SFT Group Meeting

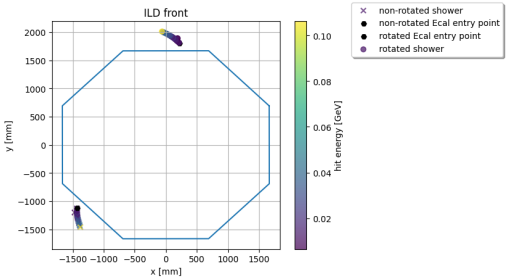
Status Update #6

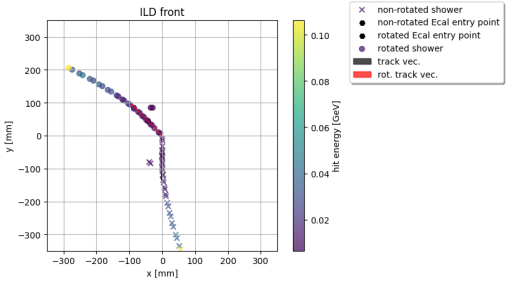
Konrad Helms

29th June 2023

What am I doing?

- Regression: TOF estimation using ML techniques based on ECal hits
- data: 4D point cloud: (x,y,z,e) ➡️ $N \times 4$ points, $N = \#$ hits
  - $+$ timing info ➡️ let's see how to implement that, 5th dimension?
- remark: N **will** differ for different pfos





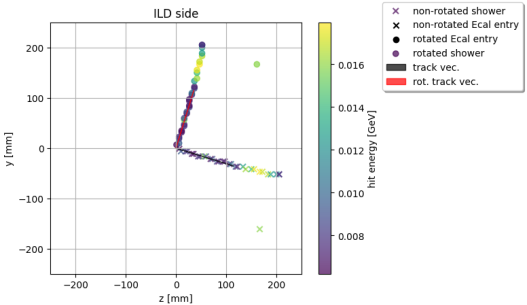
22 June - 29 June: PFO Selection

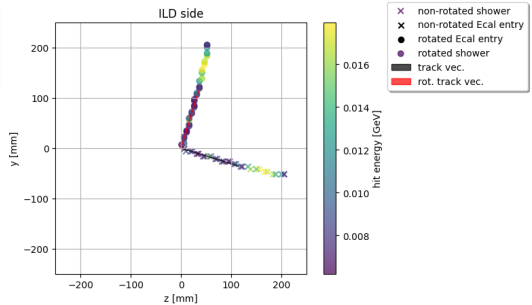
- reworked selection:
  - only cut on reco information (except cut on non-physical PFOs)
    - → this cut is already applied in the data generation script true TOF $> 6\,\text{ns}$
  - refined cuts: only ECal particles in barrel or endcap

cut	% of total number of PFOs kept
track length $> 1800\,\text{mm}$ track length $< 8000\,\text{mm}$	97.0
d_{length}(Ecal surf., first hit) $< 30\,\text{mm}$	87.0
track momentum $< 10\,\text{GeV}$	86.0
if d_{time}(hit $i+1$, hit i) $> \mu_{d_{\text{time}}} + \sigma_{d_{\text{time}}}$: **remove hit** $i+1$**, but do not reject the pfo**	removed hits in 48.6% of the pfos not as expected from Gaussian ($\sim 16\%$)

22 June - 29 June: Effect of d_{time} 'Cut'

- $\mu_{d_{time}} = \frac{1}{\#\text{ total PFOs}} \times \sum_{\text{PFOs}} \sum_{\text{hits in PFO}} d_{time}(\text{hit } i+1, \text{hit } i)$
- $\sigma_{d_{time}} =$ common std. calculation with $\mu_{d_{time}}$





22 June - 29 June: PointNet++

- got PointNet++ running
  - at the moment: playing around
  - writing data loader for TOF dataset
- generating a new dataset right now

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- outlook:
  - using Pointnet on TOF dataset
  - figuring out how to deal with dynamic point clouds