Matrix Homogeneity Measurements

Simone Esch[1], University Bonn

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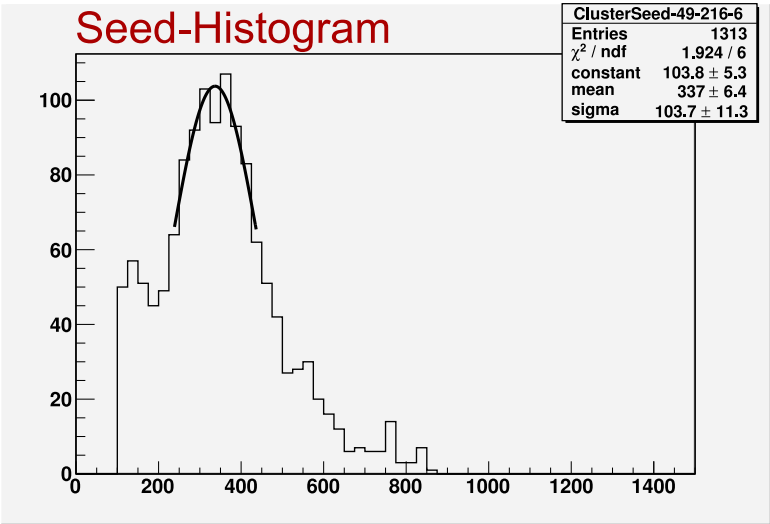
[1]esch@physik.uni-bonn.de

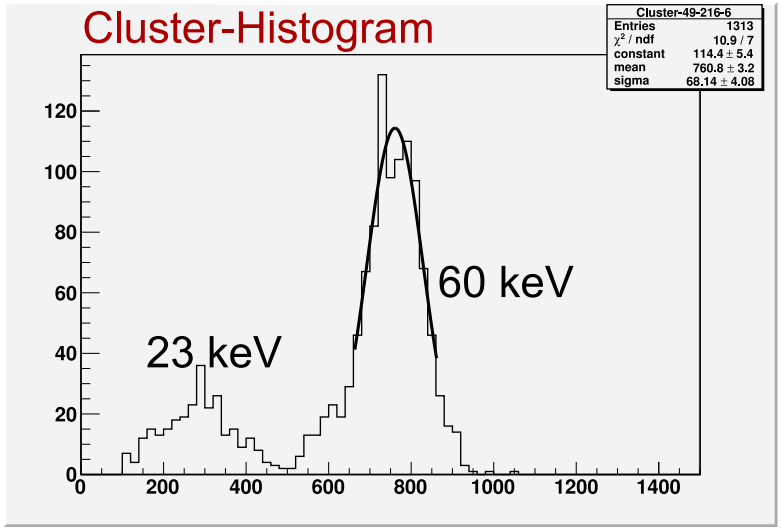
Idea

To measure gain for each Pixel we used a γ- Source:
^{241}Am ($\sim$ 60 keV γ)
2 methods for gain calculation

- Peak position of seed-histograms for every pixel $\Rightarrow$ proportional to gain of pixel
- Peak position of cluster-histograms for every pixel $\Rightarrow$ related to gain of more than one pixel, weighted with cluster shape

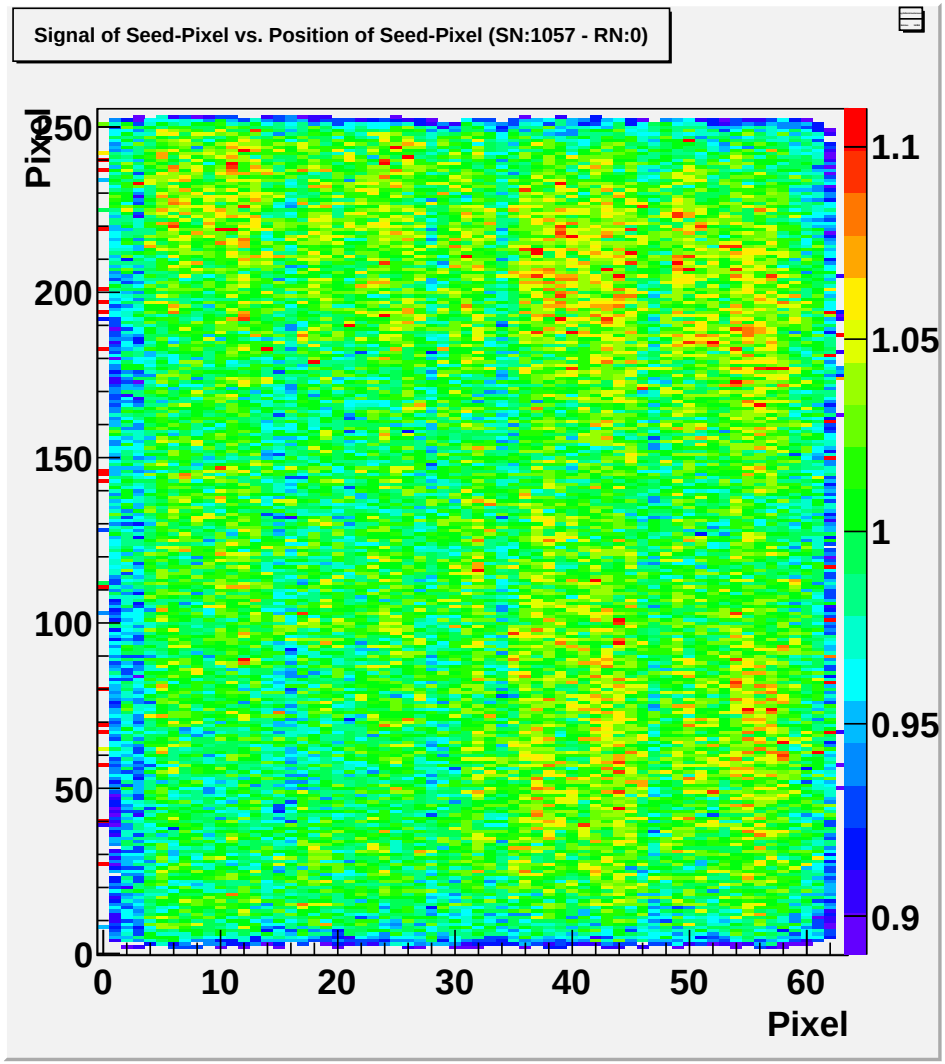
Method





- Create two sets of puls-height-histogramm for every pixel ($\sim$ 16,000 Pixel)
- If a pixel was the seed of a hit:
  - $\Rightarrow$ seed-histogram is filled with the seed-signal
  - $\Rightarrow$ cluster-histogram is filled with the corresponding 5x5-cluster-signal to the seed
- Fit restricted area of histograms with a gauss-function to find peak position

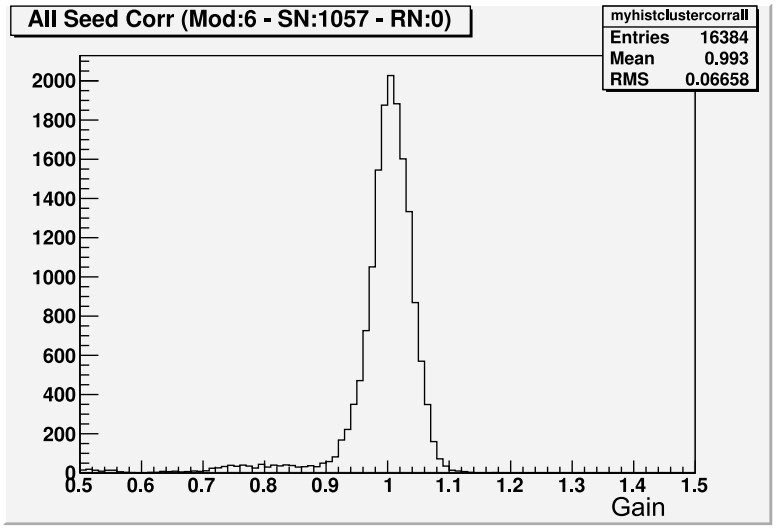
Seed-Map

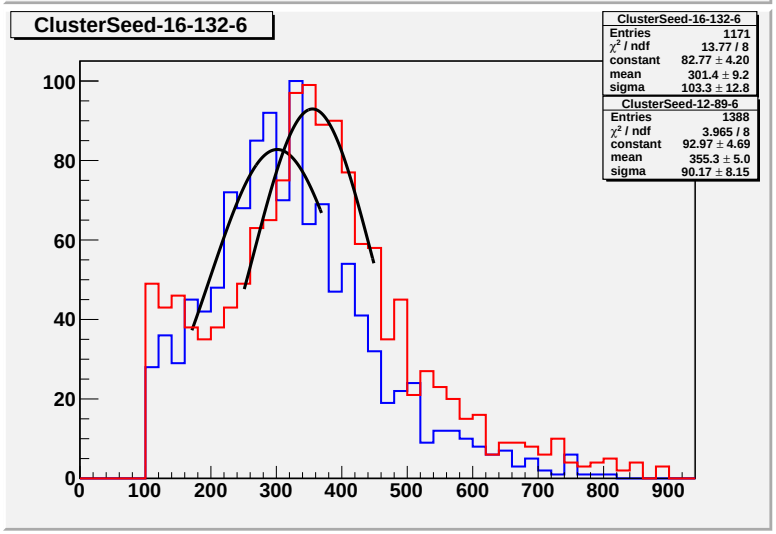


- Mean-values of fits are filled in a 2D histogram, representing the whole matrix
- Colourscale: Normalisation to average-seed
- Hybrid H3.0.11 COCG L B ($32\mu m$ x $24\mu m$)
- differences in the order of $\pm 10\%$
- Apply this correction-map for pixel in monitor-software to correct data

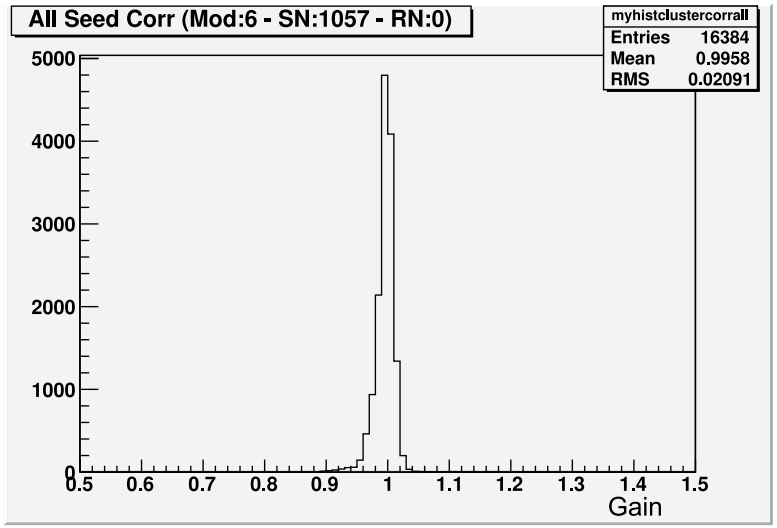
Correction with Seed-Map in Monitor-Software

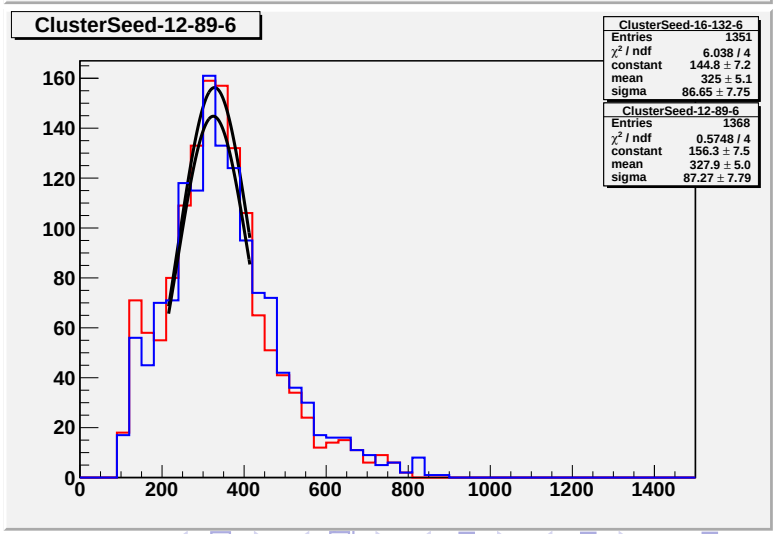
original





processed with seed gain-correction

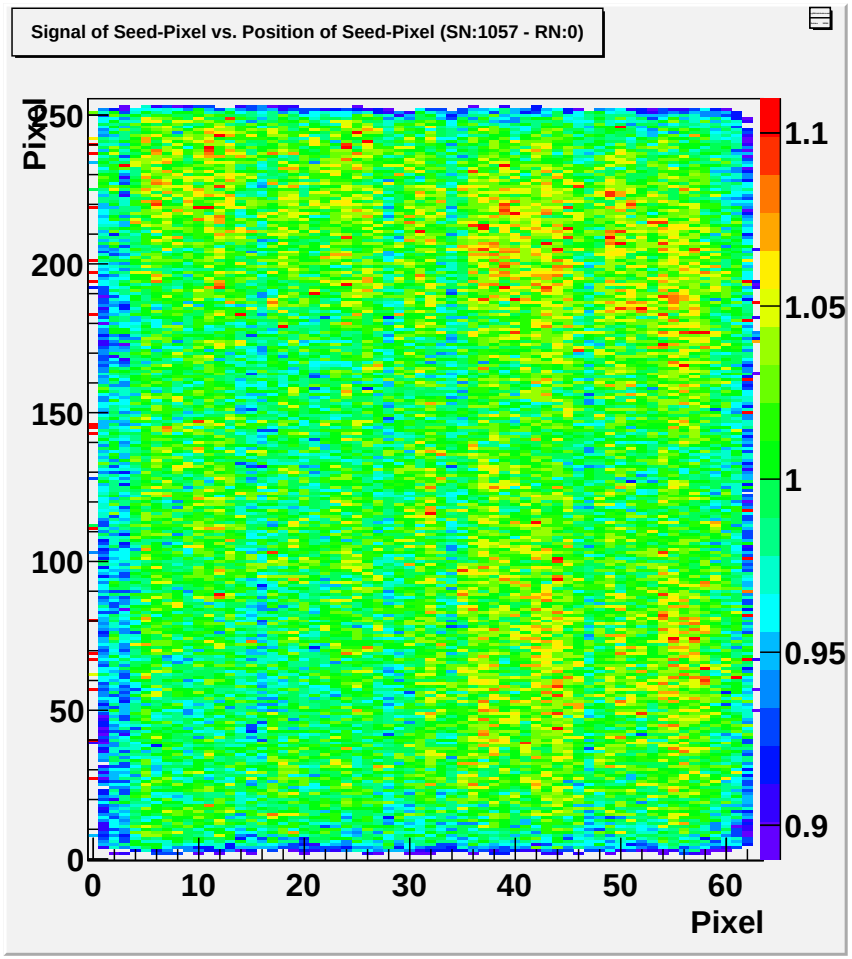




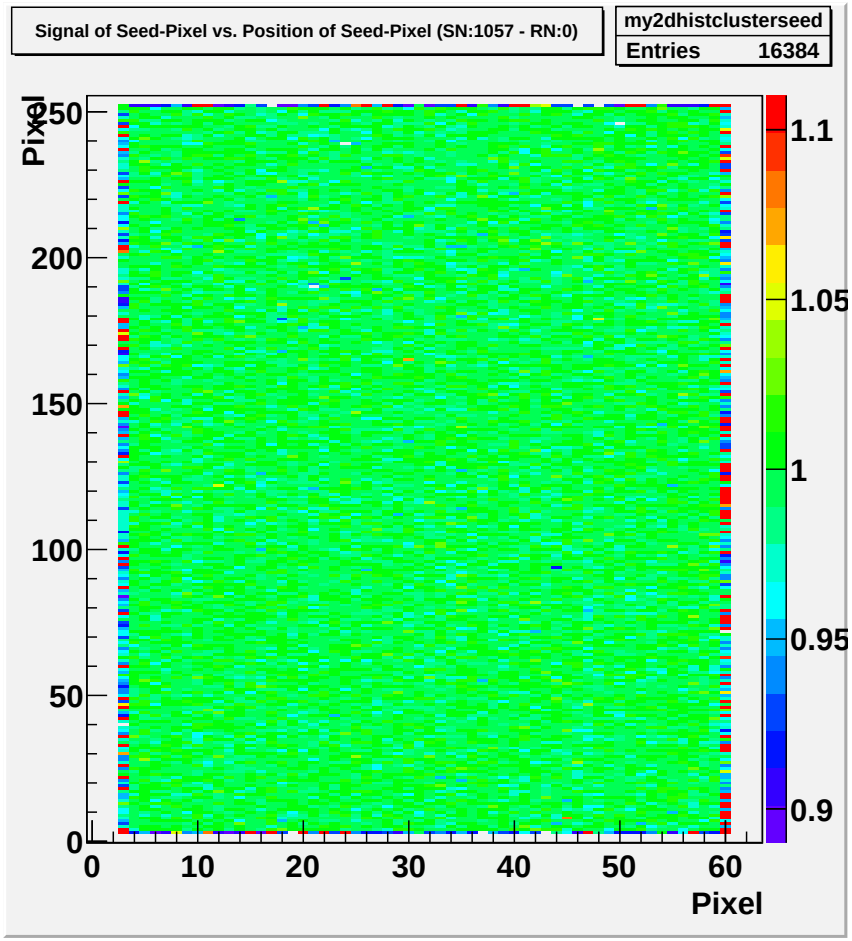
Seed-Map

Here the same 2D histograms for seeds:

original

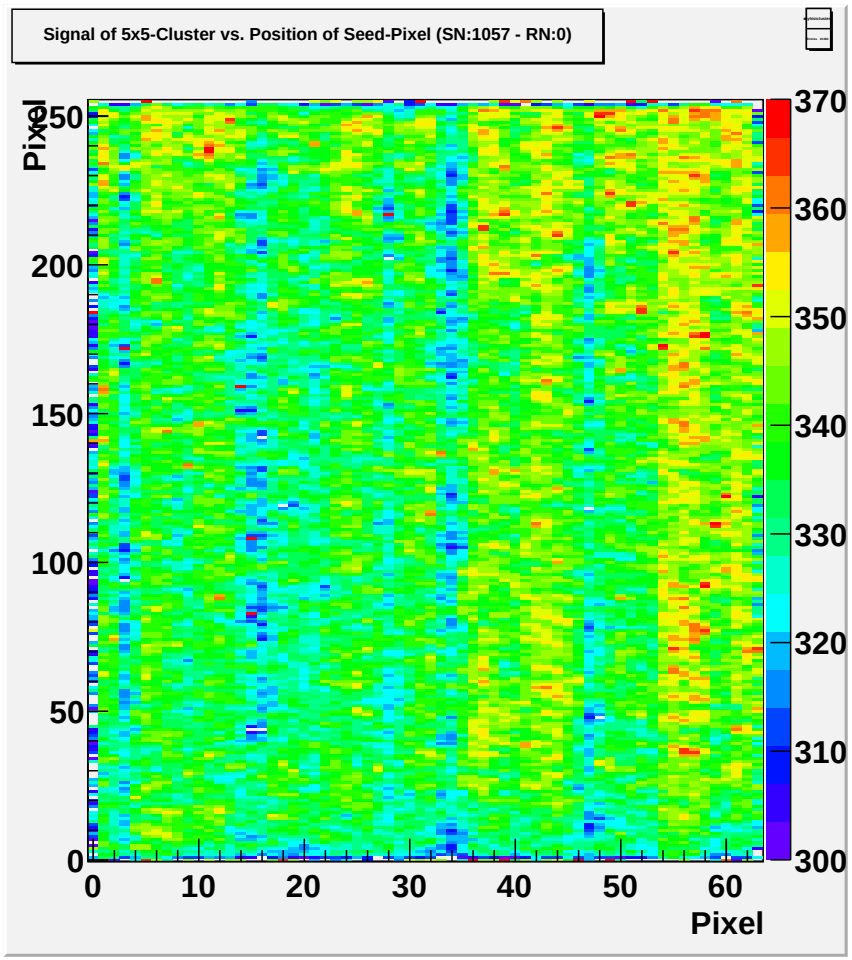


processed with gain-correction

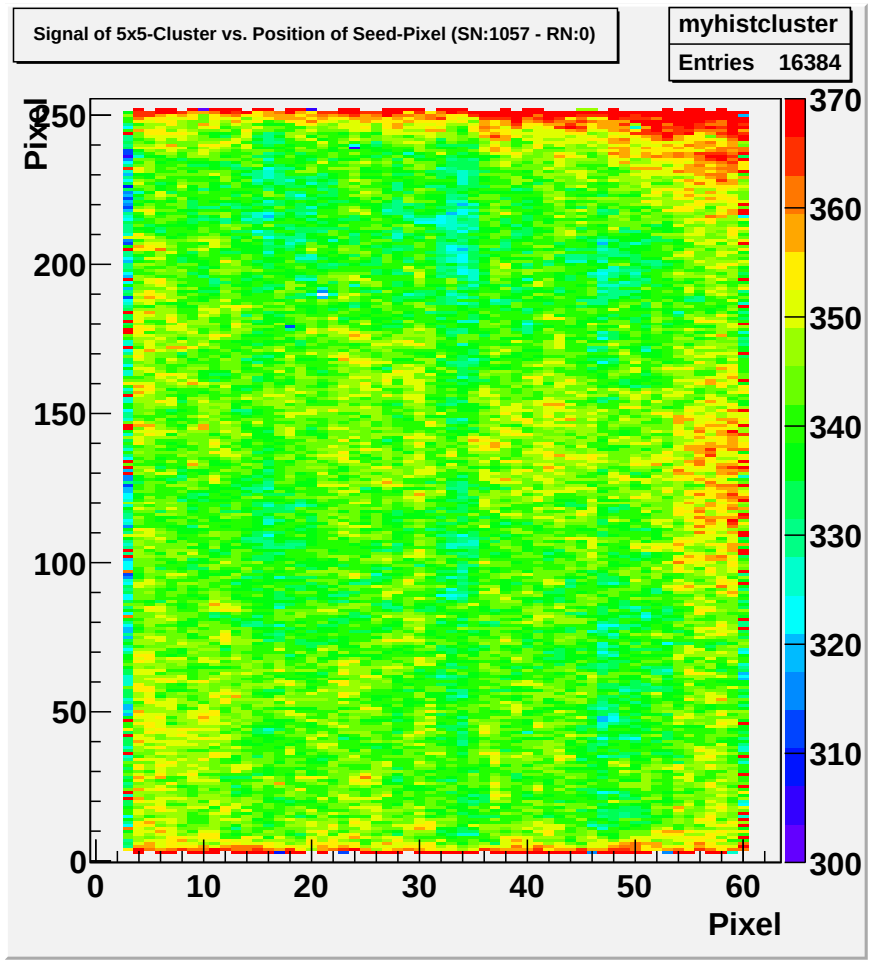


Cluster-Map

original

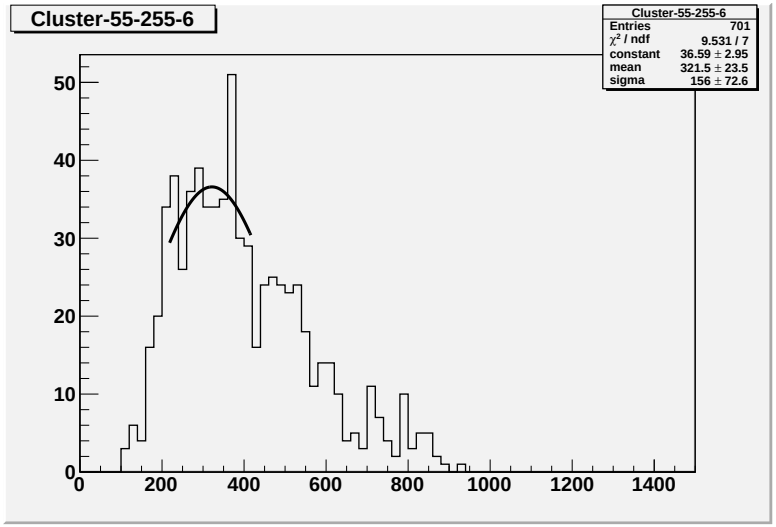


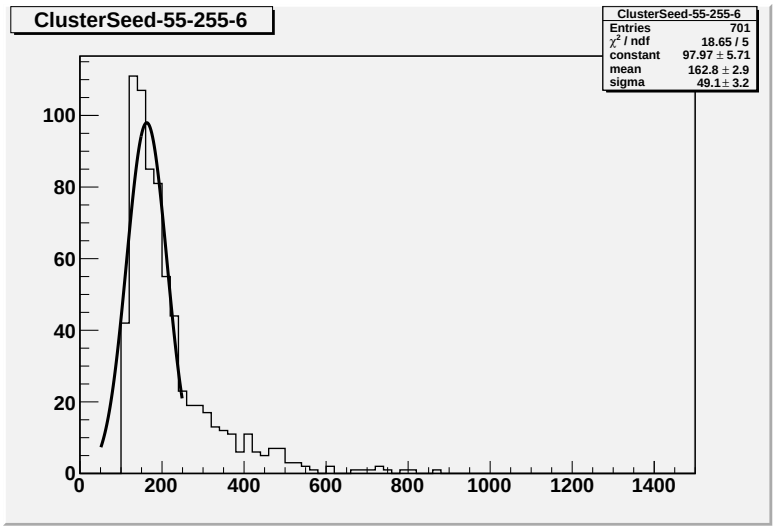
processed with seed gain-correction



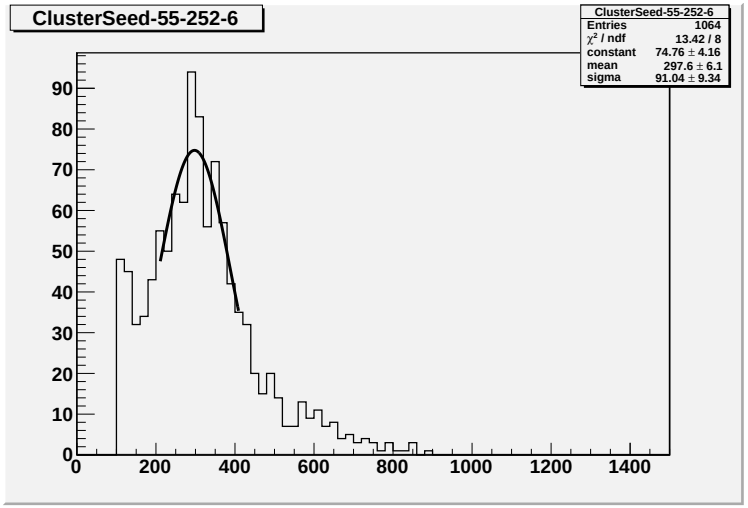
Problems

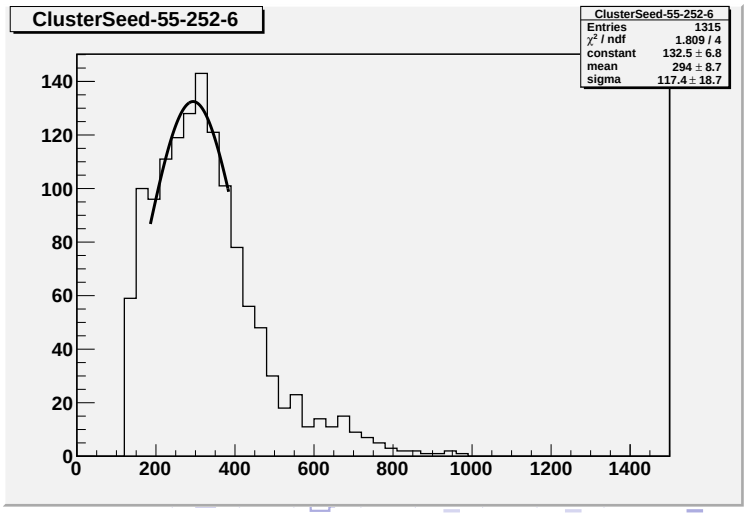
Just fitting the noise in some pixels





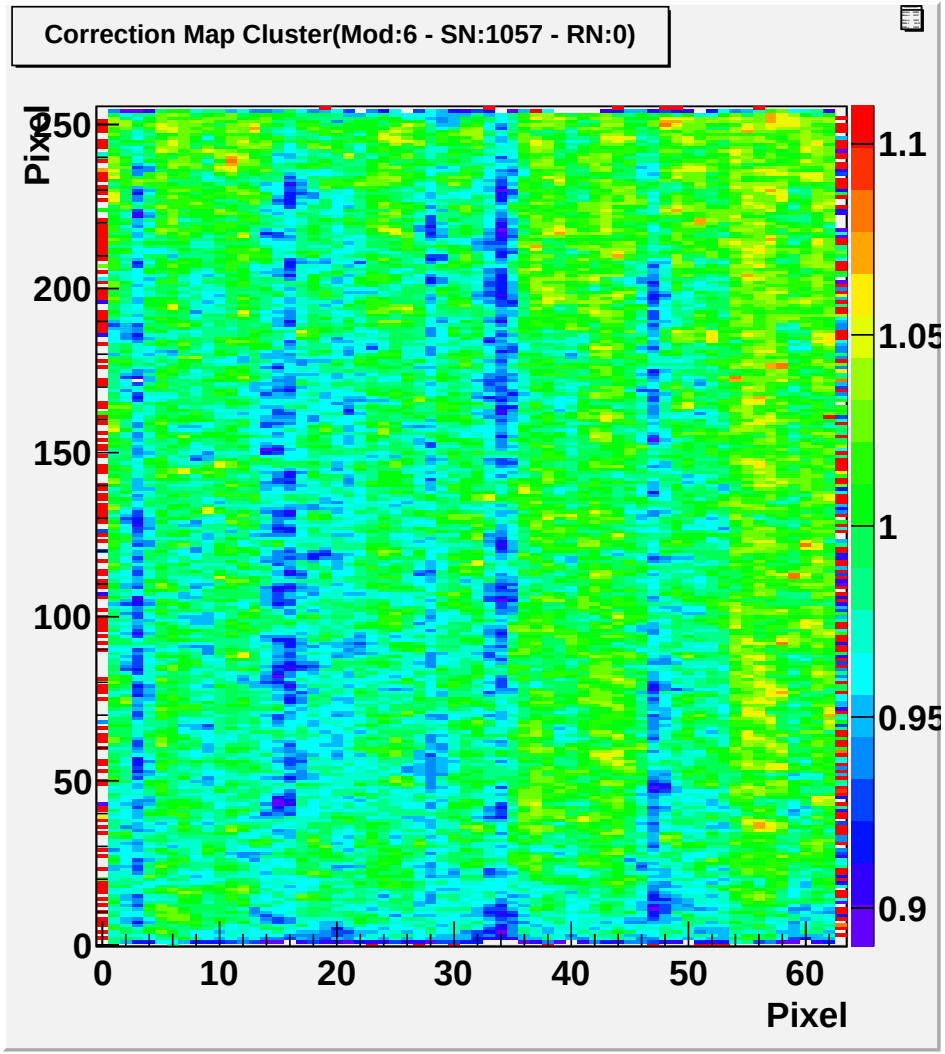
example for corrections with no effects



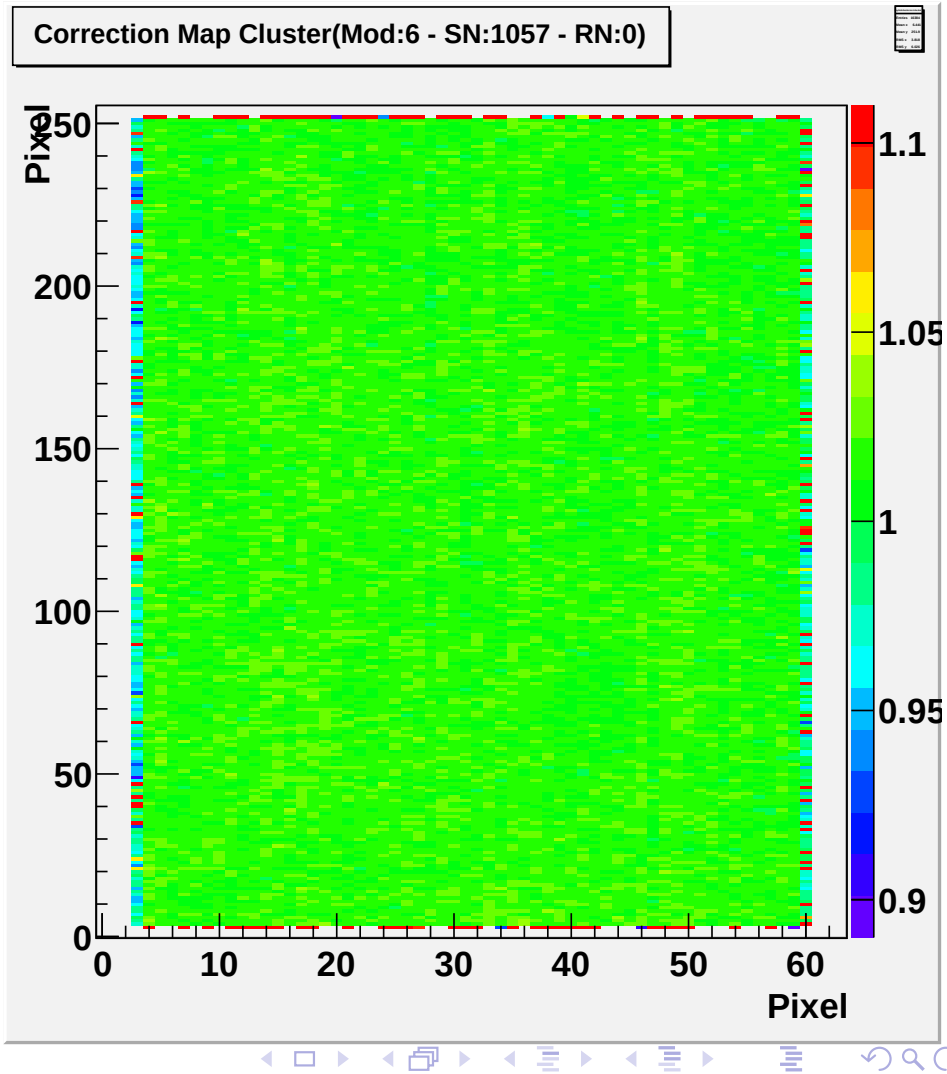


Correction with Cluster-Map in Monitor-Software

original

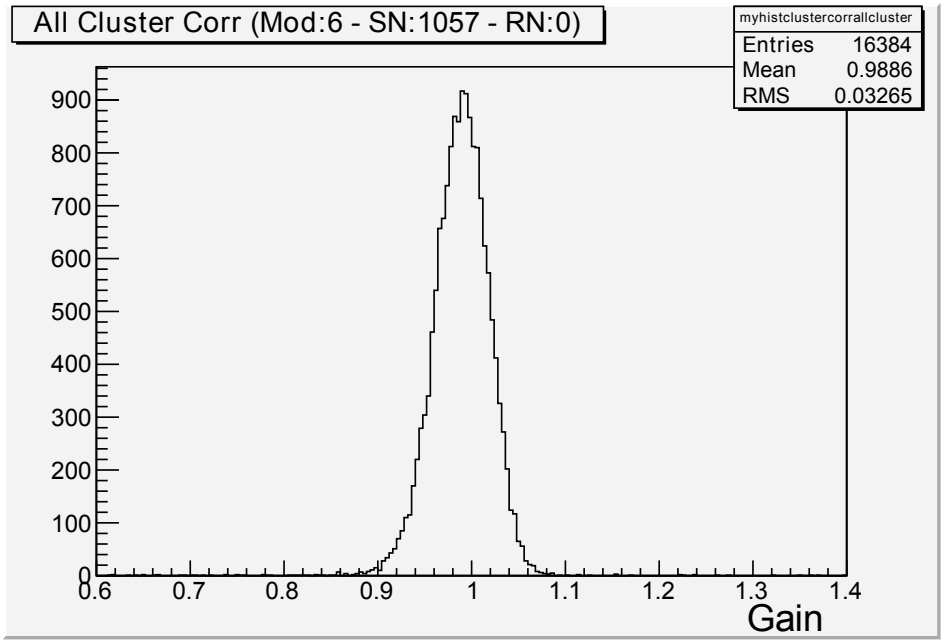


processed with cluster gain-correction

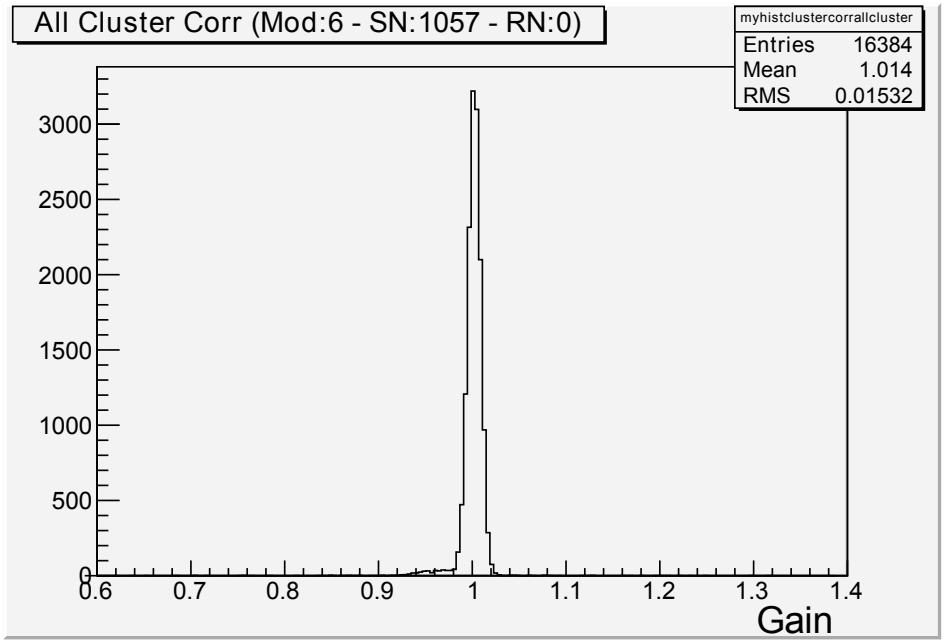


Correction with Cluster-Map in Monitor-Software

original



processed with cluster-map



Summary

- As part of work for Matrix characterization we developed tools to measure pixel gain dispersion.
- Gain-distribution before up to $\pm 10\%$
- tested 2 methods of gain calculation and correction:
  - using seed signal distribution for pixel
  - using cluster signal distribution for Seed-pixel
- Method with seeds distributions require huge statistics, and shows a problems with low statistics.
- Method with cluster distribution shows better results

Dankeschön

Thank you for your attention