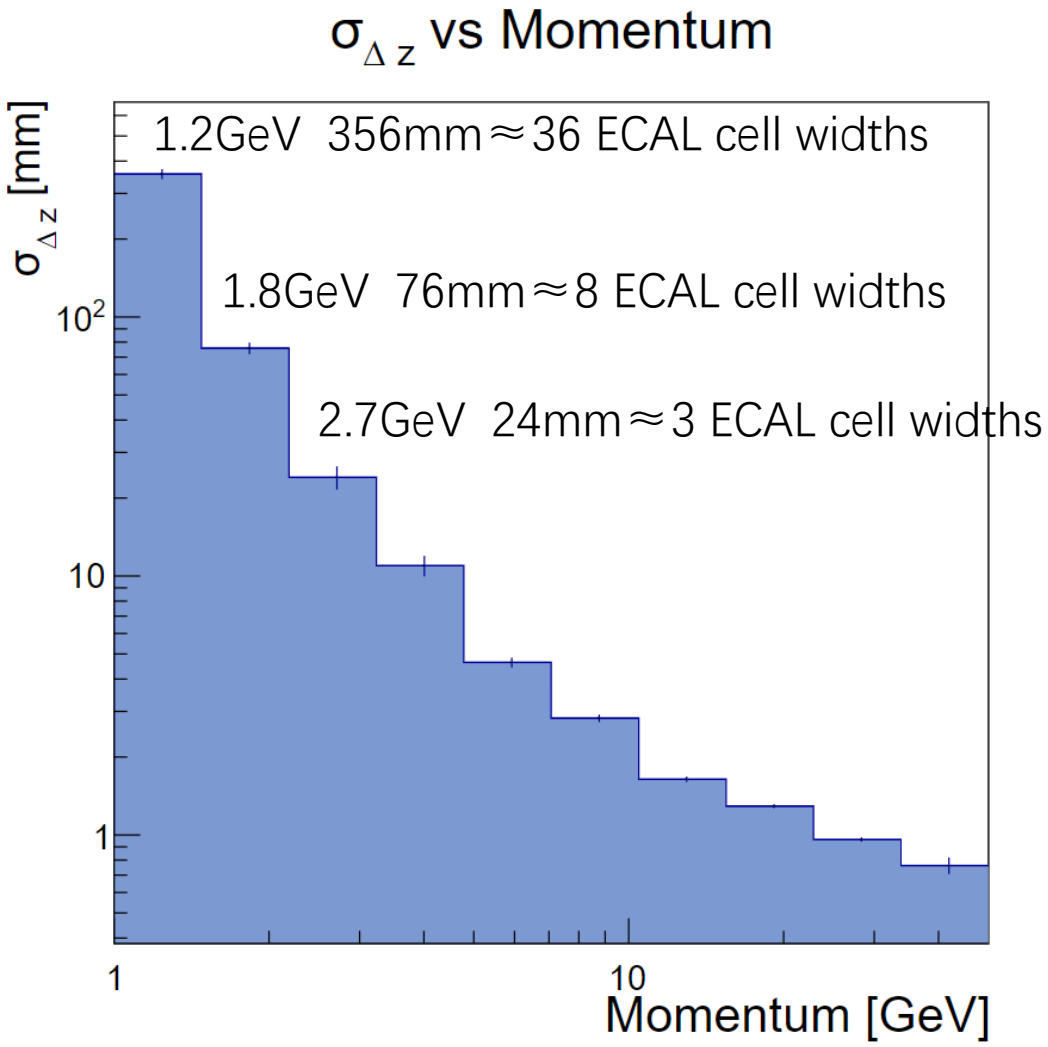
- The extrapolated position of Vertex+ITK track to OTK in the z-direction, denoted as z0.
- The true track hit position of OTK in the z-direction, denoted as z1. The deviation is calculated as Δz=z1-z0.
- Study Δz can help to understand inaccuracy in the z-direction due to multiple scattering and the necessary of double-side strip LGAD.



Results

- Configuration:
  - 30k muon events were used
  - Events involving inelastic interaction with materials were excluded.
  - Events that did not hit both ITK and OTK were were excluded
  - After selection, about 12k events passed.

- Conclusion:
  - Improvements in z-position accuracy through the development of double-side strip LGADs should be considered:
    1) No requirement for time measurement on the z-measurement strips.
    2) The pitch size of the z-measurement strips can be as large as 300 μm



Thank you!