Karlsruher Institut für Technologie

weekly tracking meeting

FUN WITH REAL DATA

16.03.2018

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LOOKING INTO REAL DATA

Most of the information I present here are from Jakub.

Data samples

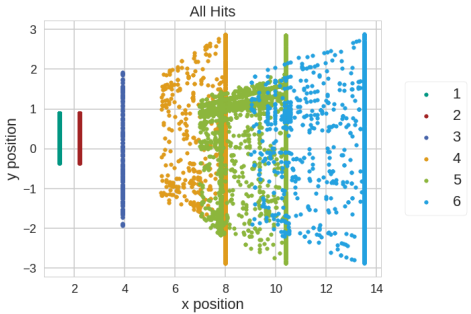
I am using run **451** from the usual location `/ghi/fs01/belle2/bdata/Data/Raw/e0002/`. I am using either the central database `332_COPY-OF_GT_gen_prod_004.11_Master-20171213-230000` or a local database from `/ghi/fs01/belle2/bdata/group/detector/VXD/phase2/alignment/`.

A general comment: I know, that most of the calibrations etc. of the subdetectors are not ready yet, but the alignment group asked me to perform a check of the CKF, so I will present my results anyway. I will not blame anyone for not having made the studies for the subsetectors already!

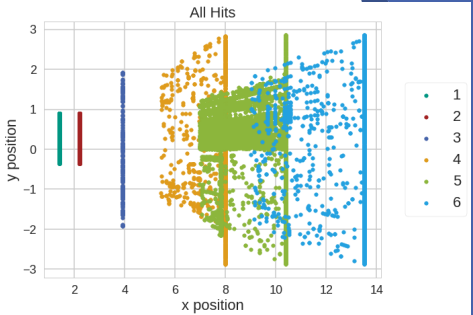
RECONSTRUCTION

- I am applying the default phase2 cosmics reconstruction, as it is currently on **master** (although there is no large difference to the release for the relevant tracking).
- I am using the `ActivatePXDPixelMasker` as suggested by Jakub and the phase 2 geometry from the file (not from database).
- I am only looking into events which have both at least one `SpacePoint` (in SVD or PXD) and a fittable CDC track.
- I am excluding `Tracks` and `TrackFitResults` which are already in the data.
- I did not change anything else than this!

USE OF LOCAL DATABASE



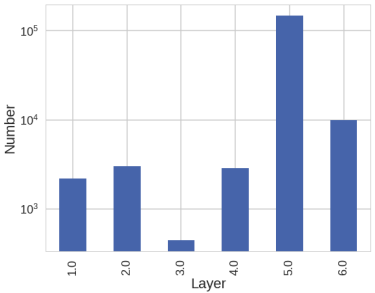
Using localdb.

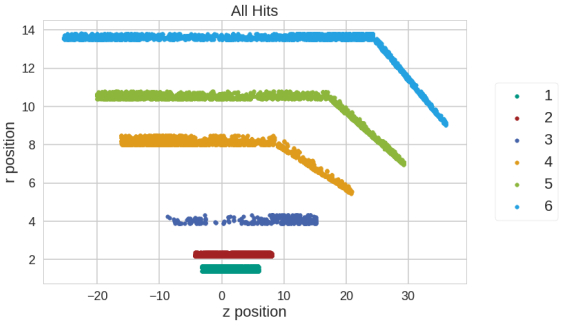


Using centraldb.

- The settings in the localdb seems to suppress the very full detector sensor in layer 5 better (but not fully).
- There seems to be a strange displacement in layer 4 and 5 from slanted to non-slanted parts...

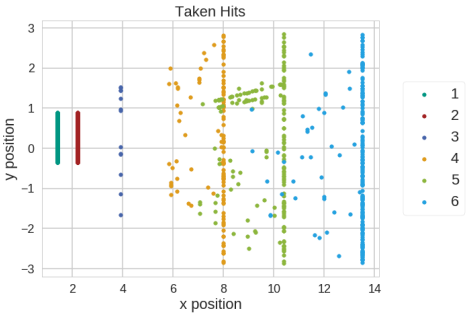
DETECTOR VIEW





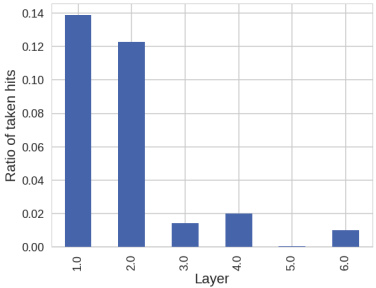
- There seems to be a slight drop on layer 3.
- Layer 5 has clearly some problems in this run (the histogram is logarithmic!)

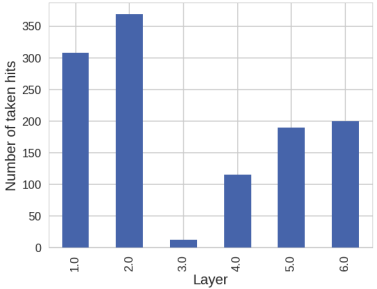
TAKEN HITS



- Distribution of attached hits by CKF looks reasonable.
- There seems to be no specific “inefficiency” in the detector for the algorithm
- PXD looks only so dense on the picture, as seen on the next slide...

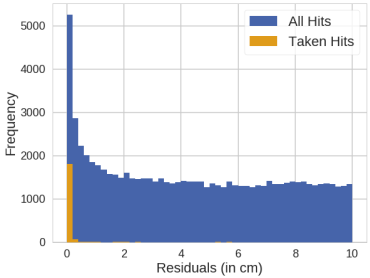
TAKEN HITS - STATISTICS

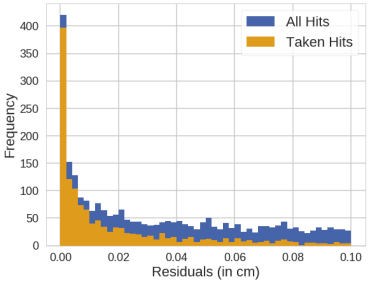




- Ratio for layer 3, 4, 6 looks reasonable - layer 5 is dominated by the noise (??). But number of taken hits in layer 5 is ok.
- Ratio for PXD is surprisingly high (maybe good noise reduction?) - or I am attaching too loosely.

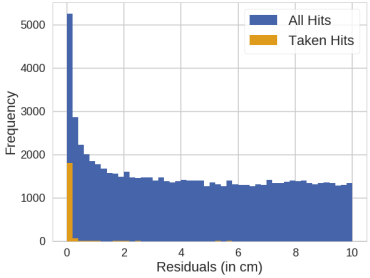
RESIDUALS

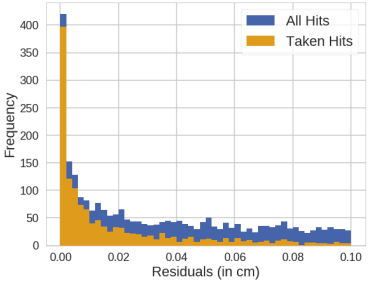


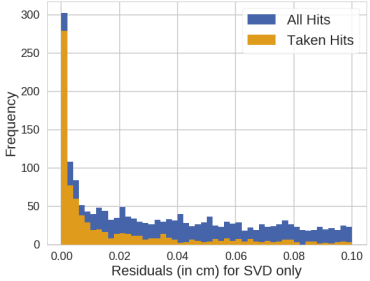


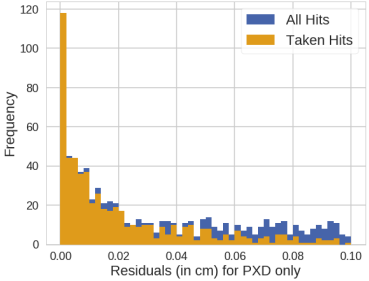
- CKF only uses hits with small distance to the final fitted track (as expected). The final fit is clearly dominated by the CDC information, to this is a good sign.
- There is a large “combinatorial” background in the events (noise, hot pixels), which are not used.
- The residual distribution for taken hits has a bit of a large tail, which means the filters are maybe too loose.

RESIDUALS

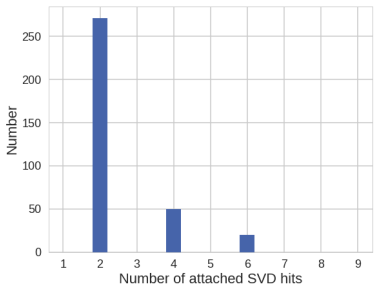

All Hits
Taken Hits
Frequency
Residuals (in cm)

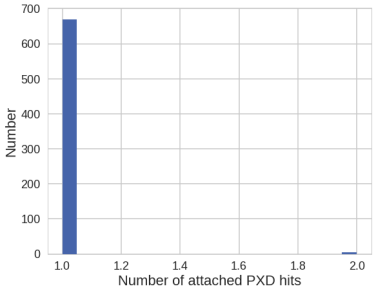

All Hits
Taken Hits
Frequency
Residuals (in cm)


All Hits
Taken Hits
Frequency
Residuals (in cm) for SVD only


All Hits
Taken Hits
Frequency
Residuals (in cm) for PXD only

LOOK ON TRACKS





- Not shown: most of the tracks have zero SVD and PXD (as expected).
- It is very improbable to have more than one hit - especially in the PXD.

SUMMARY

- CKF seems to behave (more or less) as expected: it attaches hits to tracks in all layers.
- The efficiency is not 100% (it is not optimized), but it should still be possible to perform alignment (or?).
- Maybe, the CKF is actually a bit too greedy (I have turned down many filters for phase 3), but I guess this should not be a problem (as DAF may still throw away the hits).
- I will not repeat this study on all runs (this will just cost too much of computing power), but if you have a specific data sample I should look into or if you want to see more plots, just tell me.