Baseline Effects

Olga Novgorodova
LAr Endcap Hilum Meeting

CERN
19.04.2016

Introduction

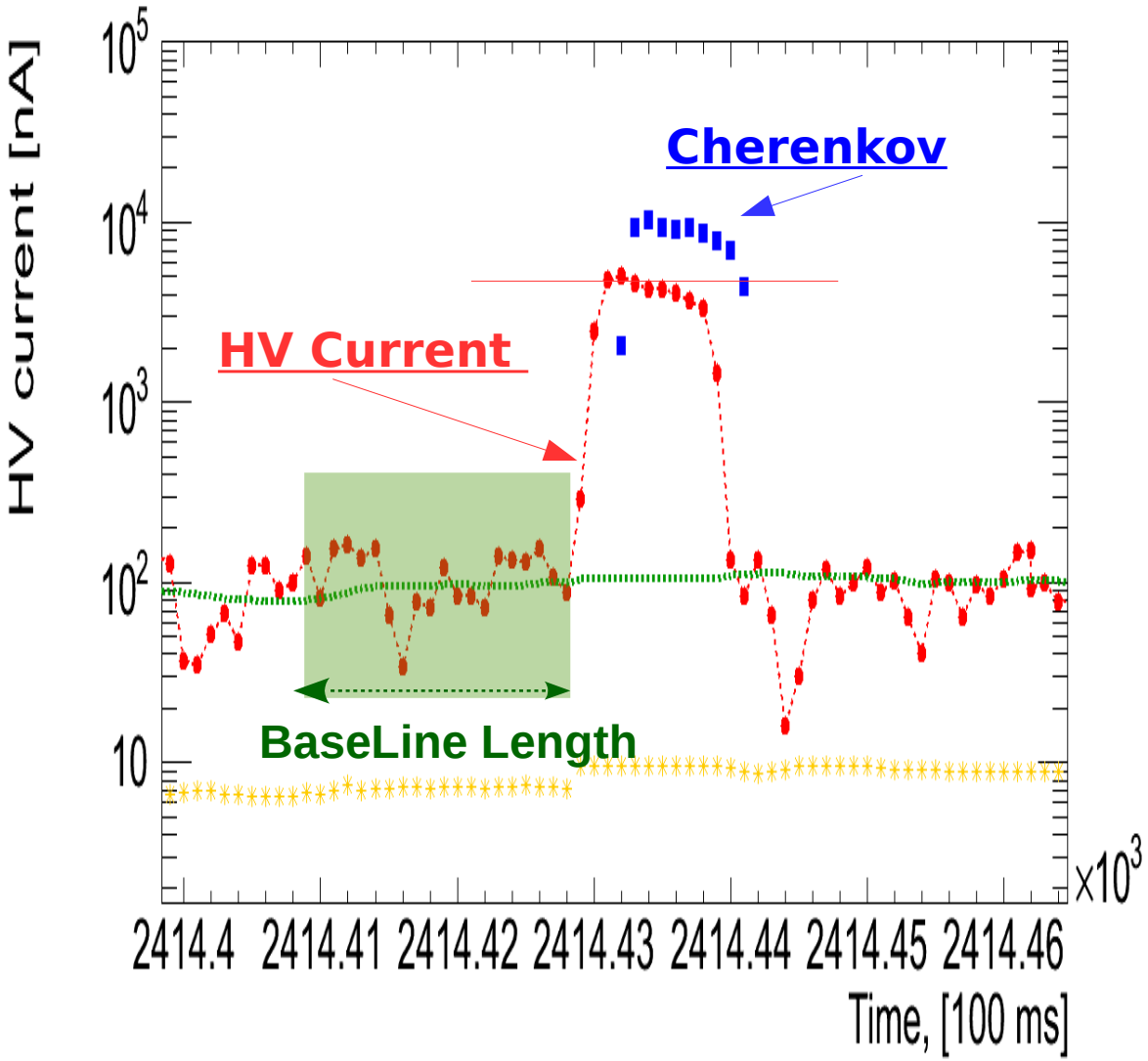
HV Current signal:

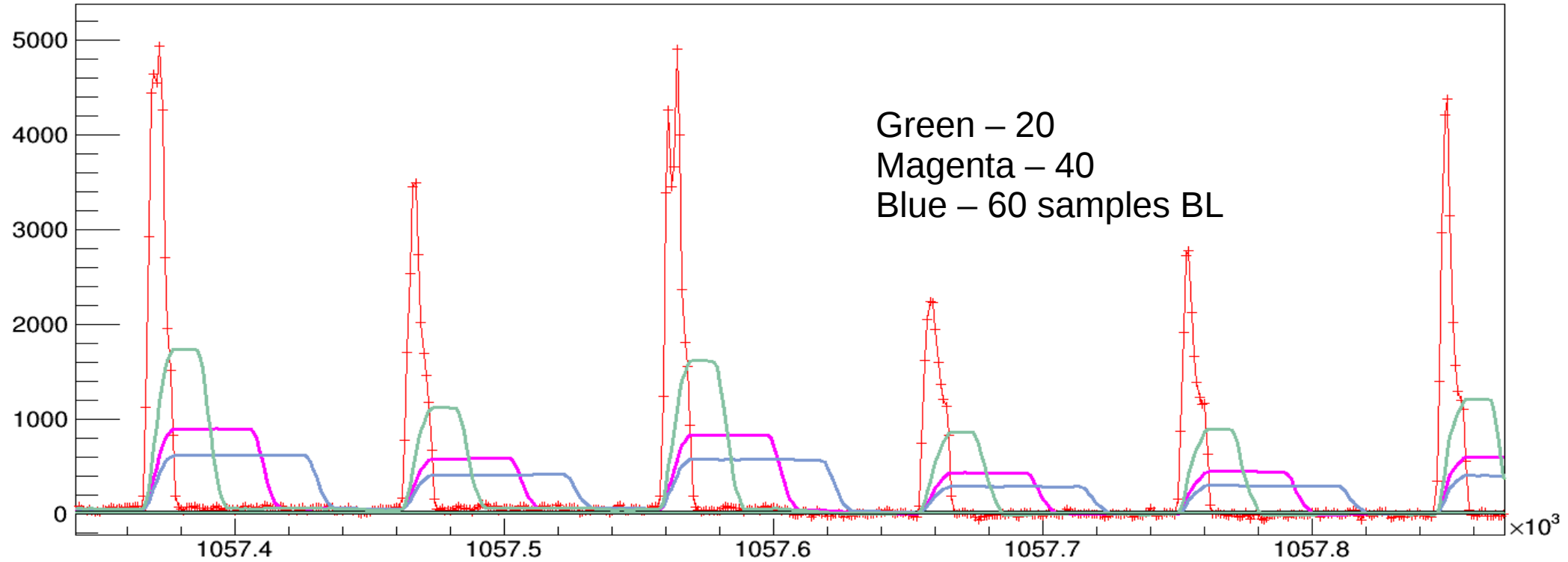
- Sliding average
- Threshold of 5 sigma
- HV signal
  →HV Current – average
- Signal length > 0.4 s

Cherenkov signal:

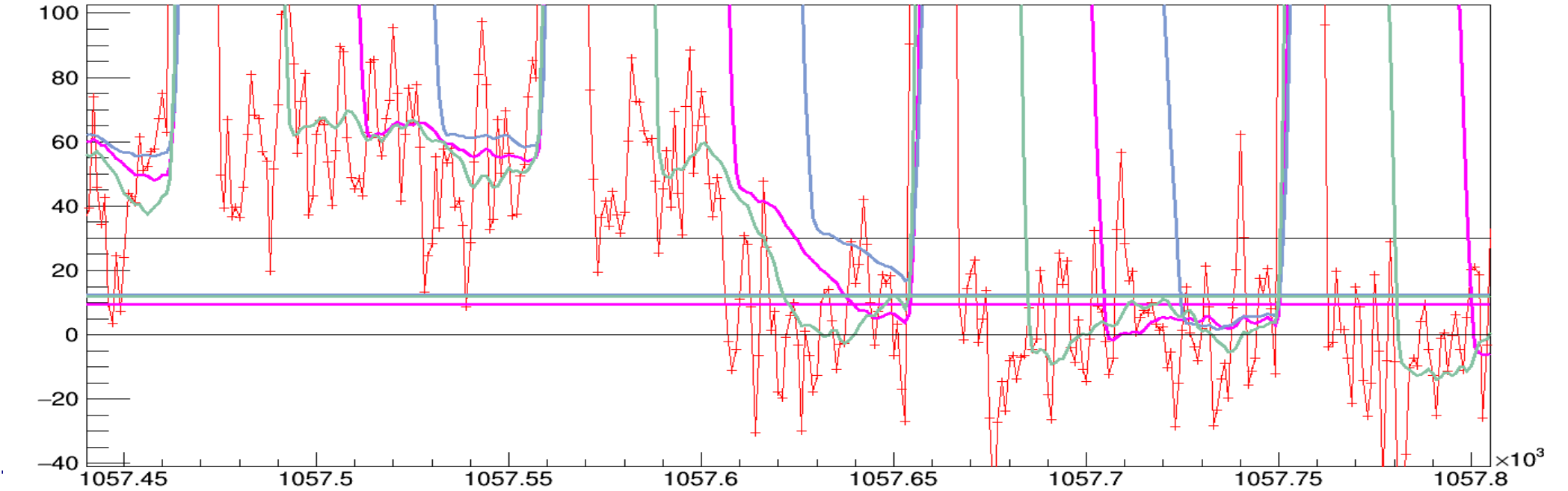
- Synchronization within 3 s with HV current
- Intensity → Ch Integral / spill length

- **BaseLine** variation 20-100 samples

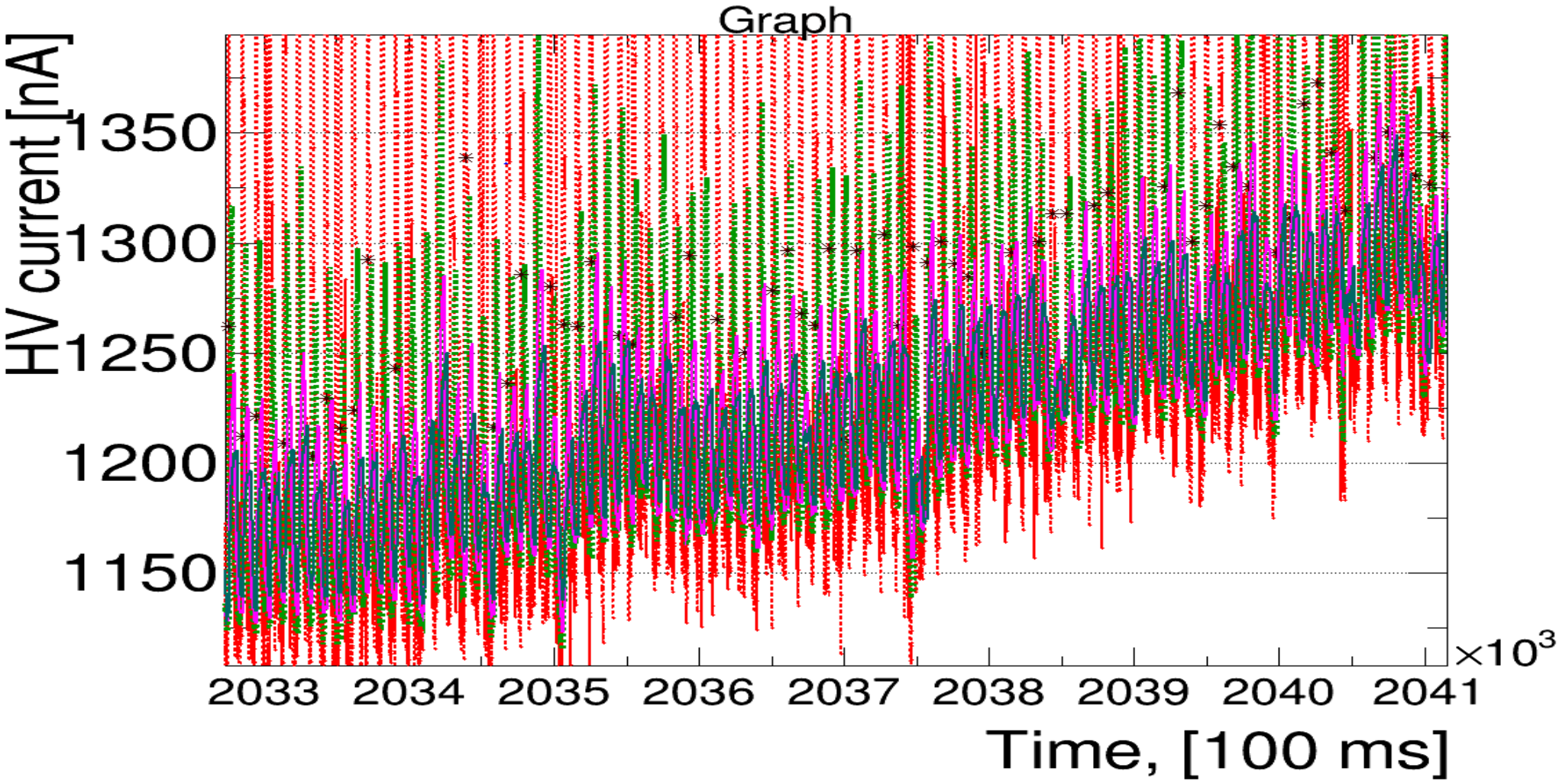




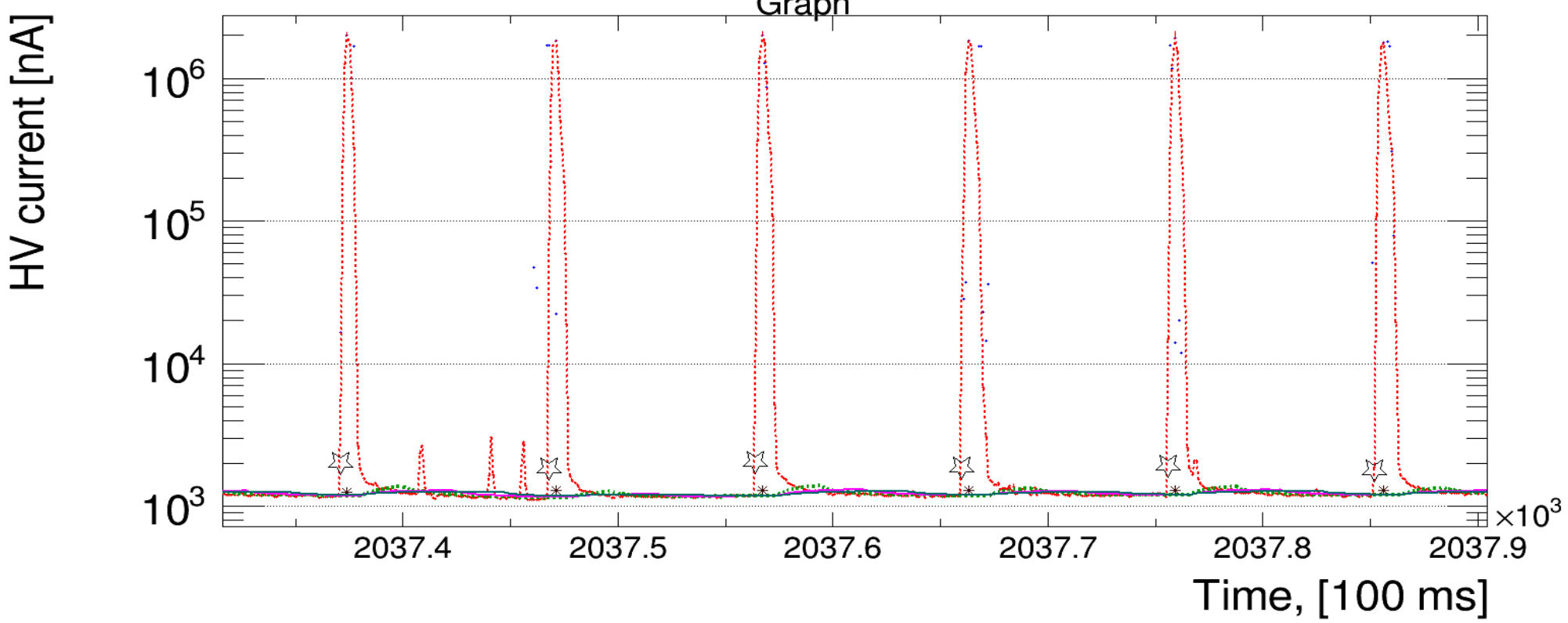
Longer baseline gets shift up, shorter is more baseline fluctuations dependent.

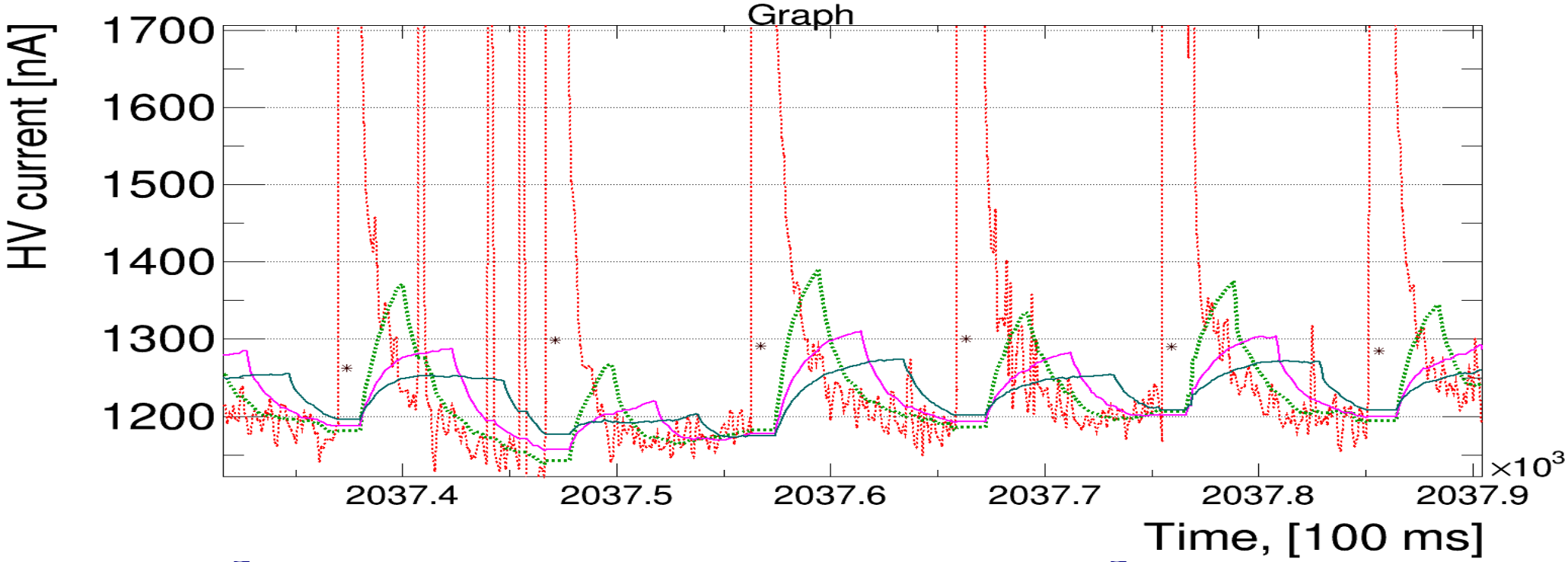


Example of large intensities



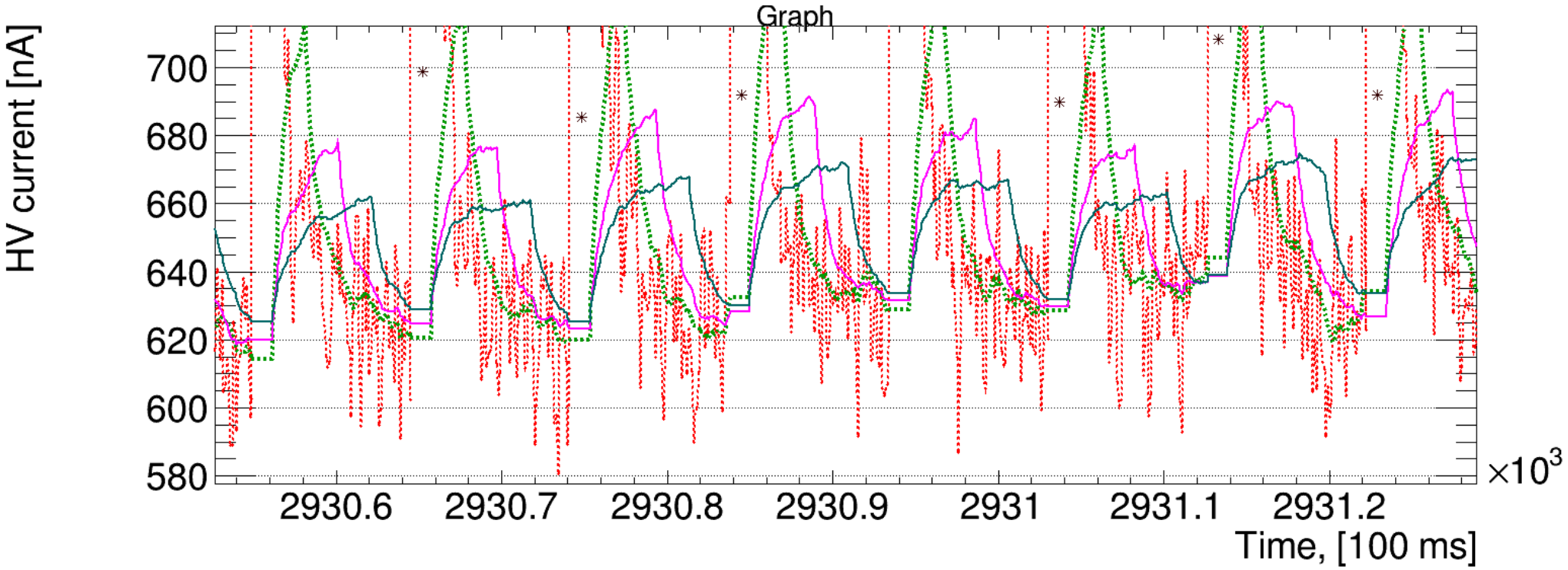
- Large intensities have increase in the base line as it does not manage to come down
- And continue going down over next signal, we under estimate signals at high intensities


Graph
HV current [nA]
10^6
10^5
10^4
10^3
2037.4
2037.5
2037.6
2037.7
2037.8
2037.9
×10³
Time, [100 ms]

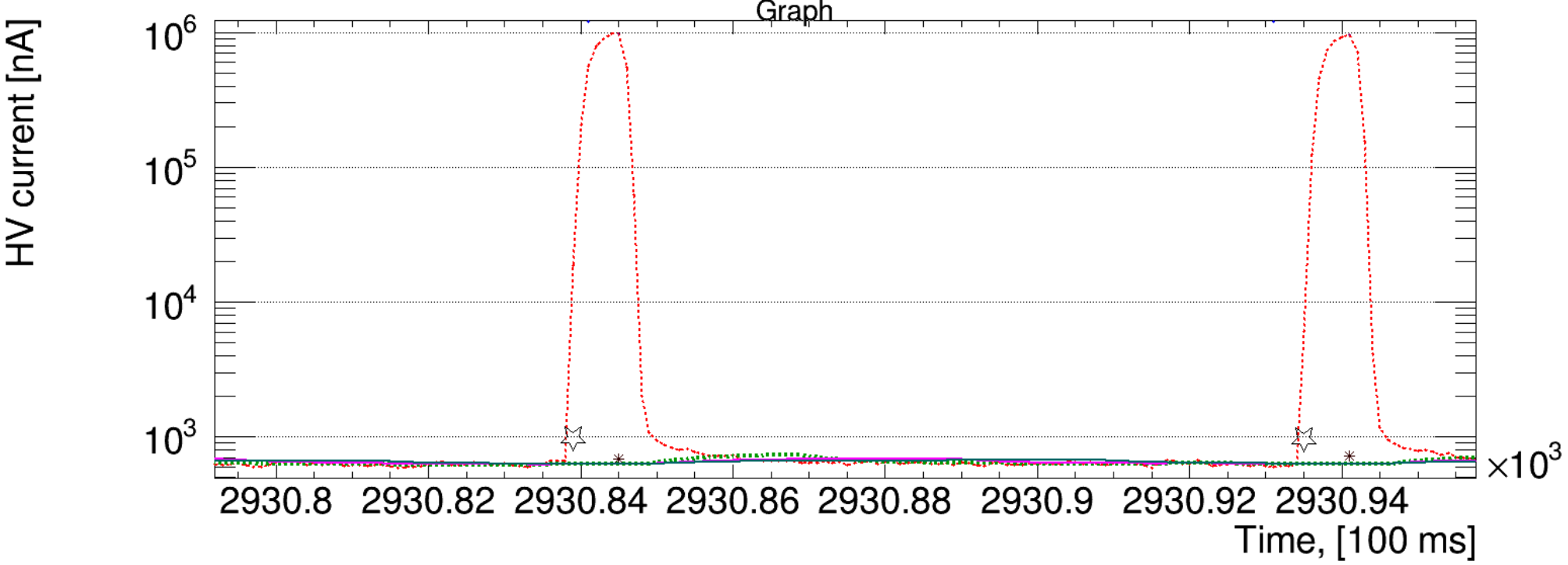

Graph
HV current [nA]
1700
1600
1500
1400
1300
1200
2037.4
2037.5
2037.6
2037.7
2037.8
2037.9
×10³
Time, [100 ms]

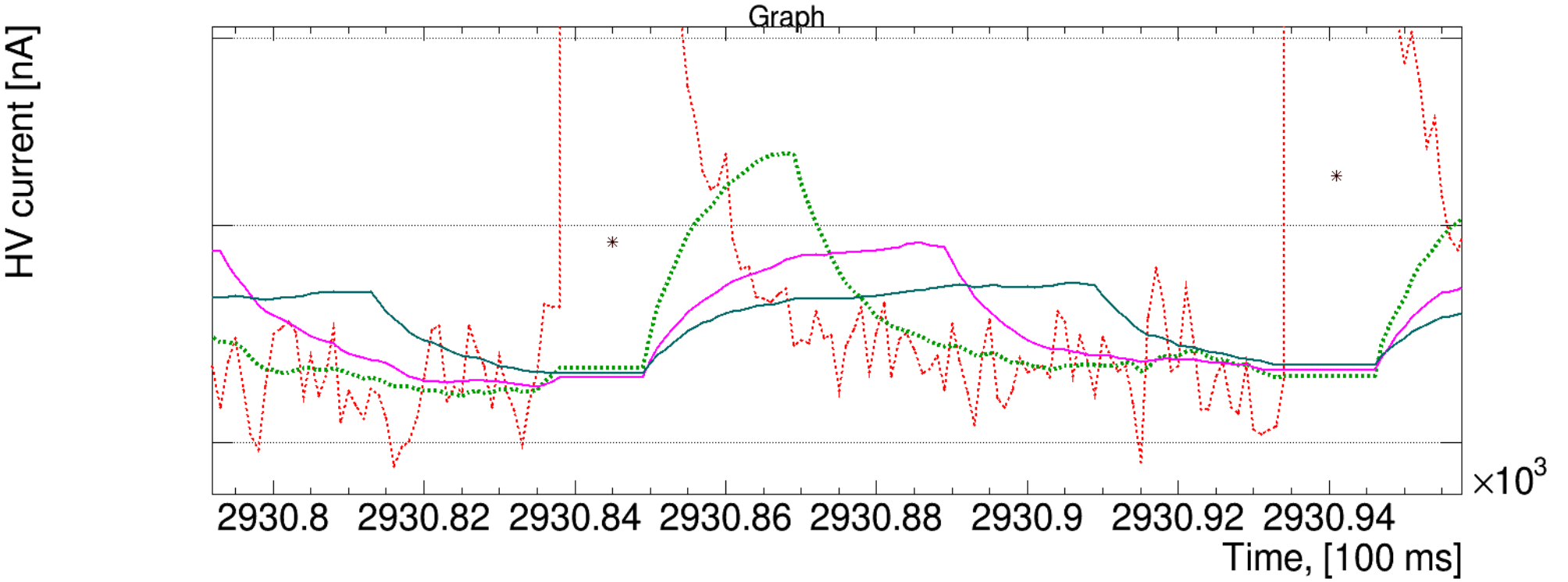
Ideas

- To take baseline before and after is not a solution.
- Large fluctuations start to occur between the spills and therefore longer baseline will smear the effect, but will be more often affected.
- Shorter baselines would have advantage.
- Need to watch critical runs more individually.



- But may be this effect is negligible on the level of magnitude of signals → see next slide

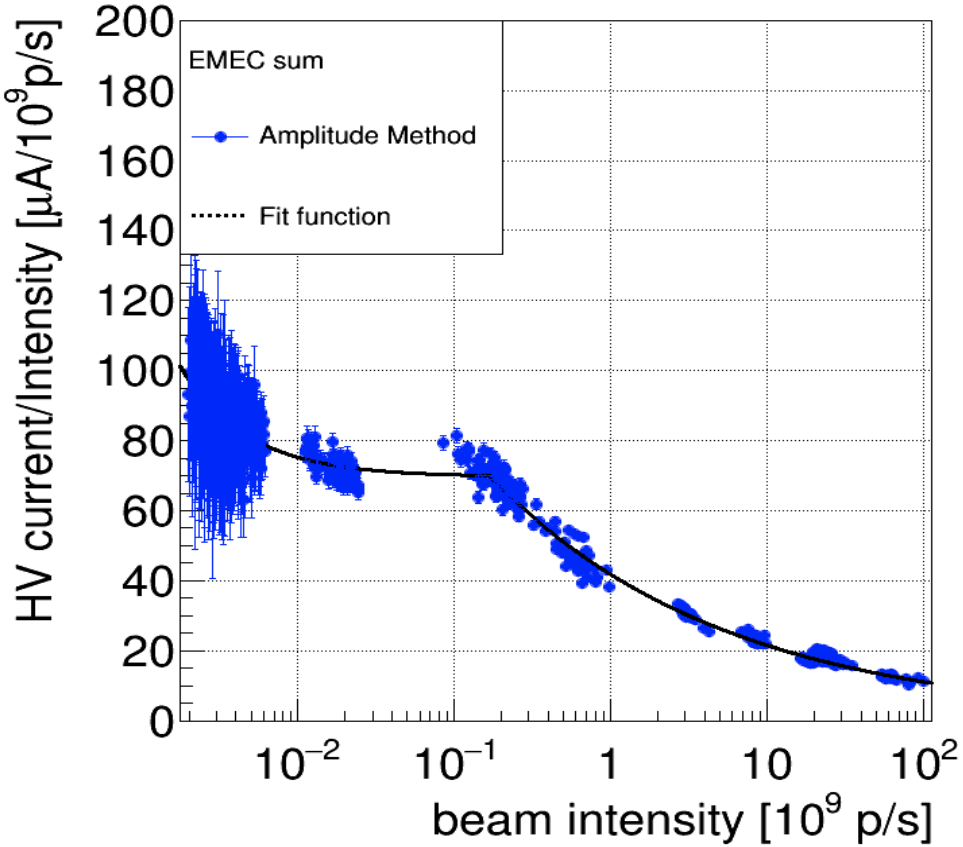

Graph
HV current [nA]
10^6
10^5
10^4
10^3
$\times 10^3$
2930.8 2930.82 2930.84 2930.86 2930.88 2930.9 2930.92 2930.94
Time, [100 ms]

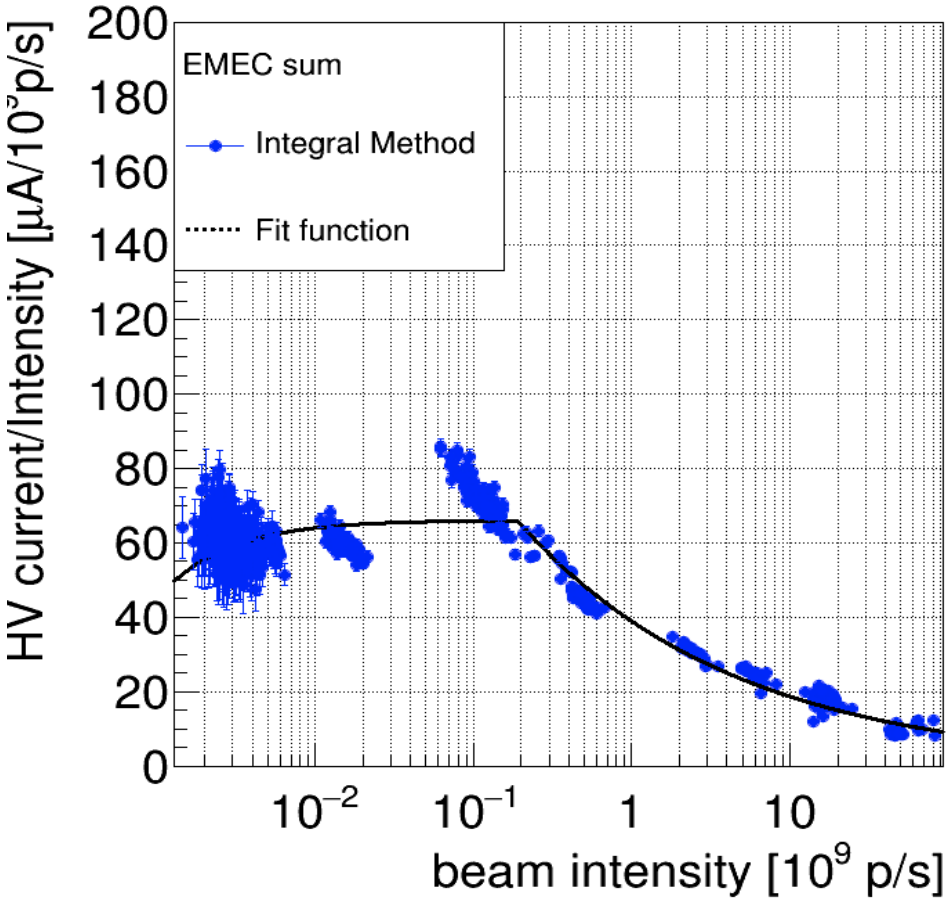

Graph
HV current [nA]
$\times 10^3$
2930.8 2930.82 2930.84 2930.86 2930.88 2930.9 2930.92 2930.94
Time, [100 ms]

Ideas

- Question stays there – why do we have an offset – definitely some effect of signal calculations
- I would say that integral method should not show any offset, or small offset, while from amplitude method I would expect a bias for one sigma at least due to bias of maximum finder to pick up high noise contribution if occurs – due to just looking for the maximum.
- Do we also need to subtract max value over the baseline window? And not the average?

How it looks now



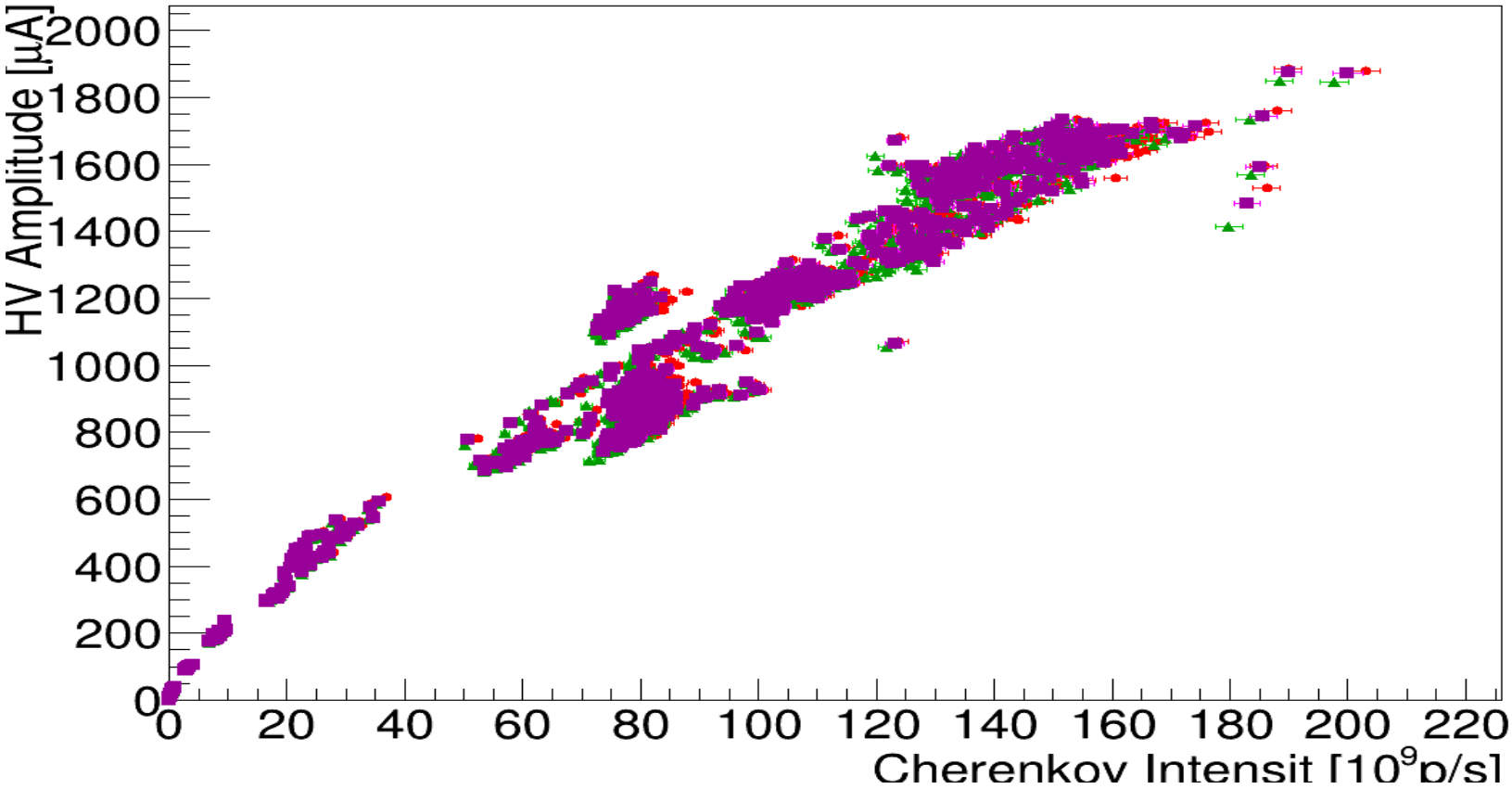


- Amplitude method shows the offset and integral method can be fitted directly without offset
- Only a run around the knee has to be understood

Maximum signal definition

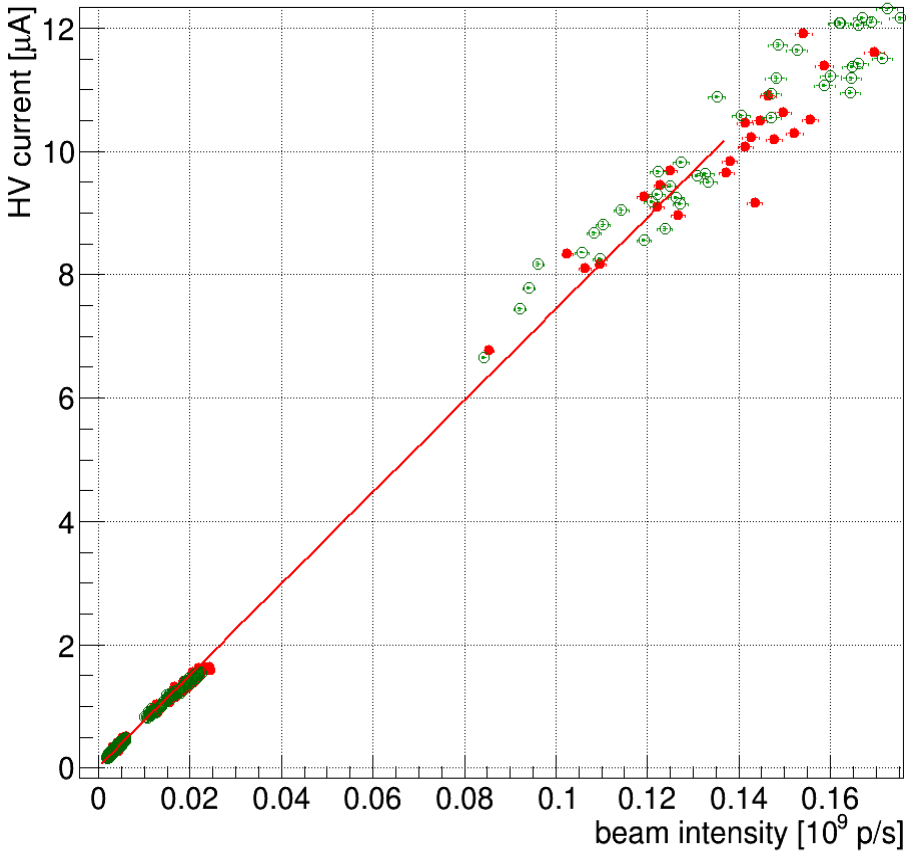
- Look for the found signals for the maximum of sum of
  - 1 sample maximum
  - 2 sample maximum
  - 3 sample maximum
- See what effect it does for the amplitude method offset for low intensities

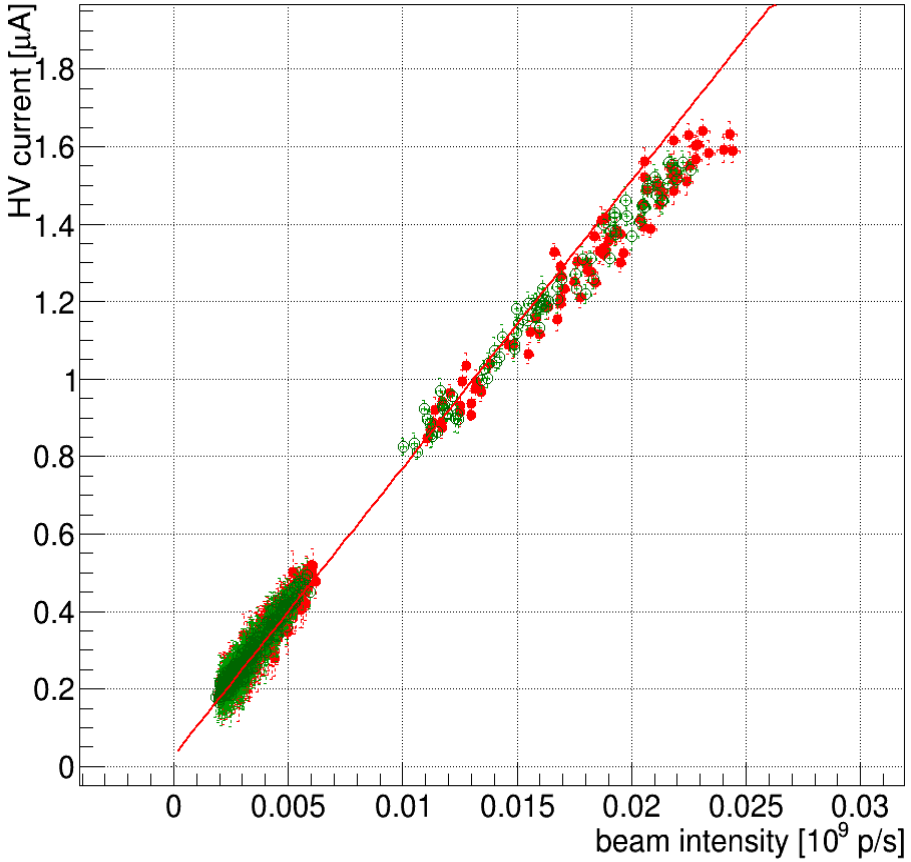
1,2,3 samples results



- Red – 1 sample
- Magenta – 2 samples
- Green – 3 samples

Zoom & Fit



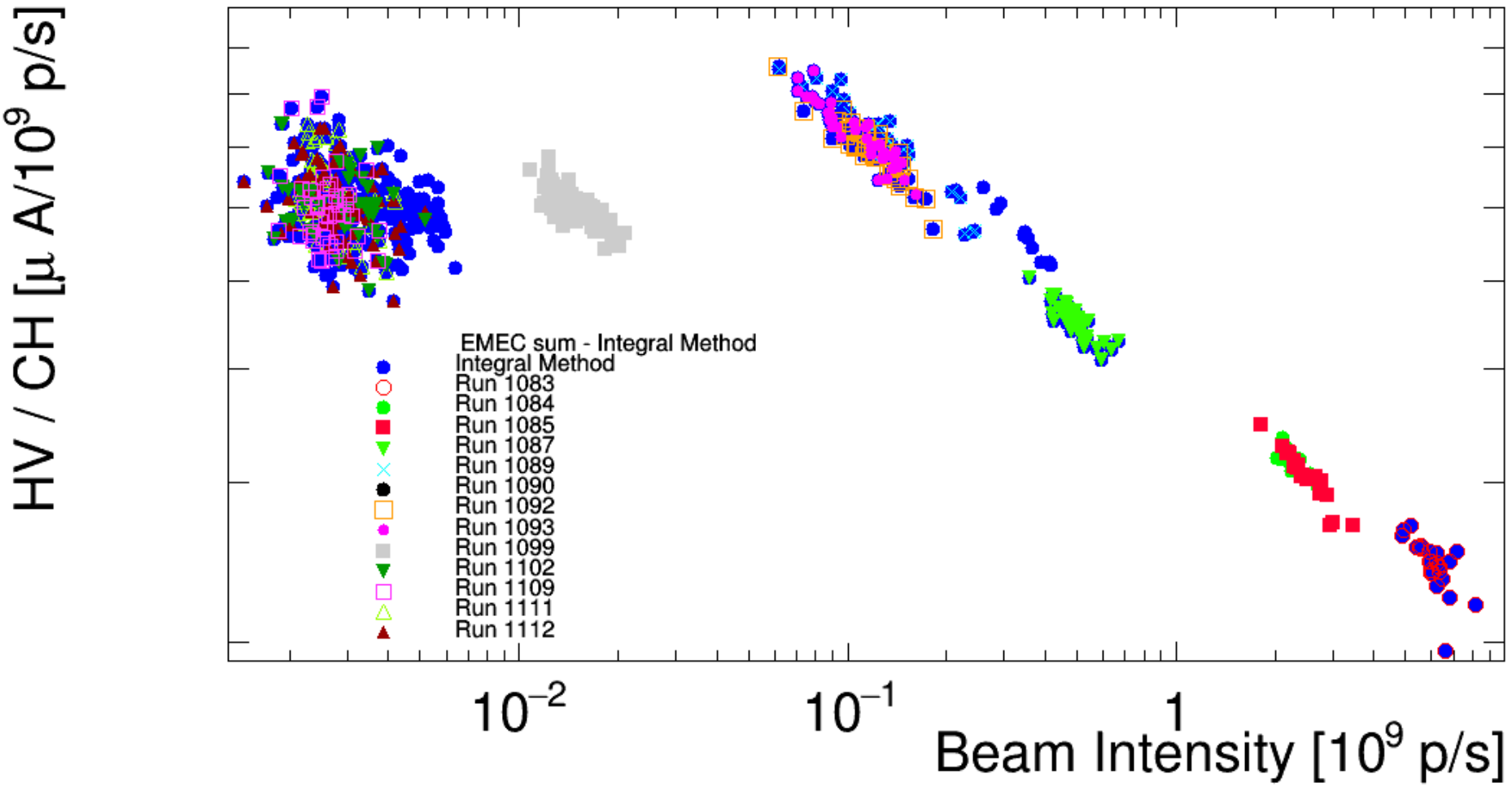


- No visible results

Other check to be finished

- Check for low intensity runs if the baseline is calculated correctly in terms of the method
- Take the calculated baseline and RMS values and fill next histograms
- (HV[i]-BL)/RMS – expectation – normal distribution with mean at zero and RMS = 1

Thank You for your attention



- Runs in the knee – 1089, 1092, 1093 – all are considered bad from the asymmetry values of EMEC, HEC, FCal analysis by A. Savin
- We can not get rid of them, we need or to use and remember they have asymmetry or to introduce some correction