Karlsruher Institut für Technologie

weekly tracking meeting

L1-ONLY PXD SETUP

31.08.2018

Nils Braun | IETP - KIT

SETUP

Geometry

There is still no official geometry setup I am aware of, so I have edited the PXD components XML file and in the clusterizer. I have also removed other things related to layer 2 (SwitcherGroovesLayer2, BorderGroovesLayer2, Balcony*CopperLayer2, ThinningLayer2).

Tracking

I have retrained the PXD MVA filters and optimized the rest of the algorithm (also for full PXD setup), but the ”main” part has not changed. I am now also using PXD cluster shapes.
I am using ROI extraction using SVD+CDC tracks (see second part of my presentation).

SETUP

Coverage

The resolutions are given as 68 % and 80 % coverage defined as

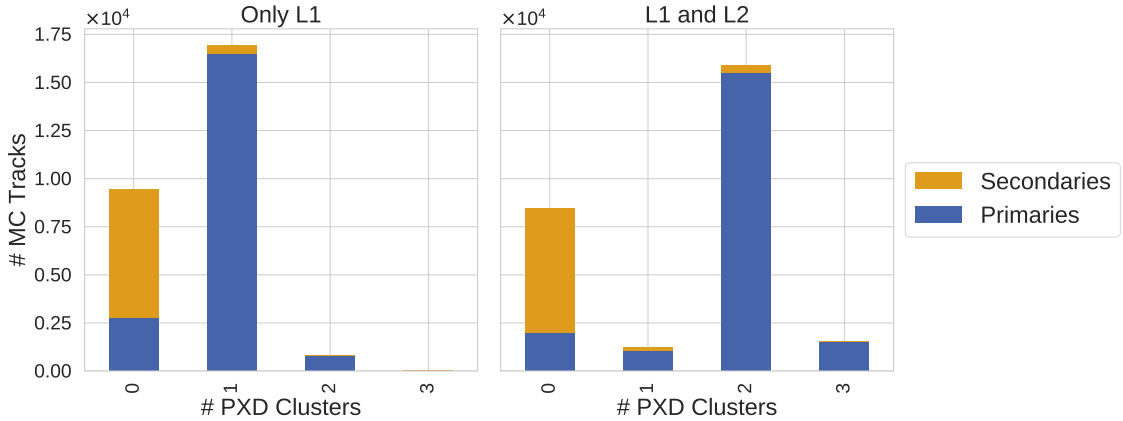
$$c_q = P_q(|X - P_{50\%}(X)|)$$

where P_q is the q-th percentile and X is the residual between reconstructed and truth quantity.

A word on uncertainties

The shown uncertainties are calculated using bootstrapping.
I am using 2000 events (20000 tracks), which should be enough statistics for bootstrapping.

PXD CLUSTERS



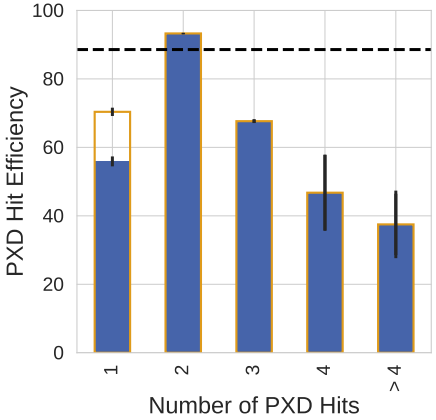
Be aware that PXD efficiency and purity is worse for single-cluster tracks (as expected).

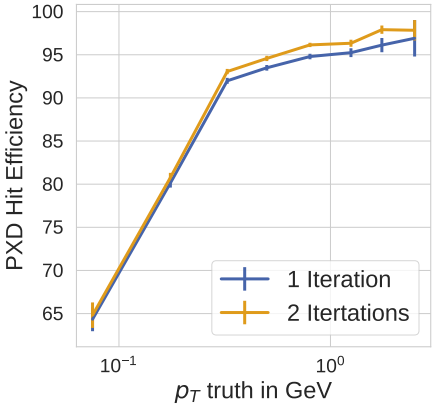
EFFICIENCIES

- I only take into account found and fitted CDC or SVD tracks after combination.
- I normalize to truth PXD clusters after ROI selection.

In Percentage	PXD CKF (L1 + L2)	PXD CKF (L1 only)
Any Correct PXD Hits attached	93.17 ± 0.19	84.41 ± 0.28
PXD Hit Efficiency	89.34 ± 0.20	82.61 ± 0.30
only on tracks with at least one found PXD hit	93.23 ± 0.14	88.39 ± 0.24
Hit Purity	96.65 ± 0.13	90.32 ± 0.24

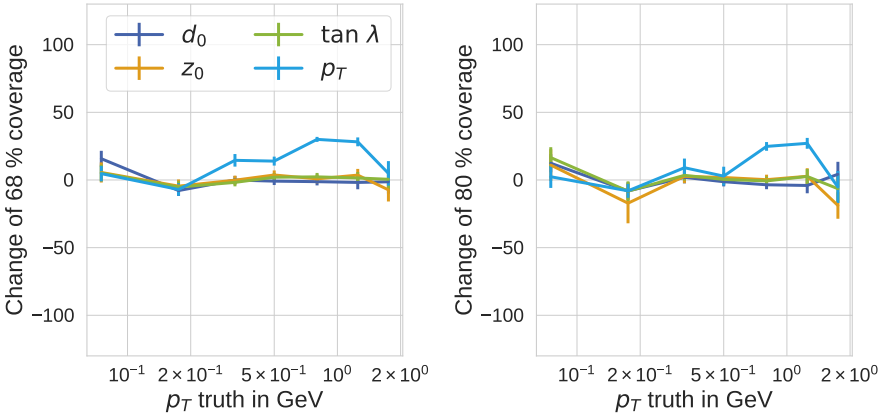
EFFICIENCIES (IN THE FULL PXD SETUP)





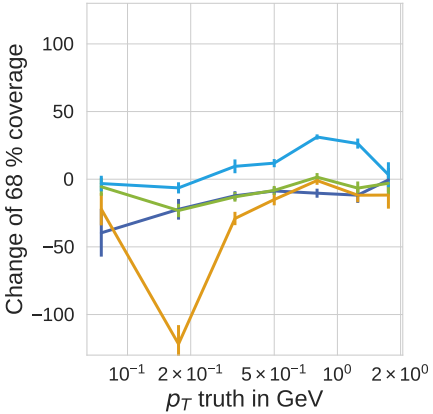
In the full PXD setup, I can do two iterations for finding the single-cluster tracks, to increase the purity.

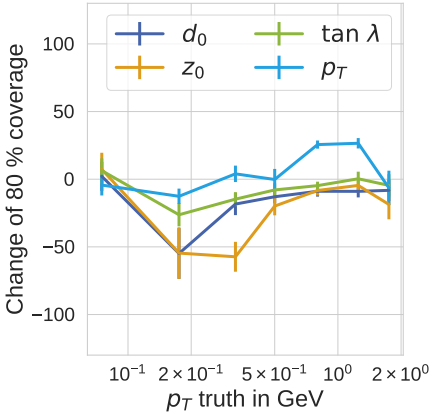
RESOLUTIONS (NO PXD)



The missing material increases the resolution in p_T, because this is mostly dominated by the outer detectors.

RESOLUTIONS (WITH PXD)





SUMMARY

- Resolution is worse in L1-setup as expected – for single tracks.
- I do not see any way to achieve a better purity/efficiency.
- Adding PXD hits is still better than not adding them.
- Some other results have already shown that the influence after vertex fit is smaller and the influence on most analyses is probably negligible (but someone needs to make sure this is correct).

- Wishlist: background, ”official” geometry, a global tag and a dedicated experiment number for this.

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ROI SELECTION IN CURRENT SOFTWARE

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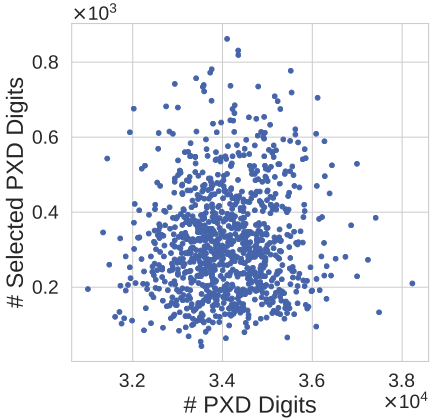
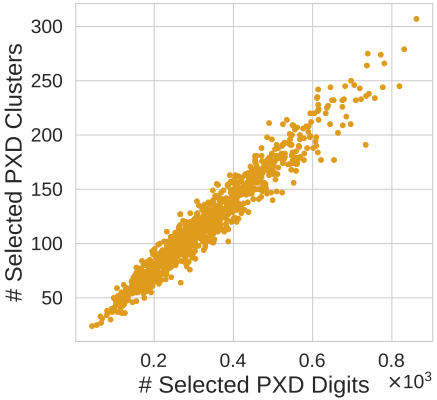
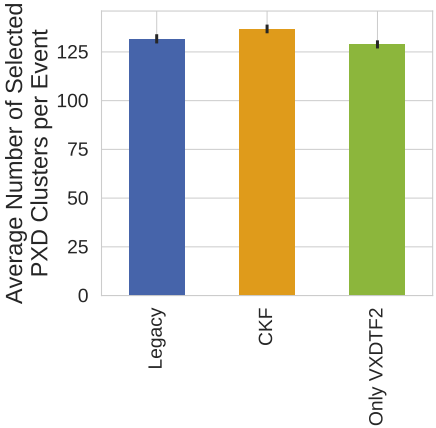
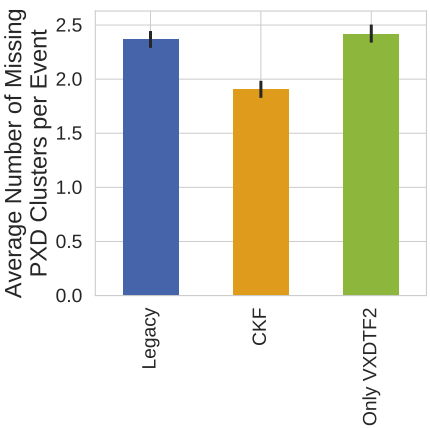
SOME NUMBERS ON PHASE 3 WITH BKG





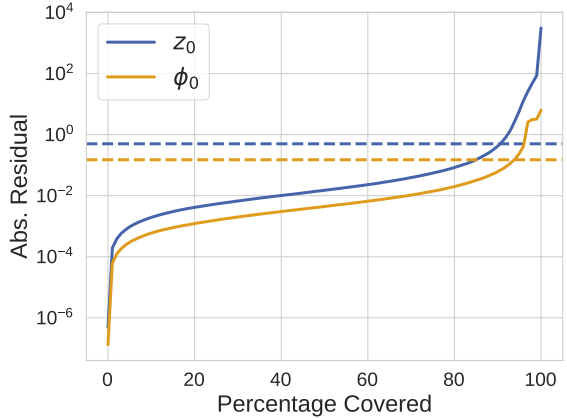
EFFICIENCY





This is only an efficiency of 91.91 $\pm$ 0.26 %!

LOOKING FOR REASONS



Problematic tracks: orientation is wrong.

SUMMARY

- I am a but puzzled about the low efficiency...
- Someone (not me ;-)) needs to make sure the efficiency is better.
- We have still a lot of room for additional ROIs.