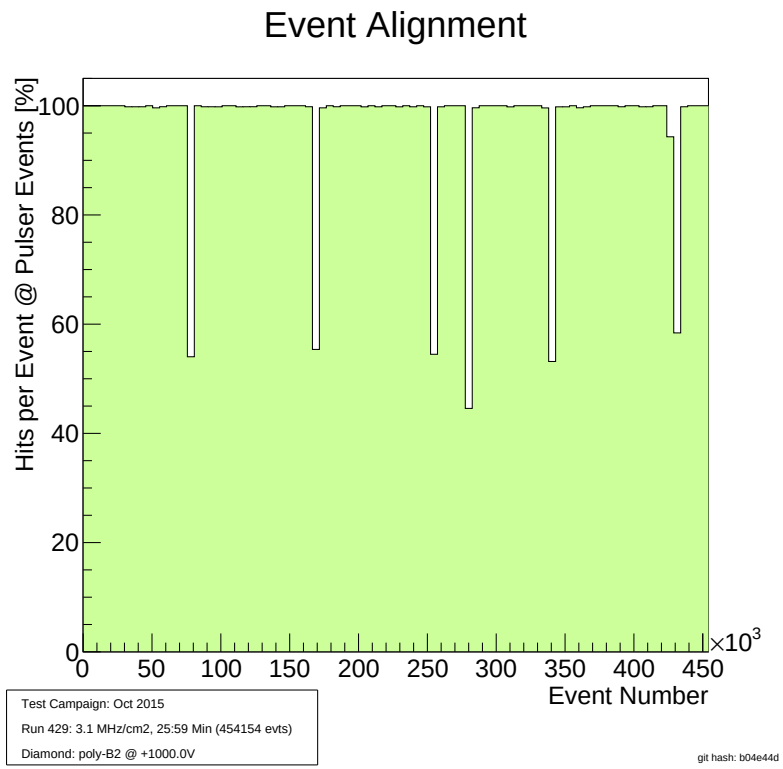

Event Alignment

Speaker: Michael Reichmann

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Section 1

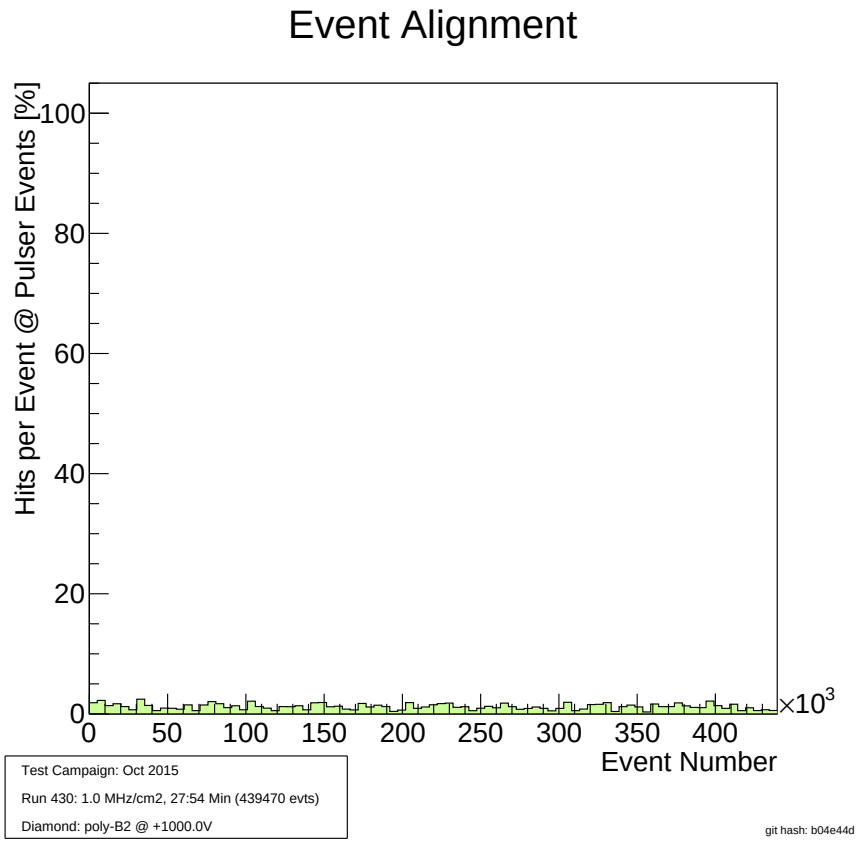
Introduction

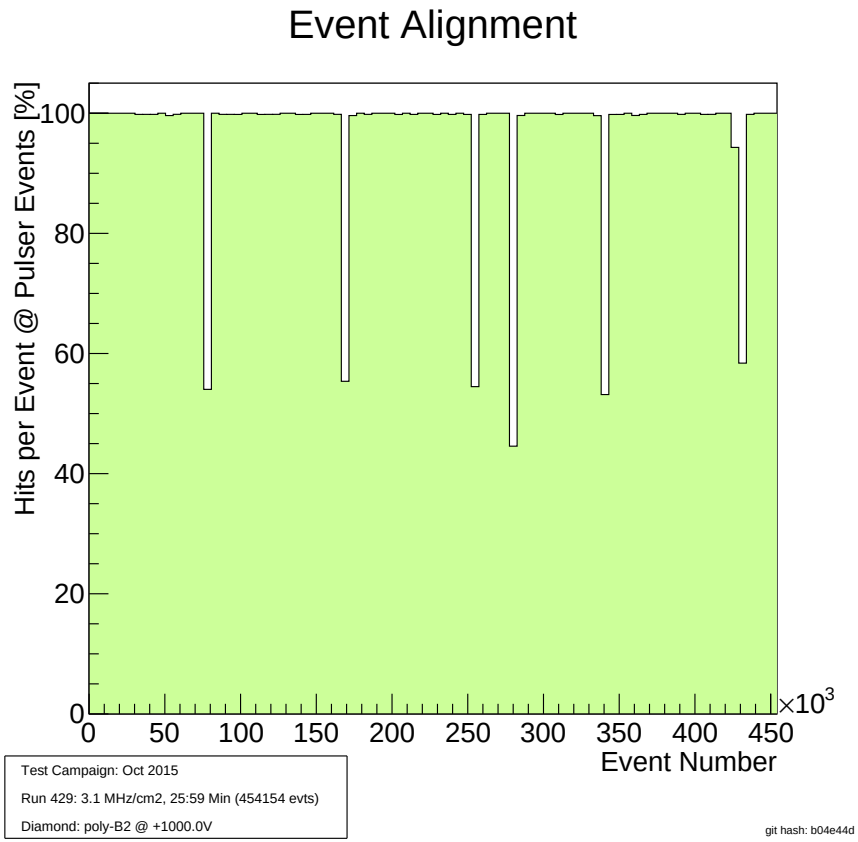
Introduction

- event based data taking
- possibility to get event misalignment between diamond and telescope data
- all telescope cuts would be meaningless
- exclusion of many good events
- flat diamond signal map

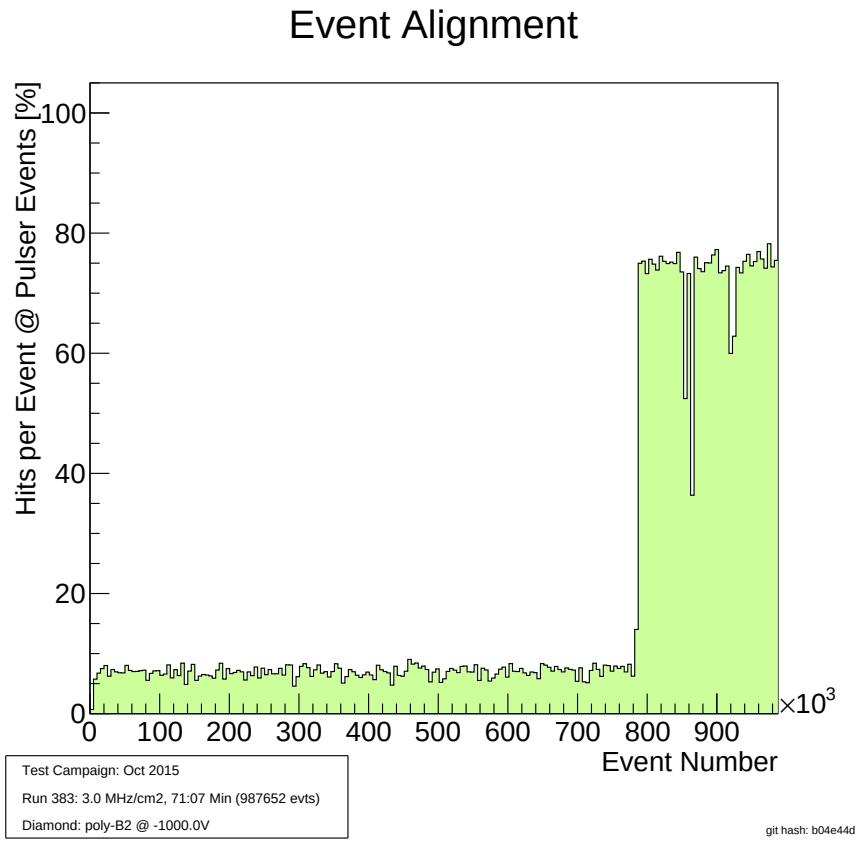
Section 2

Event Alignment

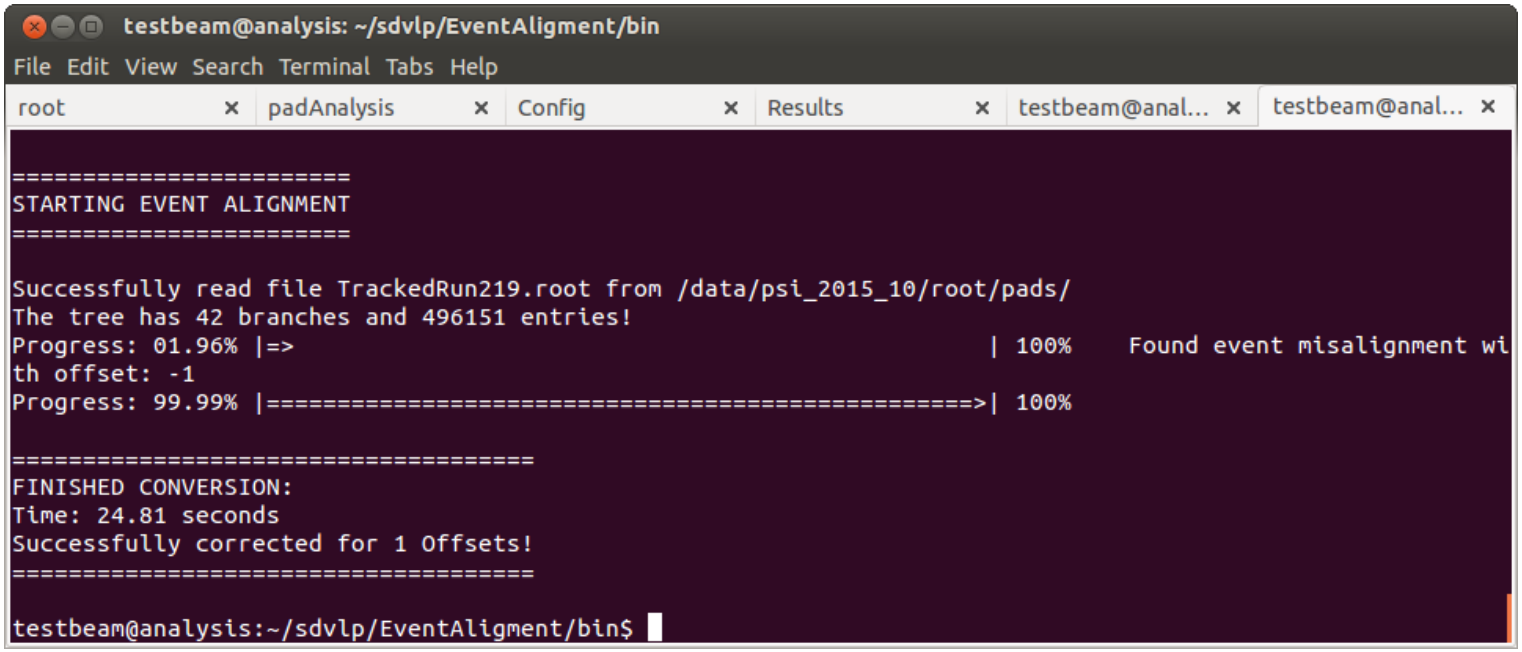




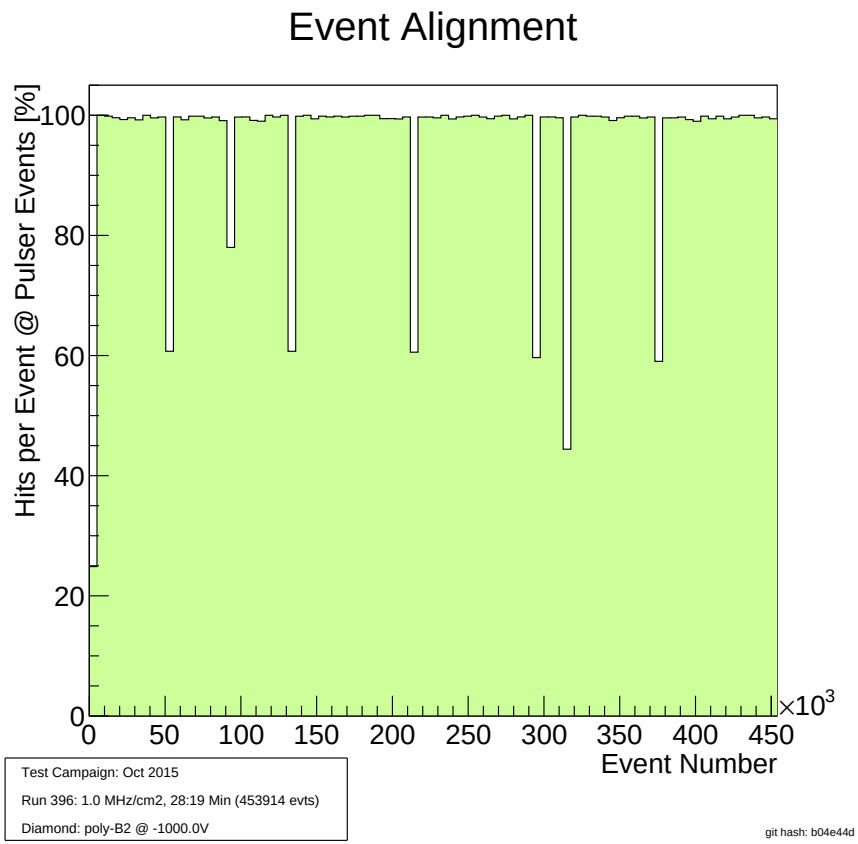
- check if there is a hit in any plane at the pulser events of the DRS4
- we only have pulser events at if there was no trigger from the telescope
  - expect only random hits at these pulser events
- very good indicator for misalignment of DTB and DRS4

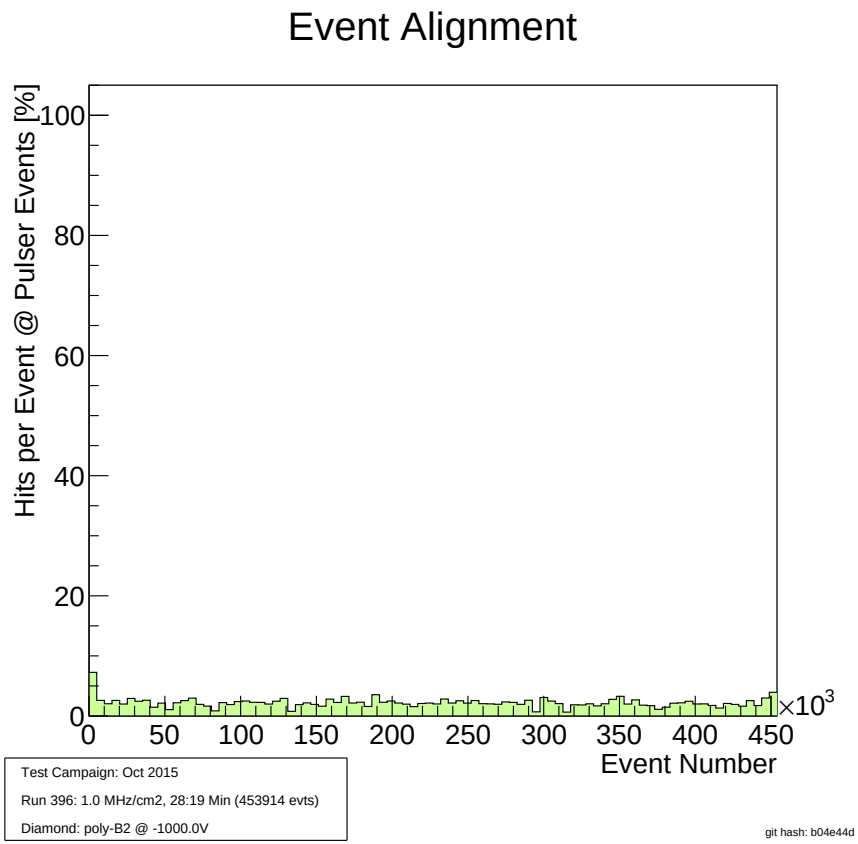


- usually event misalignment right from the start:
  - offset is -1 which means that the DRS4 is 1 event behind
- there also runs which pick up an offset during the run
  - positive offset: DTB misses trigger!

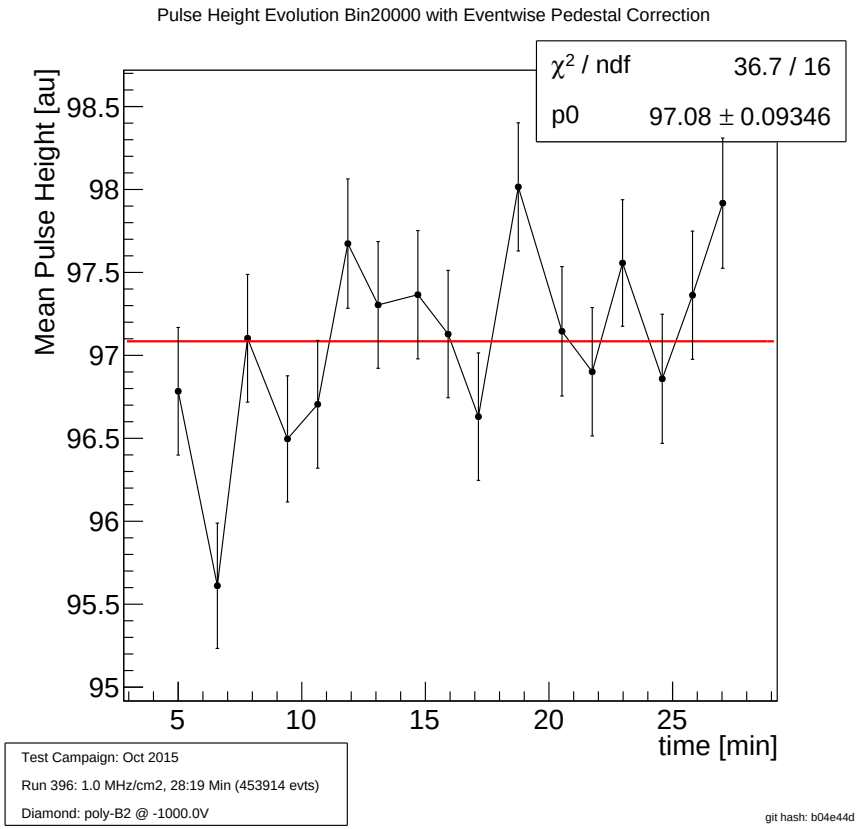


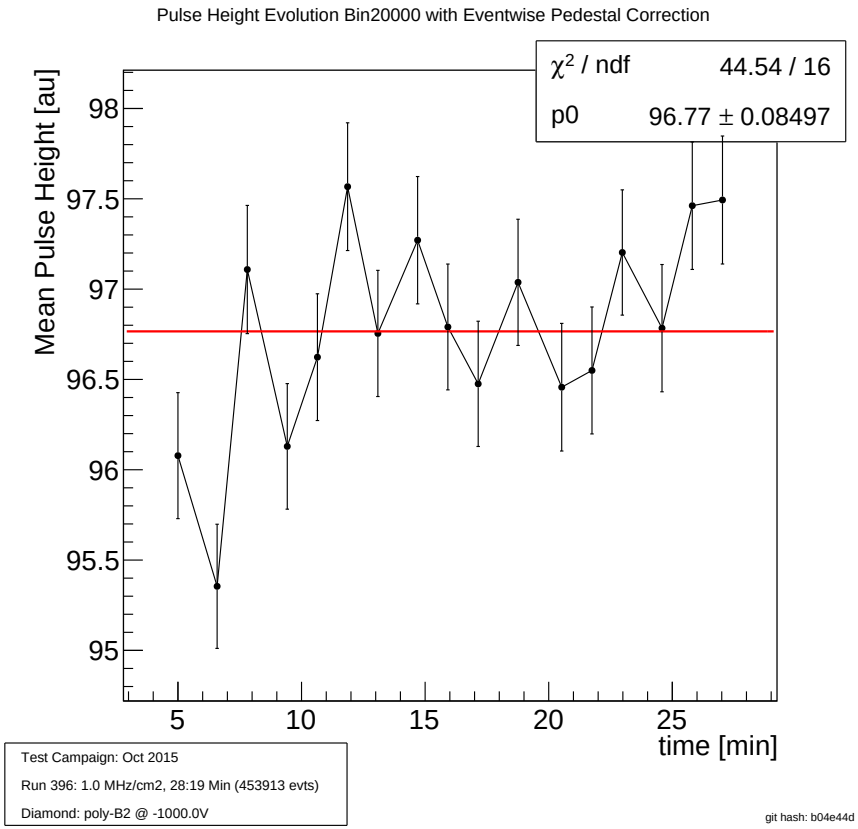
- writing tool in c++ to realign the trees with negative offset
- save <N> last events of the telescope branches
- check the number of hits for the <N> last telescope events for every <X> pulser events
- offset = lowest hit rate
- save the correct telescope event to the DRS4 events by choosing form the last <N>
- may correct for a large number of offsets


Event Alignment
Hits per Event @ Pulser Events [%]
100
80
60
40
20
0
0
50
100
150
200
250
300
350
400
450
×10^3
Event Number
Test Campaign: Oct 2015
Run 396: 1.0 MHz/cm2, 28:19 Min (453914 evts)
Diamond: poly-B2 @ -1000.0V
git hash: b04e44d

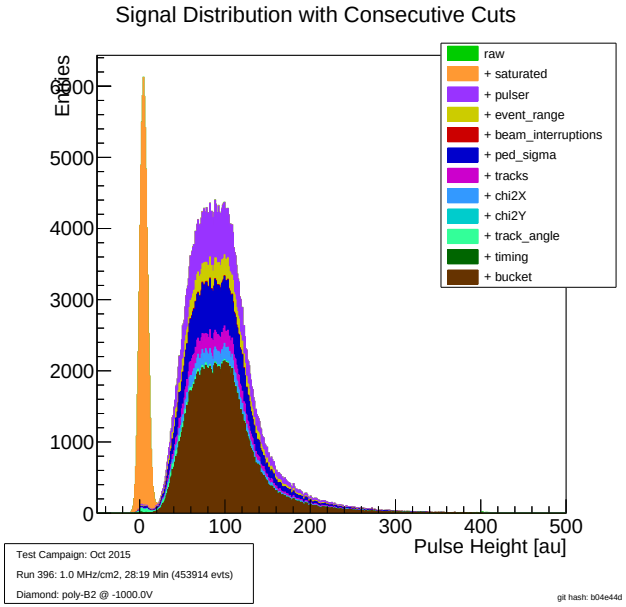

Event Alignment
Hits per Event @ Pulser Events [%]
100
80
60
40
20
0
0
50
100
150
200
250
300
350
400
450
×10^3
Event Number
Test Campaign: Oct 2015
Run 396: 1.0 MHz/cm2, 28:19 Min (453914 evts)
Diamond: poly-B2 @ -1000.0V
git hash: b04e44d

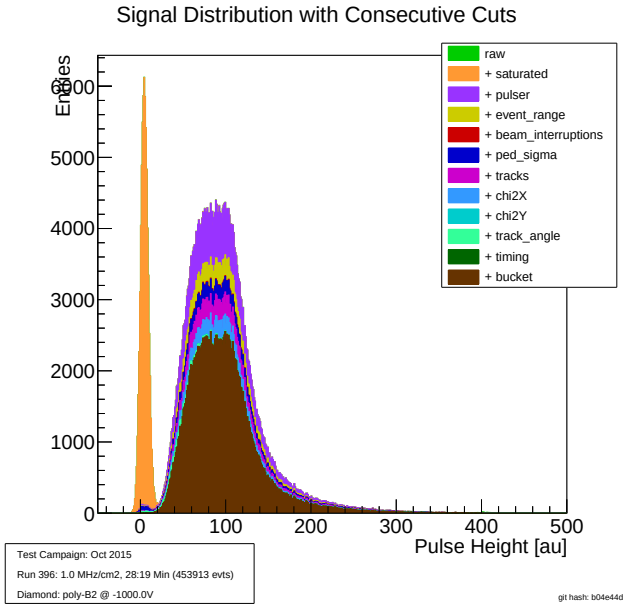
Aligning

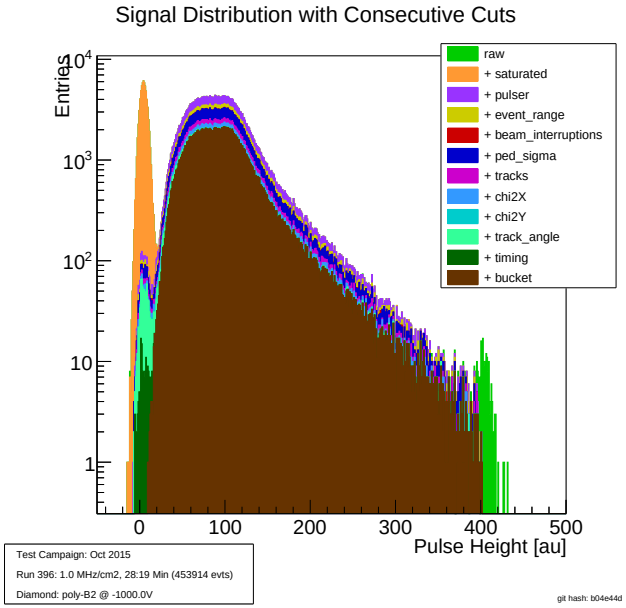

Pulse Height Evolution Bin20000 with Eventwise Pedestal Correction
χ² / ndf 36.7 / 16
p0 97.08 ± 0.09346
Mean Pulse Height [au]
time [min]
Test Campaign: Oct 2015
Run 396: 1.0 MHz/cm2, 28:19 Min (453914 evts)
Diamond: poly-B2 @ -1000.0V
git hash: b04e44d

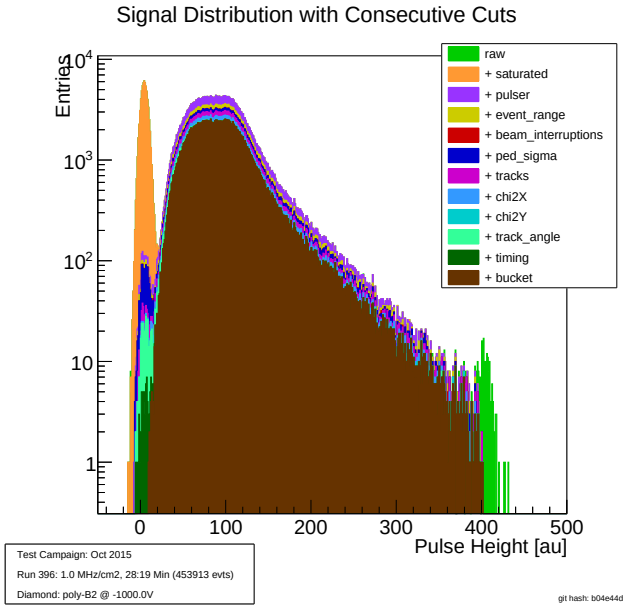

Pulse Height Evolution Bin20000 with Eventwise Pedestal Correction
χ² / ndf 44.54 / 16
p0 96.77 ± 0.08497
Mean Pulse Height [au]
time [min]
Test Campaign: Oct 2015
Run 396: 1.0 MHz/cm2, 28:19 Min (453913 evts)
Diamond: poly-B2 @ -1000.0V
git hash: b04e44d

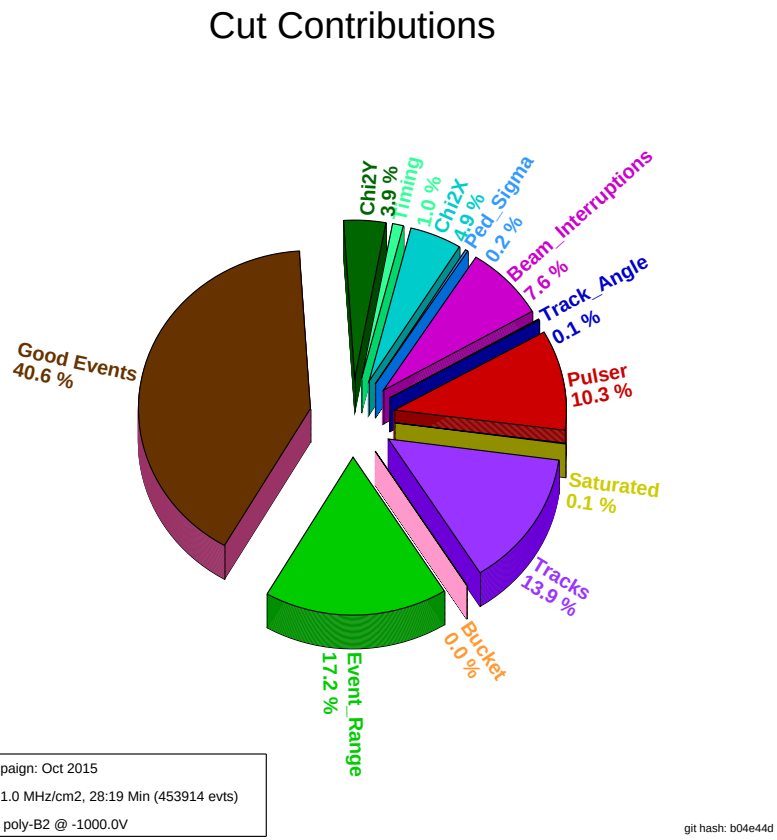
Aligning

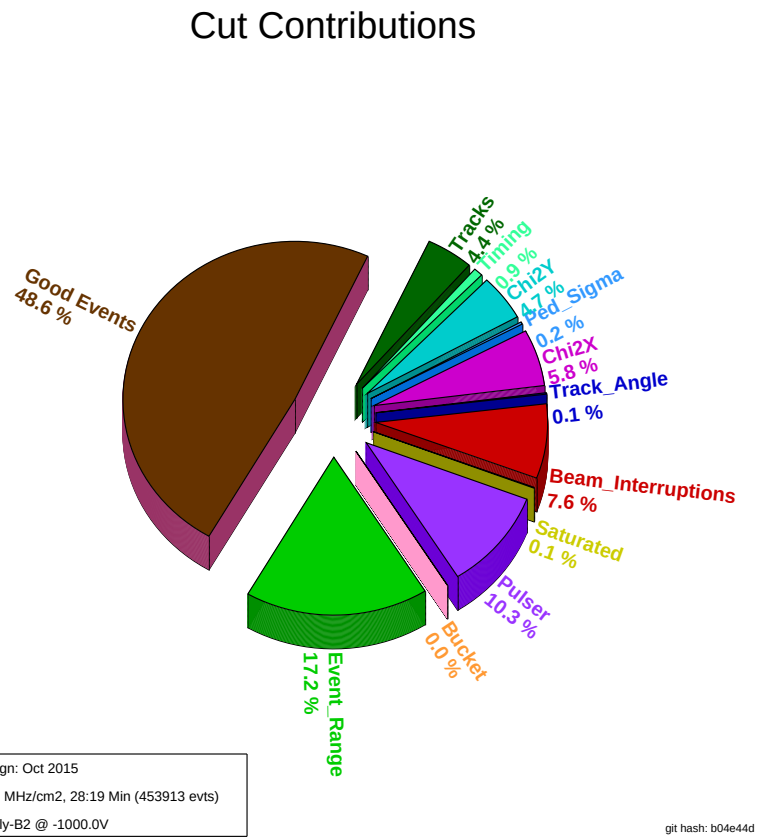

Signal Distribution with Consecutive Cuts
Entries
Pulse Height [au]
raw
+ saturated
+ pulser
+ event_range
+ beam_interruptions
+ ped_sigma
+ tracks
+ chi2X
+ chi2Y
+ track_angle
+ timing
+ bucket
Test Campaign: Oct 2015
Run 396: 1.0 MHz/cm2, 28:19 Min (453914 evts)
Diamond: poly-B2 @ -1000.0V
git hash: b04e44d


Signal Distribution with Consecutive Cuts
Entries
Pulse Height [au]
raw
+ saturated
+ pulser
+ event_range
+ beam_interruptions
+ ped_sigma
+ tracks
+ chi2X
+ chi2Y
+ track_angle
+ timing
+ bucket
Test Campaign: Oct 2015
Run 396: 1.0 MHz/cm2, 28:19 Min (453913 evts)
Diamond: poly-B2 @ -1000.0V
git hash: b04e44d


Signal Distribution with Consecutive Cuts
Entries
Pulse Height [au]
raw
+ saturated
+ pulser
+ event_range
+ beam_interruptions
+ ped_sigma
+ tracks
+ chi2X
+ chi2Y
+ track_angle
+ timing
+ bucket
Test Campaign: Oct 2015
Run 396: 1.0 MHz/cm2, 28:19 Min (453914 evts)
Diamond: poly-B2 @ -1000.0V
git hash: b04e44d


Signal Distribution with Consecutive Cuts
Entries
Pulse Height [au]
raw
+ saturated
+ pulser
+ event_range
+ beam_interruptions
+ ped_sigma
+ tracks
+ chi2X
+ chi2Y
+ track_angle
+ timing
+ bucket
Test Campaign: Oct 2015
Run 396: 1.0 MHz/cm2, 28:19 Min (453913 evts)
Diamond: poly-B2 @ -1000.0V
git hash: b04e44d


Cut Contributions
Chi2Y 3.9 %
Timing 1.0 %
Chi2X 4.9 %
Ped_Sigma 0.2 %
Beam_Interruptions 7.6 %
Track_Angle 0.1 %
Pulser 10.3 %
Saturated 0.1 %
Tracks 13.9 %
Bucket 0.0 %
Event_Range 17.2 %
Good Events 40.6 %
Test Campaign: Oct 2015
Run 396: 1.0 MHz/cm2, 28:19 Min (453914 evts)
Diamond: poly-B2 @ -1000.0V
git hash: b04e44d


Cut Contributions
Tracks 4.4 %
Timing 0.9 %
Chi2Y 4.7 %
Ped_Sigma 0.2 %
Chi2X 5.8 %
Track_Angle 0.1 %
Beam_Interruptions 7.6 %
Saturated 0.1 %
Pulser 10.3 %
Bucket 0.0 %
Event_Range 17.2 %
Good Events 48.6 %
Test Campaign: Oct 2015
Run 396: 1.0 MHz/cm2, 28:19 Min (453913 evts)
Diamond: poly-B2 @ -1000.0V
git hash: b04e44d

Section 3

Conclusion

- perhaps 5 % of the runs show an event misalignment right from the start
- misalignment weak influence on pulse height
- cut out wrong events
- working tool to correct for misalignment with negative offsets