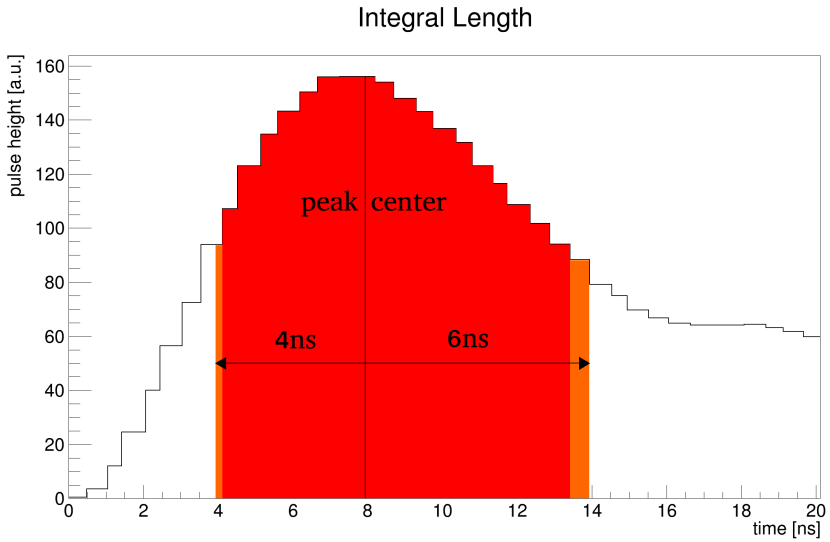

Meeting 22nd April 2016

Speaker: Felix Bachmair

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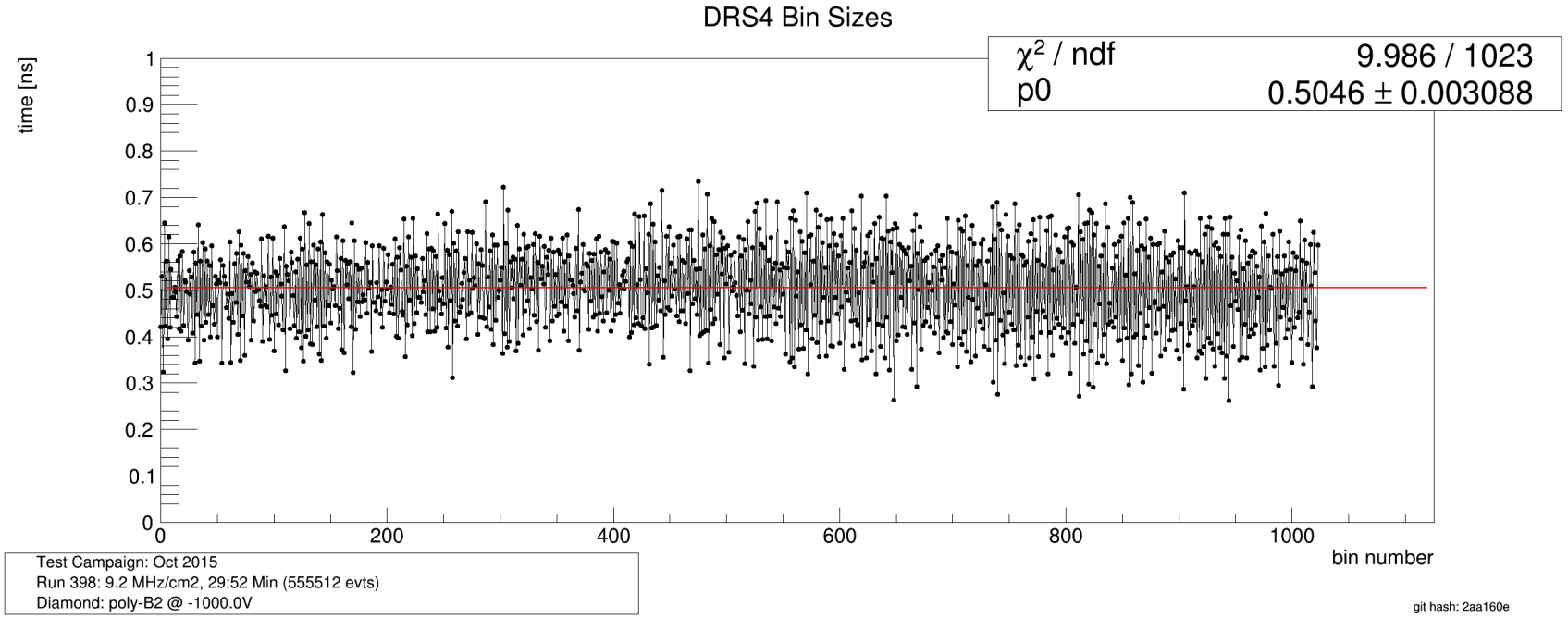
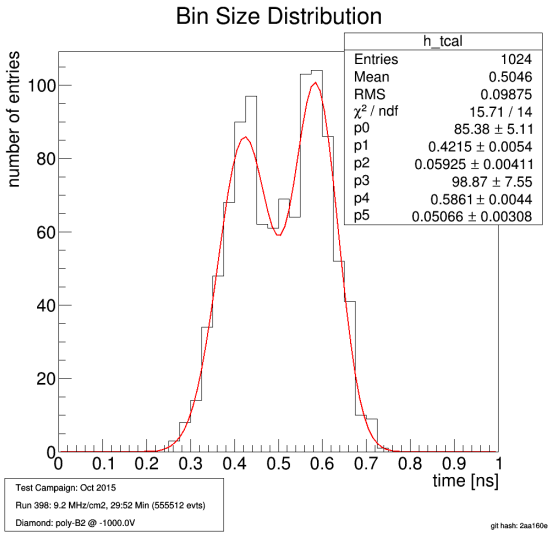
Section 1

DRS4 Cells

Cell Length

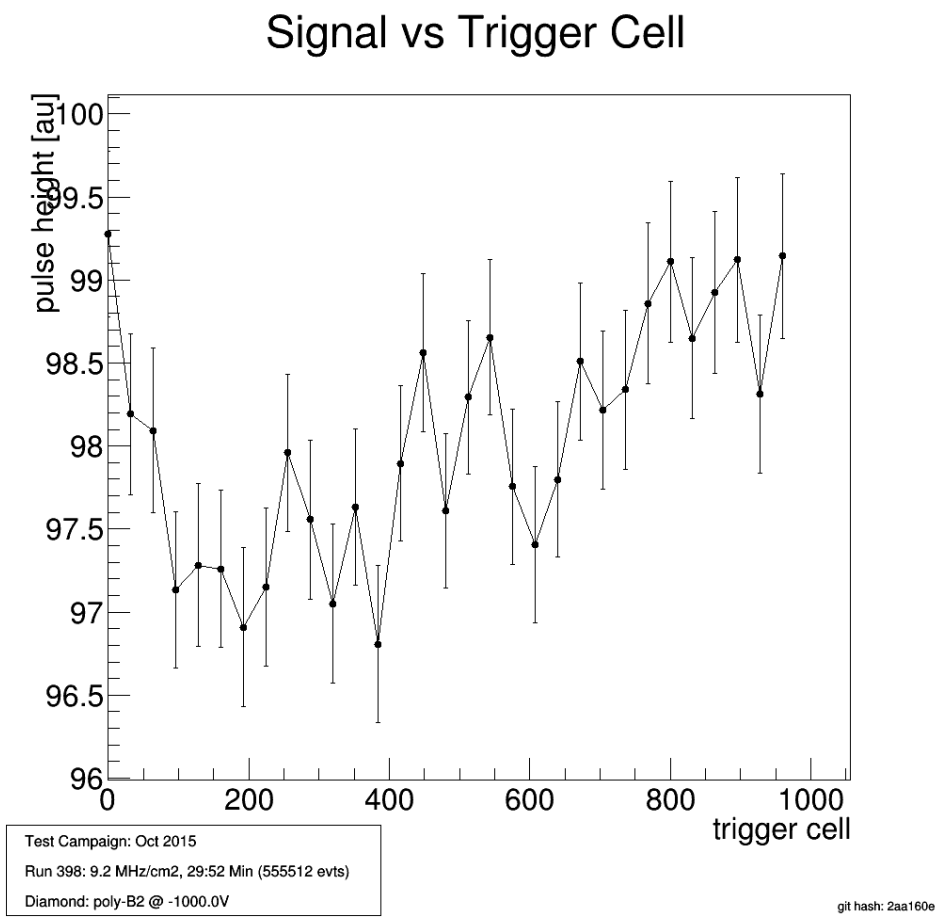




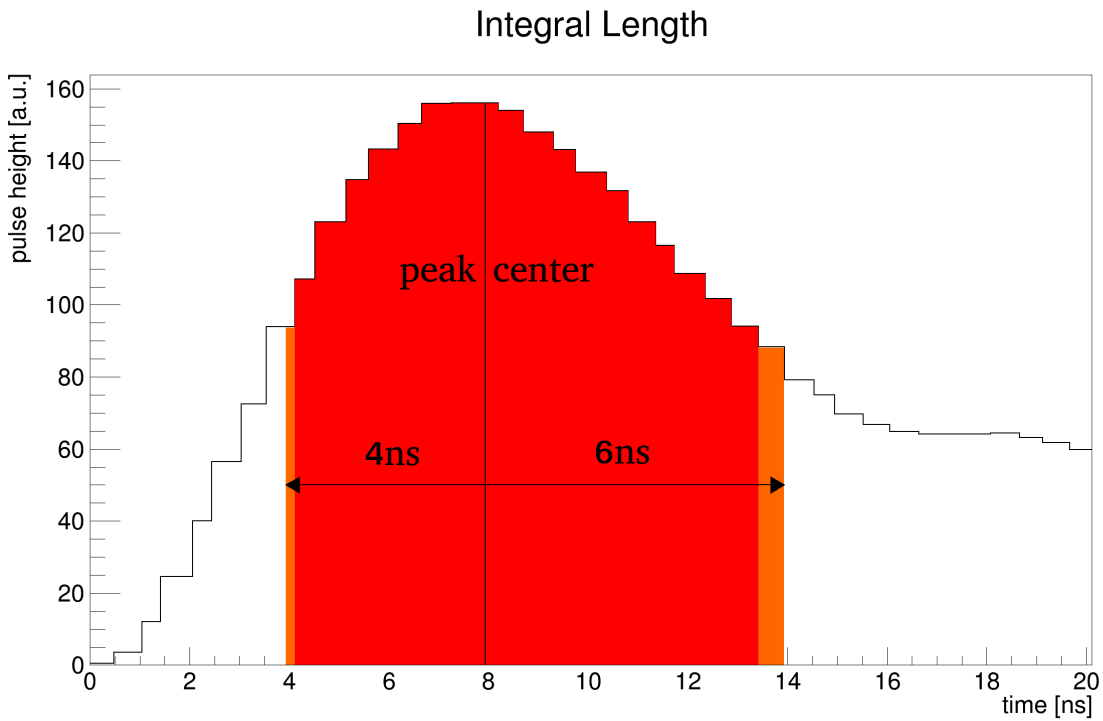
- bin sizes centered around .5
- two gaussian peaks around 0.42 ns and 0.59 ns with sigmas of $\approx$ 0.05 ns

Section 2

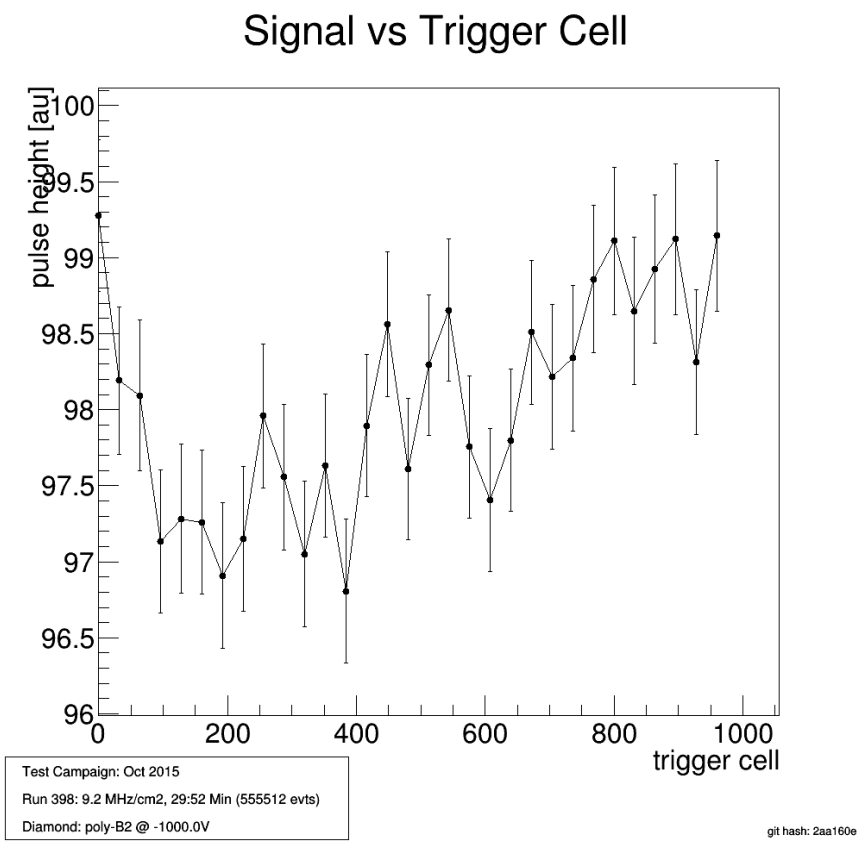
Signal Vs. Trigger Cell

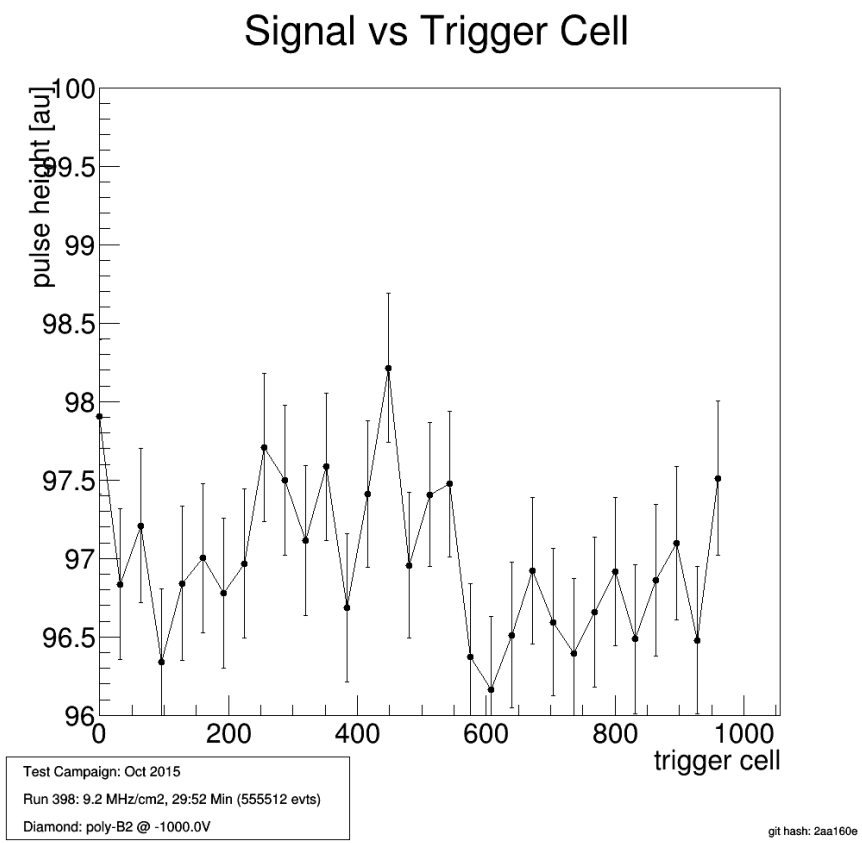


- using fixed bin size for the integration
  - length of integral depending on trigger cell since bins have different sizes



- different time sizes of the bins
- using same interval as before: [8,12] $\rightarrow$ [4 ns, 6 ns] taking 0.5 ns as average bin size
- summing up the pulse heights until the integral has a fixed time size
- taking part of the outer bins (orange) that is missing to the exact time value
- use straight line approximation?
- $\rightarrow$ make new SNR study!

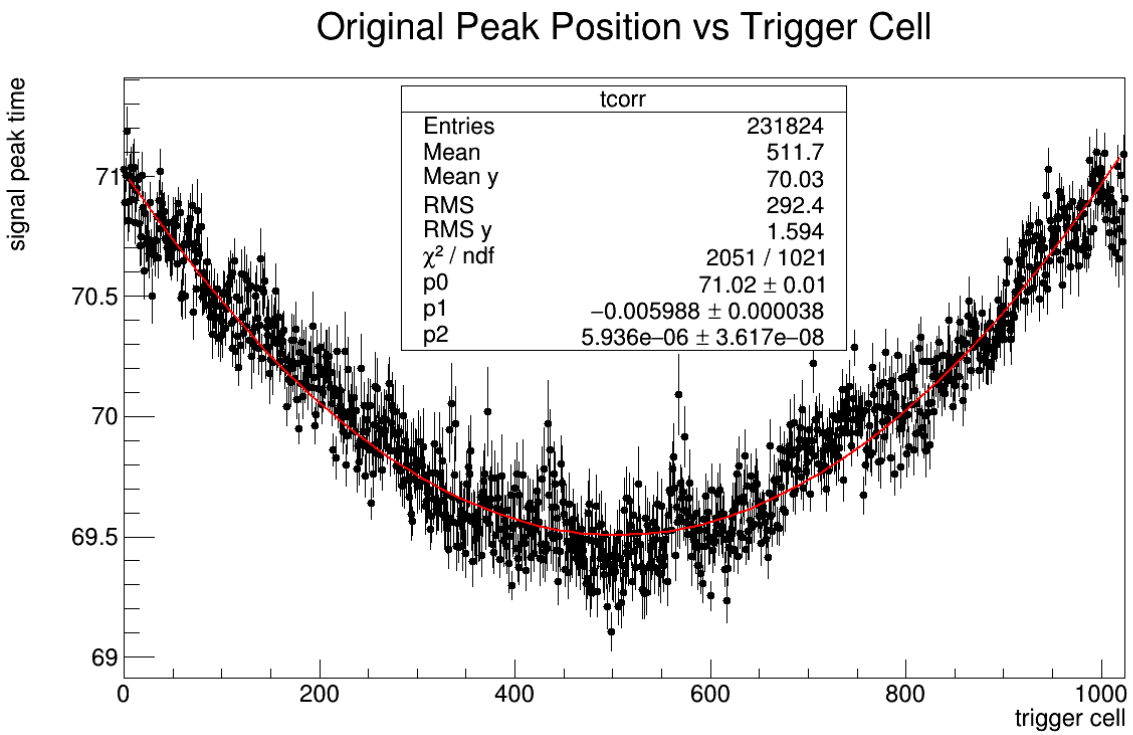




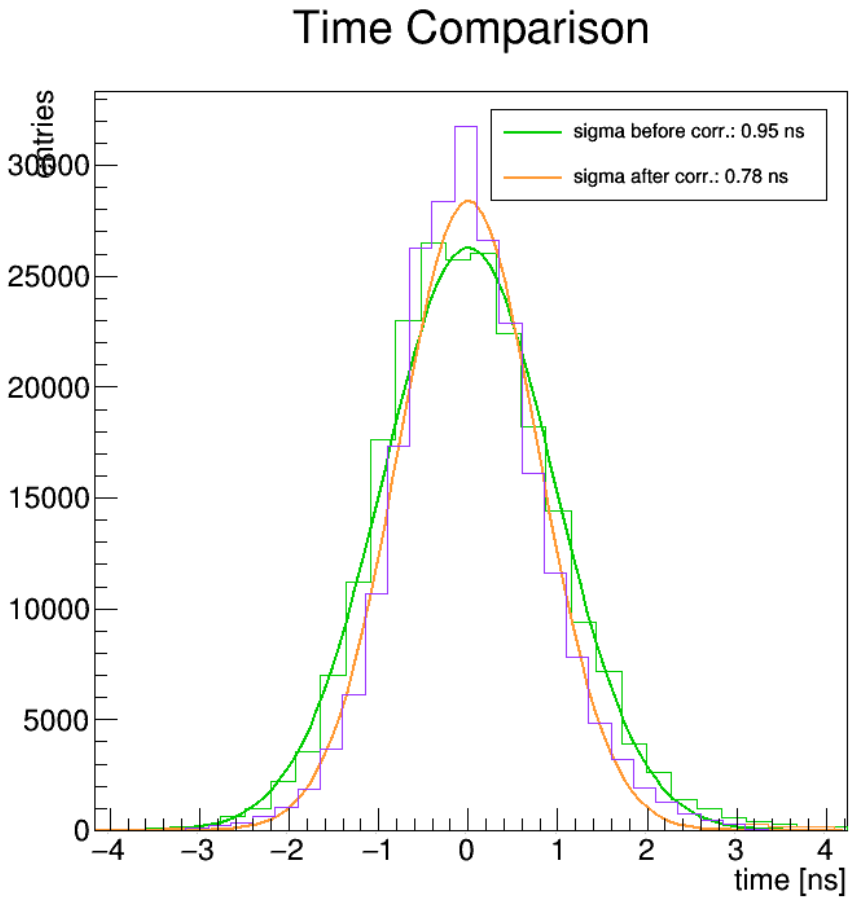
- using fixed time integral length flattens the behaviour of the pulse heights
- χ^2: 78/26 with 30 dof of pol0 fit

Section 3

Peak Timing Cut



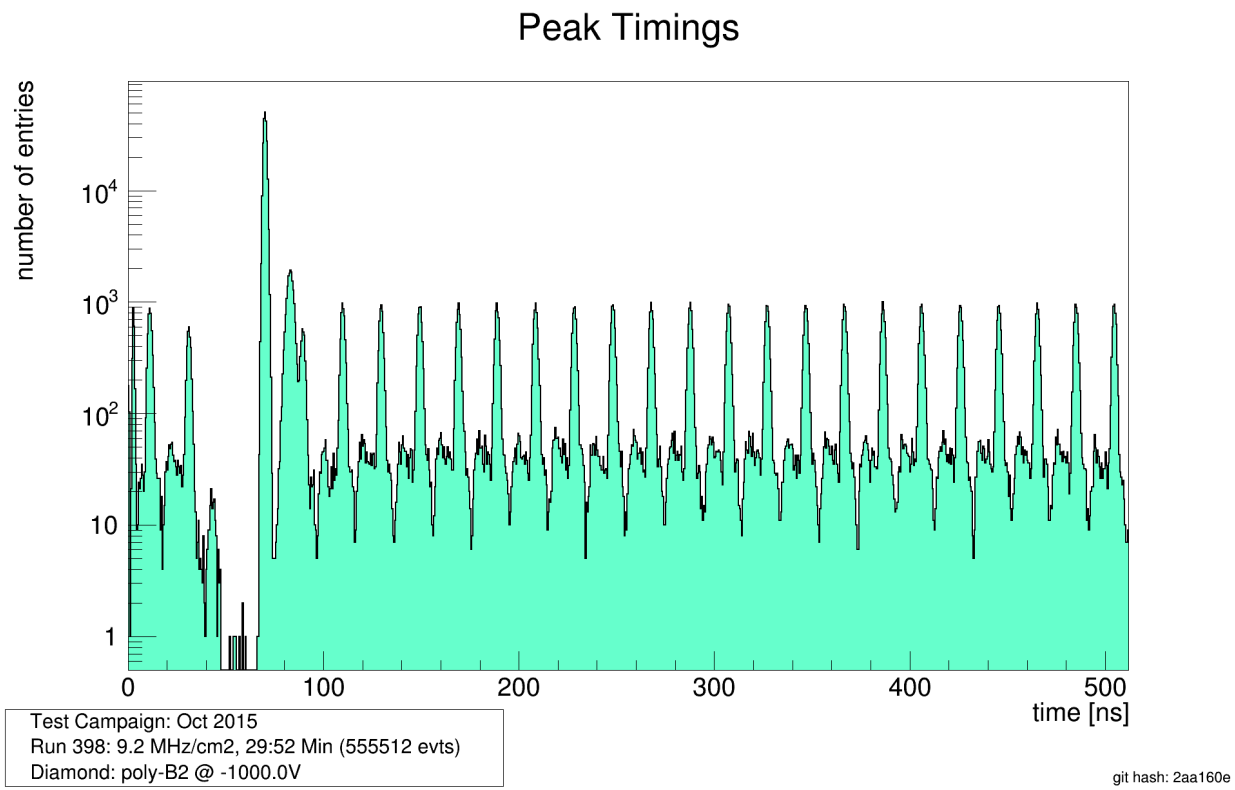
- still slight dependence on the trigger cell
- introducing trigger cell dependent cut based on the pol2 fit
  - TMath::Abs(Signal - p1 * trigger_cell - p2 * trigger_cell * trigger_cell) - mean) / sigma < 3
- takes out all events that are not in between 3 sigma of the corrected peak timings



- 0.78 ns time resolution after the correction!!
- **hier waere dein Plot mit der region auf wir cutten noch toll!!**

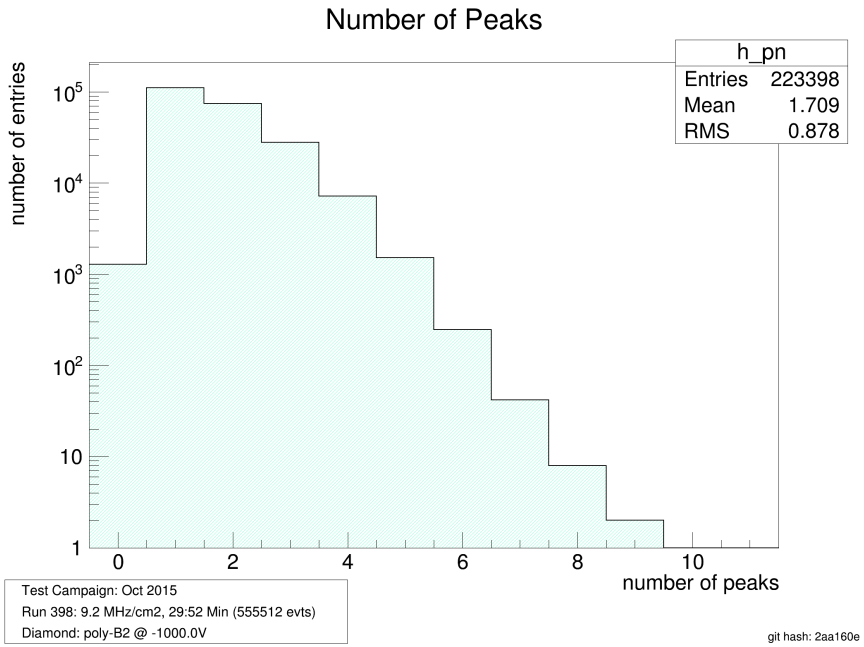
Section 4

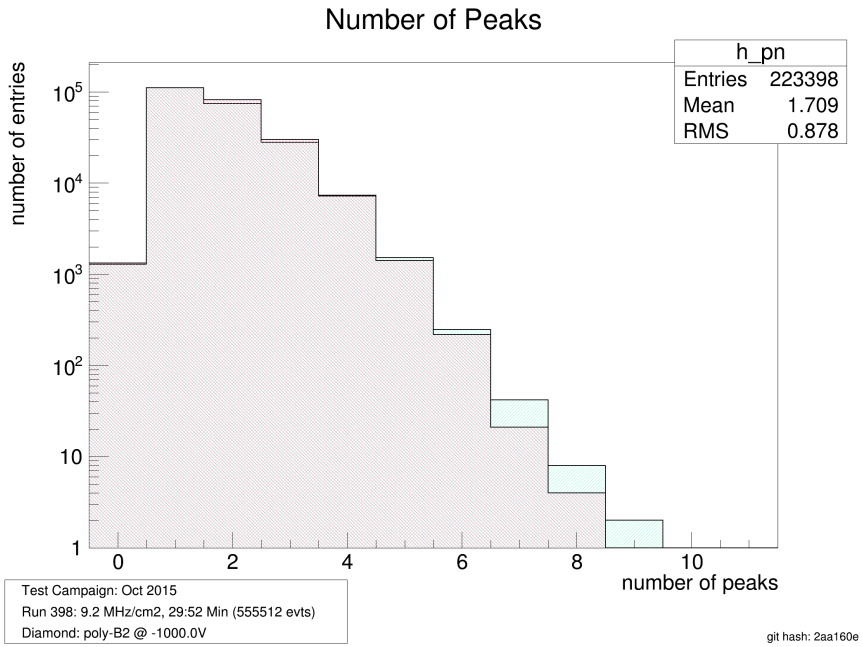
Peak Positions



- highest peak = trigger peak
- secondary peak completeley evenly distributed → nice poissonian beam
- peaks in between the secondary peaks
  - almost same ratio of trigger peak/peak after as secondary peaks/peak in between
  - idea different particle type! (positrons, myons?)
  - possibility to trigger on other particles

Peak Numbers



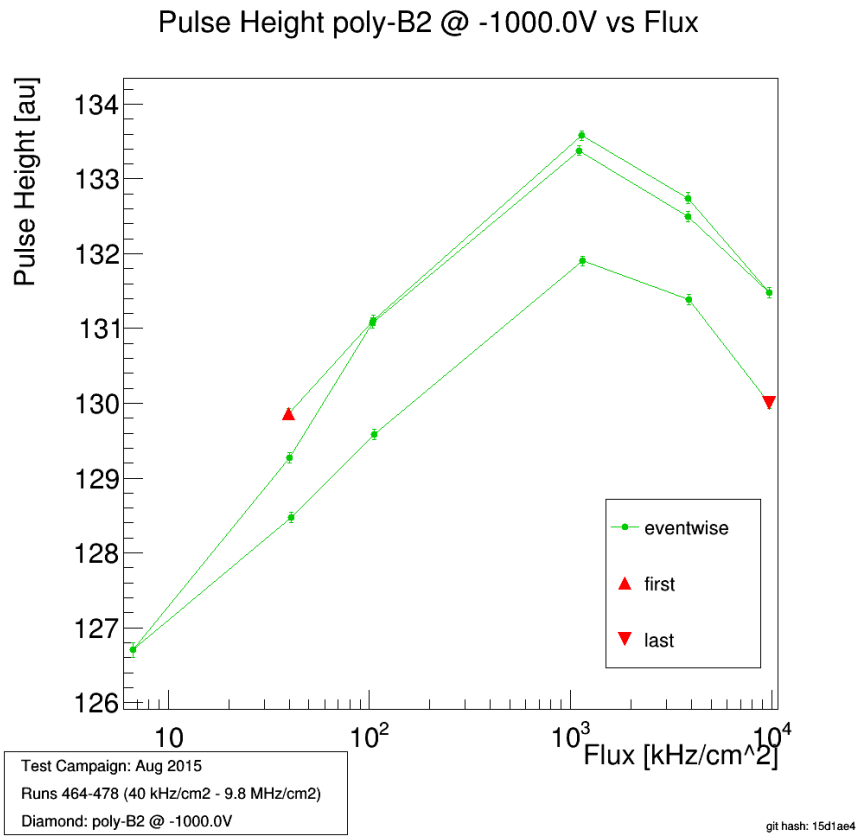


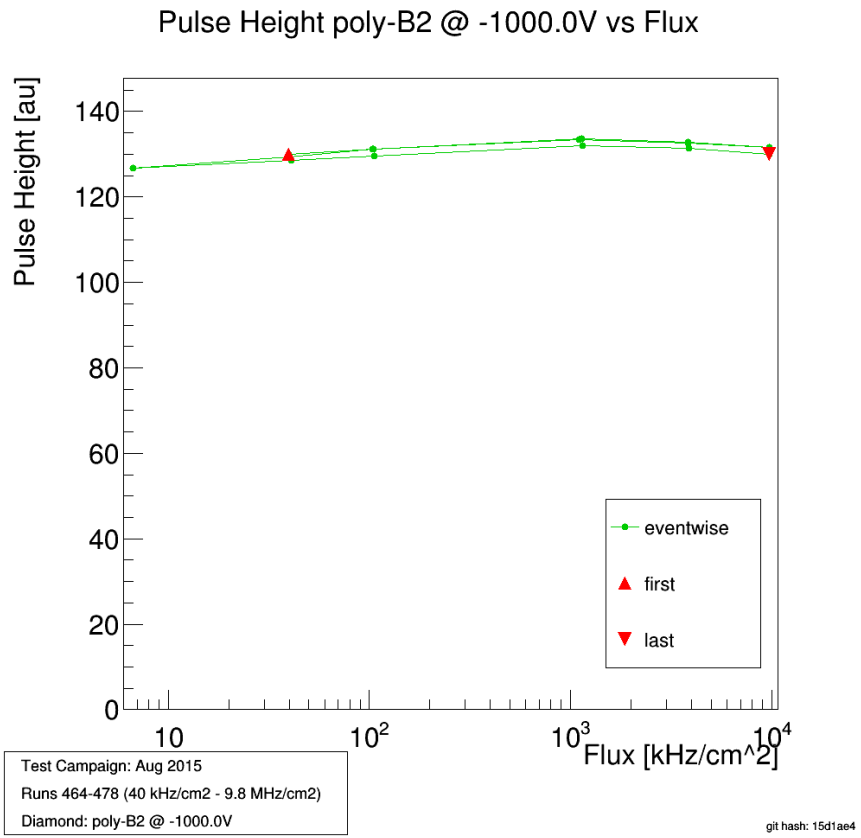
- pink distribtion histo filled with gRandom.Poisson(24 * self.get_flux() / 5e4 * .5 * .5 * p2) + gRandom.Binomial(1, p1)
  - p1 = 0.988, p2 = 0.68
- measured flux has the correct order of magnitude
- use distribution to estimate the flux!?
  - does it mean that flux is 68% lower than expected?
  - longer tail due to peak of additional particles?
  - wrong size of the diamond // edges less efficiant?
  - influence of dead time?

Section 5

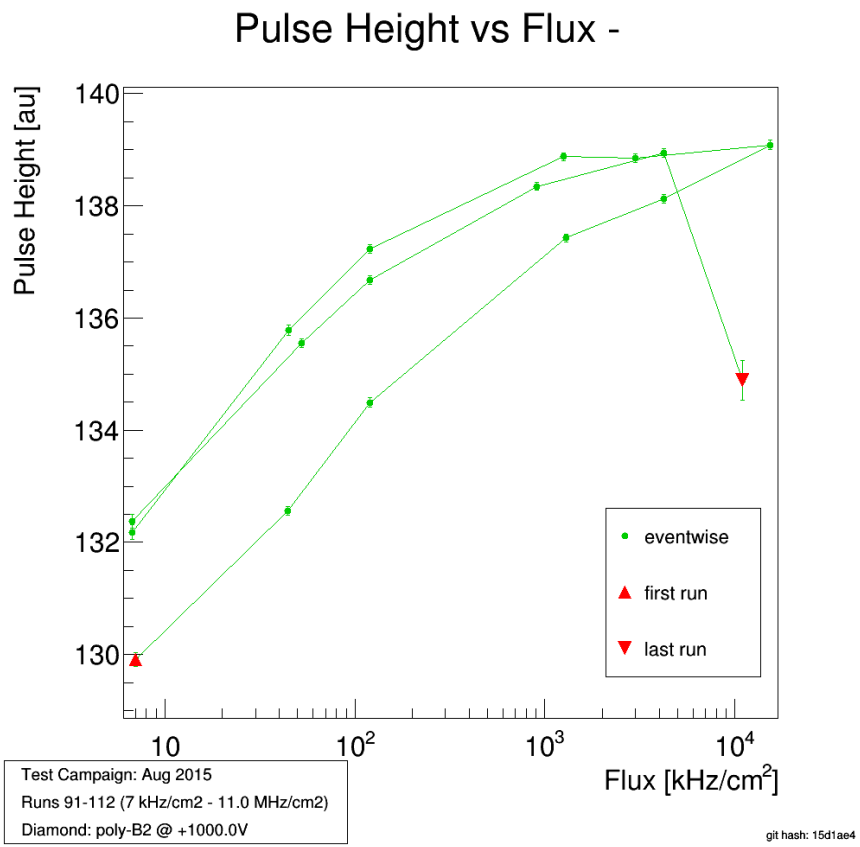
August 2015 Beam Test Data

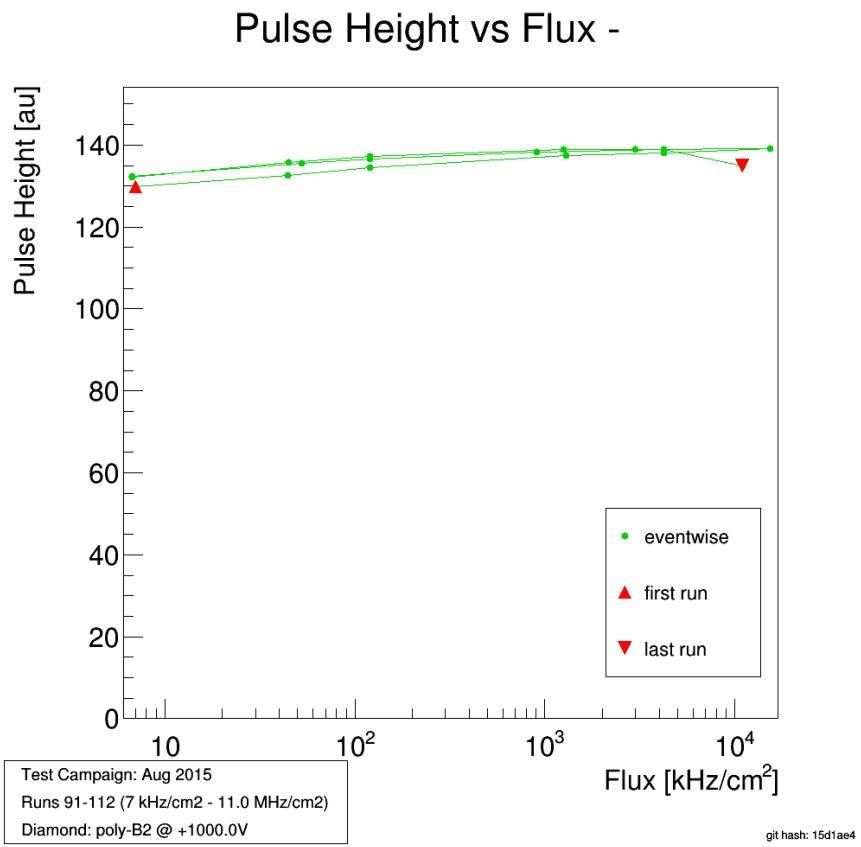
−1000 V


Pulse Height poly-B2 @ -1000.0V vs Flux
Pulse Height [au]
134
133
132
131
130
129
128
127
126
10
10^2
10^3
10^4
Flux [kHz/cm^2]
eventwise
first
last
Test Campaign: Aug 2015
Runs 464-478 (40 kHz/cm2 - 9.8 MHz/cm2)
Diamond: poly-B2 @ -1000.0V
git hash: 15d1ae4


Pulse Height poly-B2 @ -1000.0V vs Flux
Pulse Height [au]
140
120
100
80
60
40
20
0
10
10^2
10^3
10^4
Flux [kHz/cm^2]
eventwise
first
last
Test Campaign: Aug 2015
Runs 464-478 (40 kHz/cm2 - 9.8 MHz/cm2)
Diamond: poly-B2 @ -1000.0V
git hash: 15d1ae4

+1000 V


Pulse Height vs Flux -
Pulse Height [au]
Flux [kHz/cm^2]
eventwise
first run
last run
Test Campaign: Aug 2015
Runs 91-112 (7 kHz/cm2 - 11.0 MHz/cm2)
Diamond: poly-B2 @ +1000.0V
git hash: 15d1ae4


Pulse Height vs Flux -
Pulse Height [au]
Flux [kHz/cm^2]
eventwise
first run
last run
Test Campaign: Aug 2015
Runs 91-112 (7 kHz/cm2 - 11.0 MHz/cm2)
Diamond: poly-B2 @ +1000.0V
git hash: 15d1ae4

−500 V

Section 6

Conclusion

- exact time sizes of the bins distributed in double gaussian shape around 0.5 ns
- improving signal calculation by fixing the integral in time
- general dependence on trigger cell not completeley cured by tcal correction of the DRS4
- adding time correction based on remaining dependce on trigger cell
- introducing new cut on exact signal peak timing
- secondary beam bunches equally filled
- possibly a second particle type in the data
- flux measurement yields a good estimation
- August data of unirradiated II6-B2 shows stronger dependence on Rate