# Week of 09/06/25 - 13/06/25

Estrella Cayuelas Solano

#### x,y,z plots PV reconstructed – PV MC particle

- Plots of position resolution of Zbb ran on IDEA at 2T.
- x and z produce a good output
- Issue: y has a bug





## Using Delphes for geometry optimization

• We can adjust the geometry through Delphes.

• Use this to study resolution of impact parameter, momentum.. before running on full sim.



## Filtered material budget

- Purpose:
  - Ensure vertex geometries tested make sense
  - Compare full sim with result from Delphes on fastsim

- How to produce material budget:
  - See last slide for a general scheme

## Filtered material budget

- Commented out all other .xml files in k4geo/FCCee/CLD/compact/CLD\_o2\_v05/CLD\_o2\_v05.xml except for:
  - $\circ$  Vertex\_o4\_v07\_smallBP.xml
  - o InnerTracker\_o2\_v07.xml
  - o OuterTracker\_o2\_v07.xml
- Issues:
  - Have to comment and uncomment manually
  - Not clear on what combinations of .xml files run without errors



#### Next steps

- Improve filtering of the material budget to make it more accessible.
- Produce performance plots sigma(D0) vs. theta for different momenta of the muon though a single script
  - single muon gun events at (0,0,0)
  - $\circ$  θ ∈ [10°, 20°, ..., 90°]
  - Momentum ∈ [1, 5, 10, 50, 100] GeV
  - Different geometries
- Ultimately, study vertex design in all possible configurations (different positions of the layers, different geometries, etc.)



## How to produce material budget

- Process to be improved.
- So far:
  - To scan materials:
    - fccrun material\_scan.py
    - Specify k4geo/FCCee/CLD/compact/CLD\_o2\_v05/CLD\_o2\_v05.xml
    - https://github.com/key4hep/k4geo/blob/main/utils/material\_scan.py
  - To plot material budget:
    - python material\_plots.py -f out\_material\_scan.root
    - https://github.com/key4hep/k4geo/blob/main/utils/material\_plots.py