Film digitization

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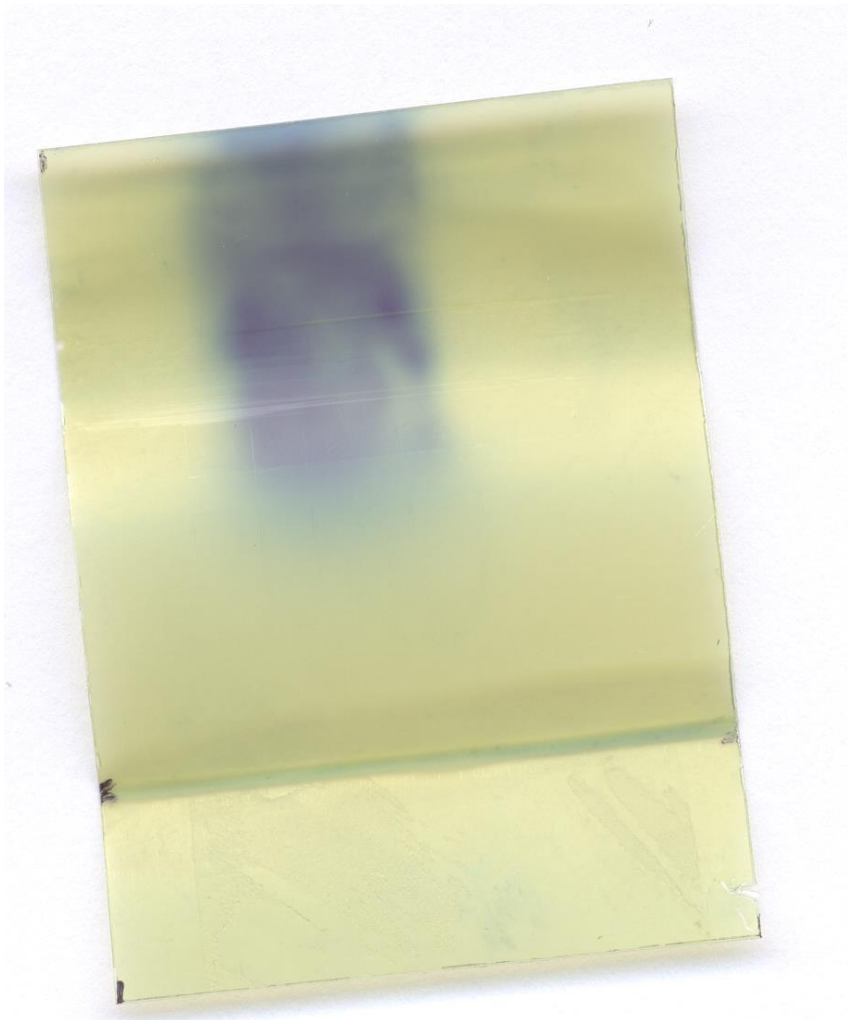
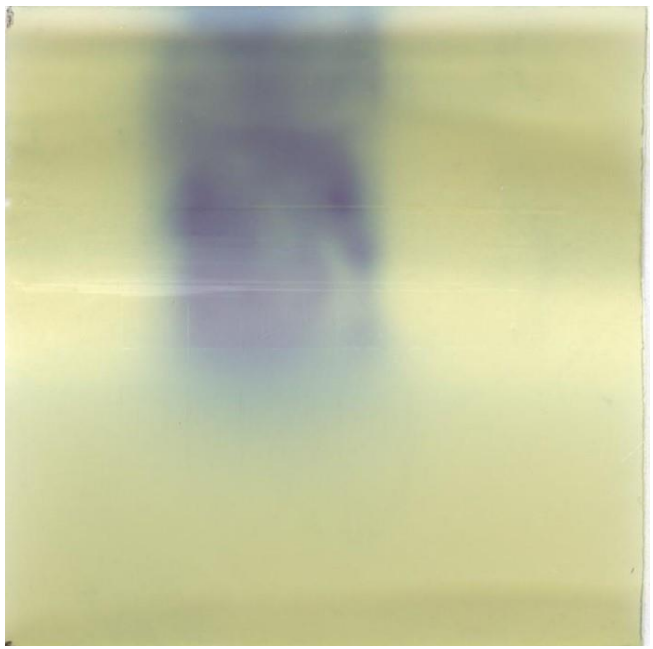
ATLAS-JINR FCalPulse project meeting

16 January 2023

Adobe Photoshop

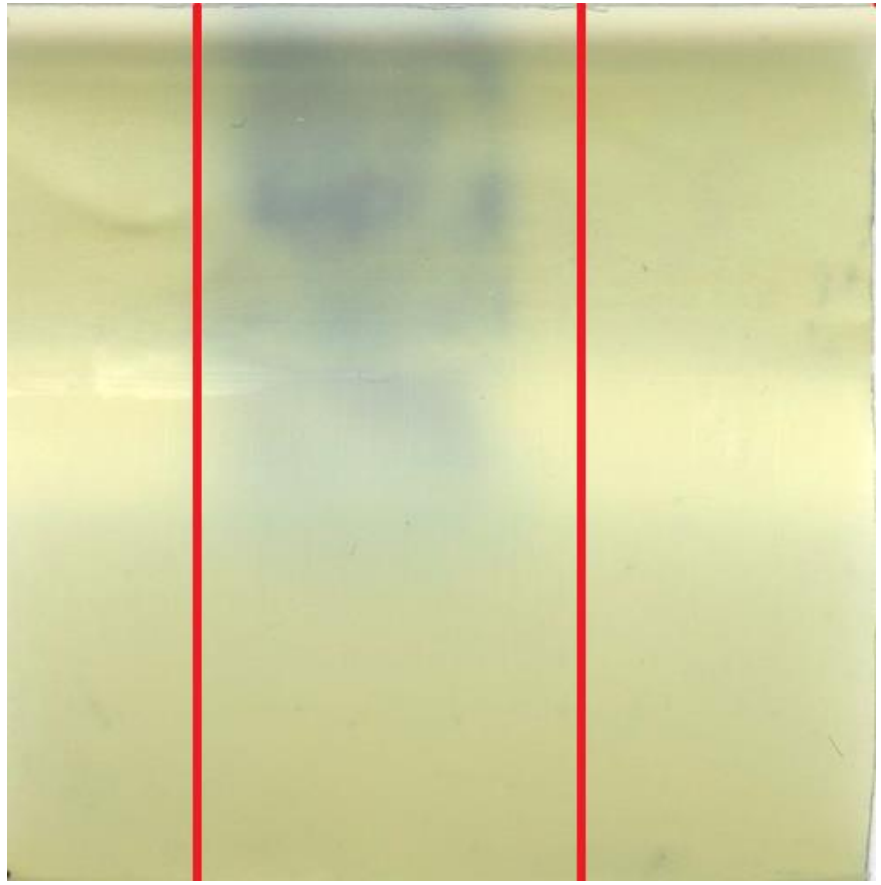




Dimension: 682x690 pixels OR 26.85x27.17 mm

Background removal algorithm

$x_1 = 100$ $x_2 = 450$



1) Draw 2 lines outside of the exposure area
2) Define RGB color codes on red lines.
3) Remove area between the lines.
4) Connect dots between the lines using polynomial function and fill the area to define background
5) Subtract background values from original image

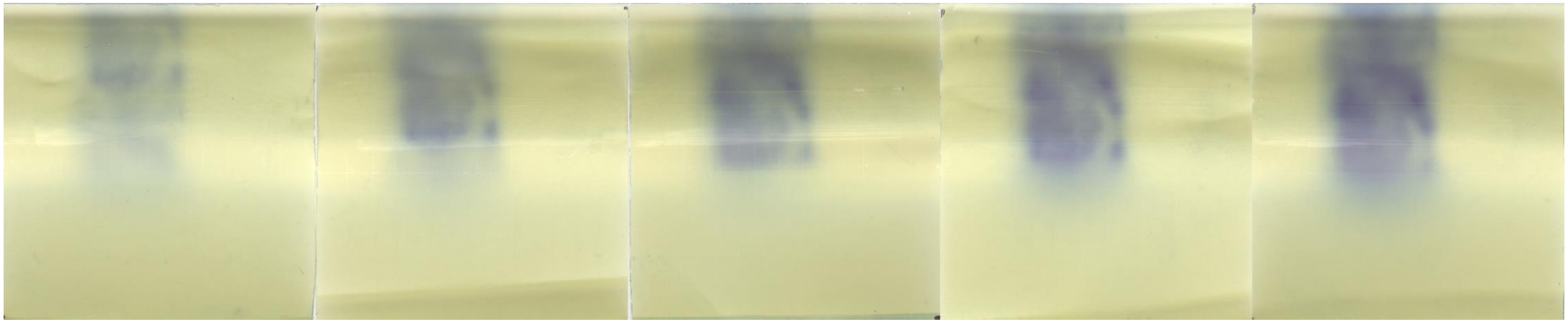
1mm = 25.4 pixels

$pol2 \rightarrow f(x) = p_0 + p_1 x + p_2 x^2$

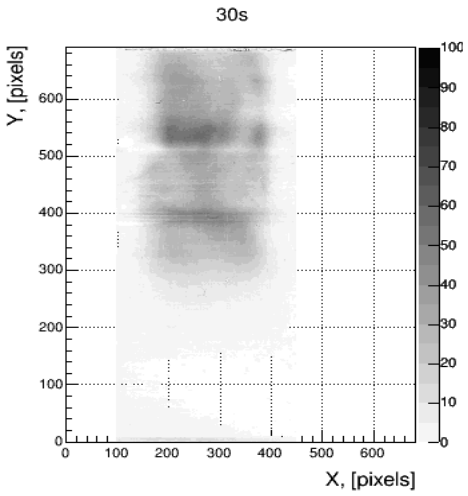
$pol3 \rightarrow f(x) = p_0 + p_1 x + p_2 x^2 + p_3 x^3$

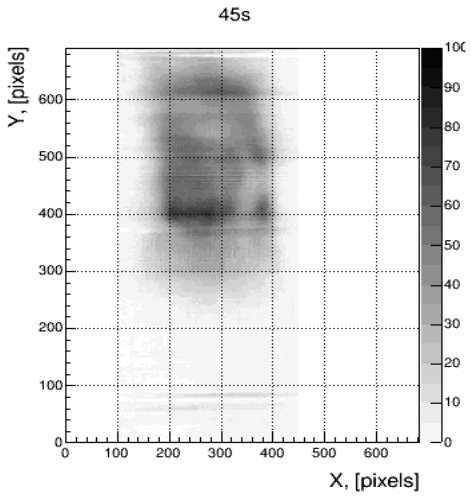
$pol4 \rightarrow f(x) = p_0 + p_1 x + p_2 x^2 + p_3 x^3 + p_4 x^4$

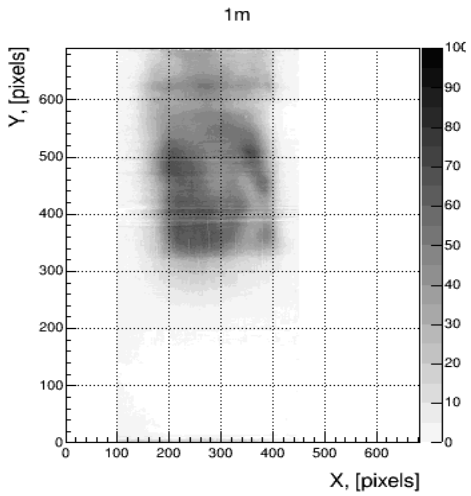
Original images:

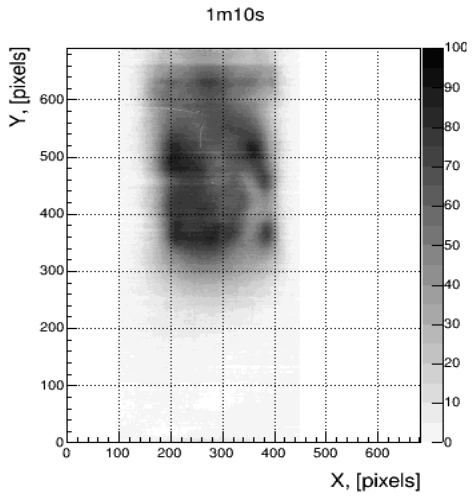


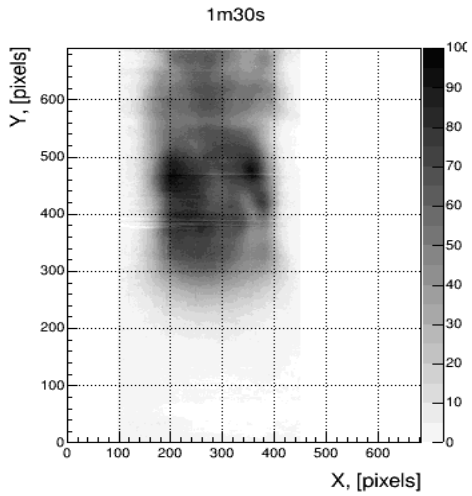
After removing backgrounds:



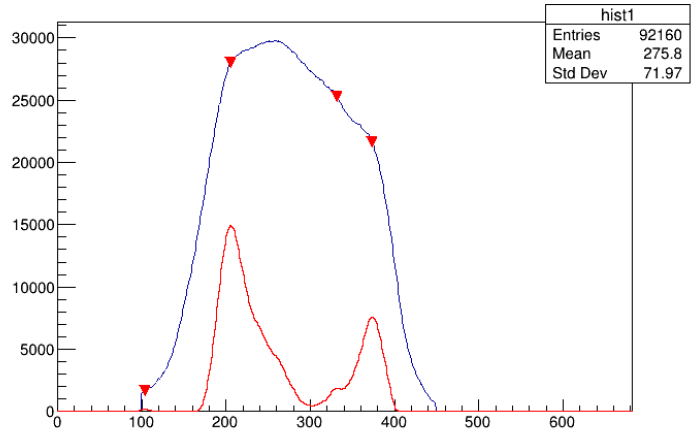




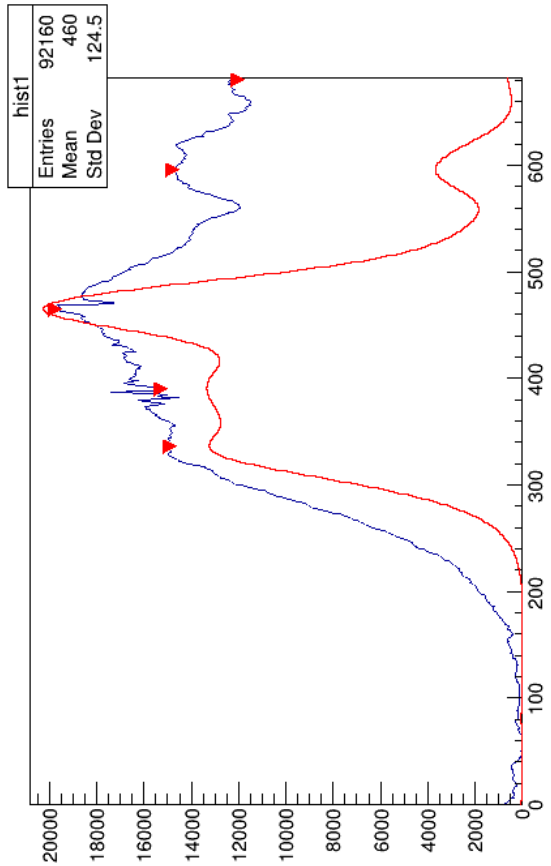


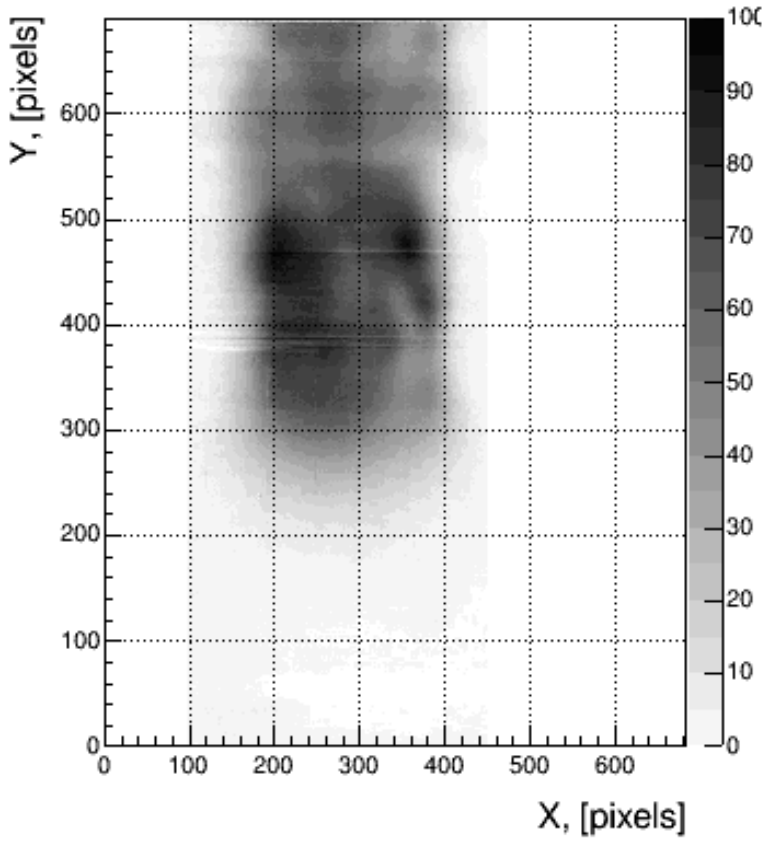


Alignment method

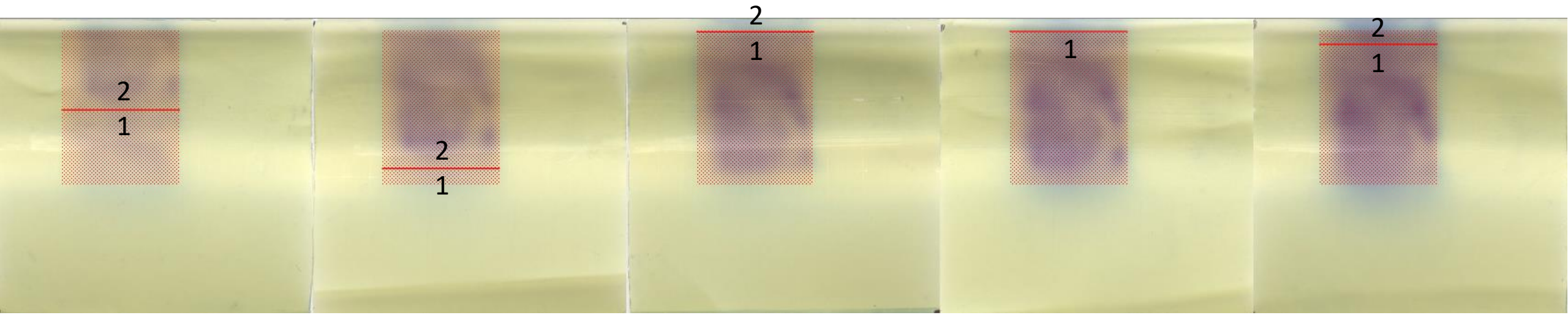


1m30s

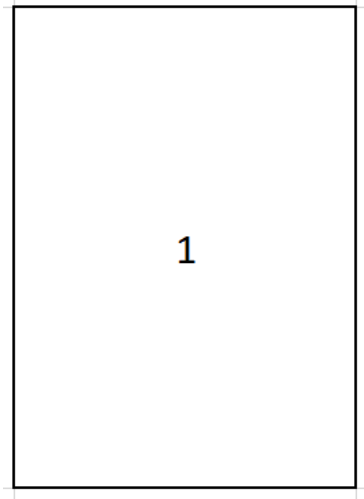


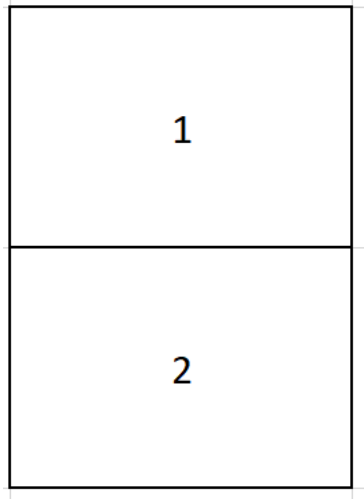


Active part is made from copper foil with the following dimensions:
10,0±0,1 mm x 13,9±0,1 mm

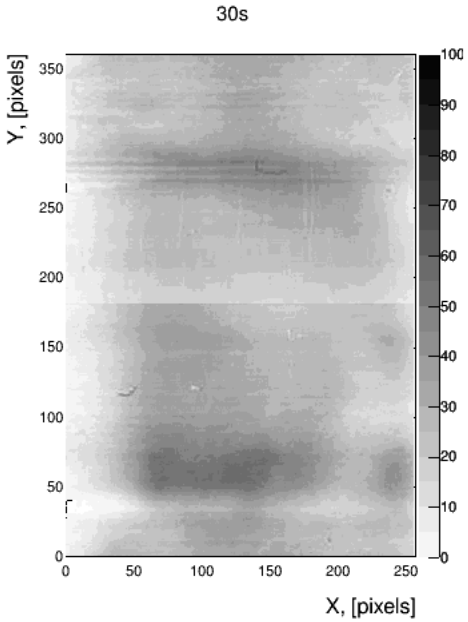


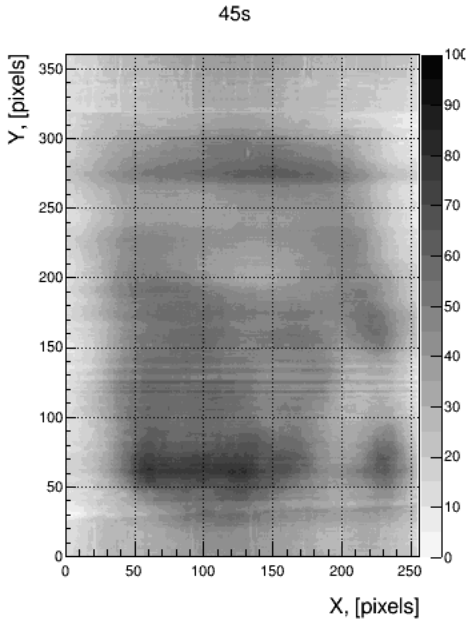
Our selected area: 256 pixel x 360 pixel OR 10.08 mm x 14.17 mm

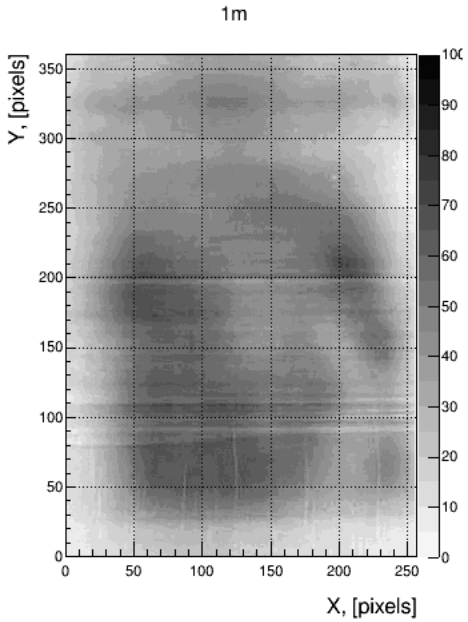


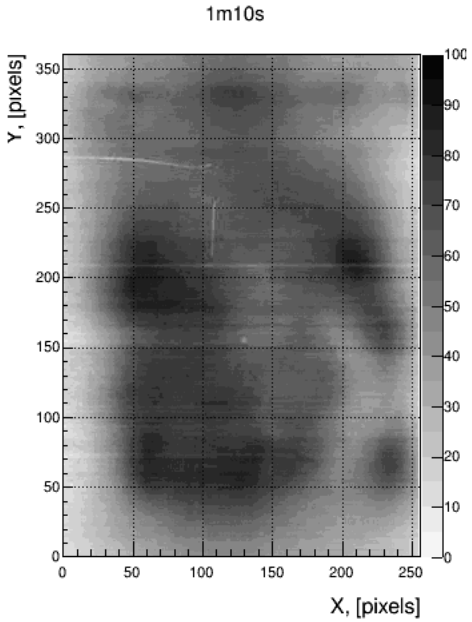


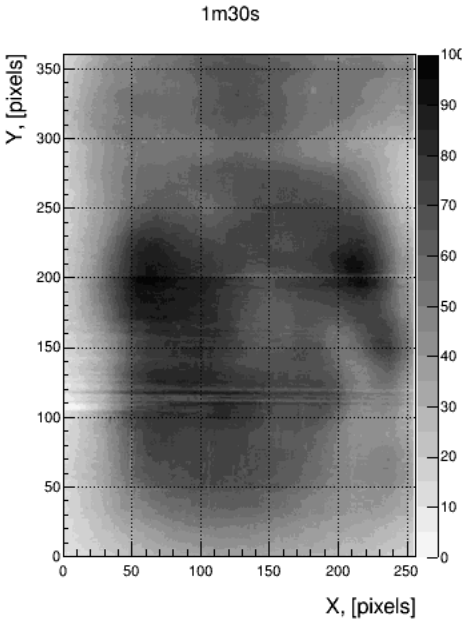
After alignment and background removal:



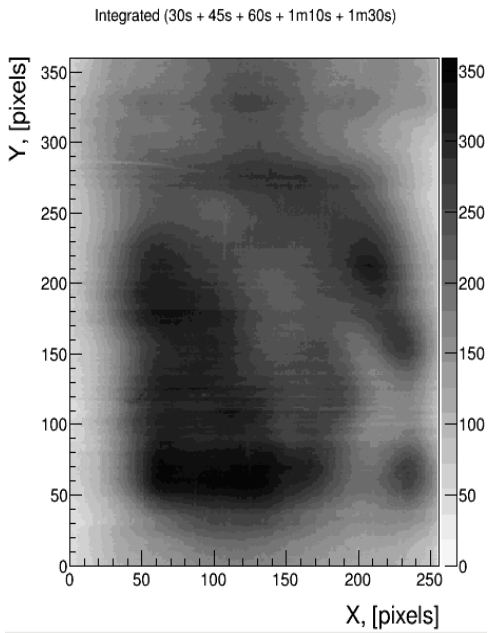






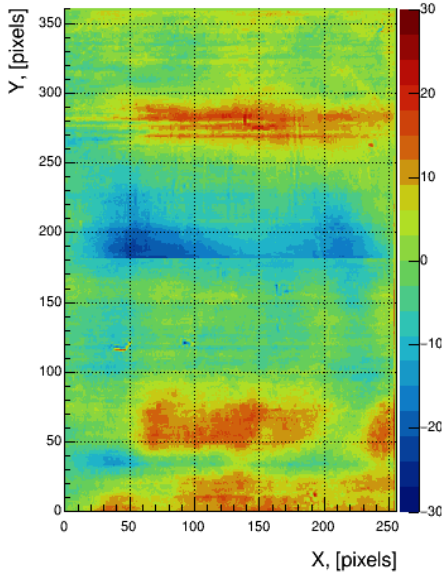


Integrated data (∑) of all 5 images above:

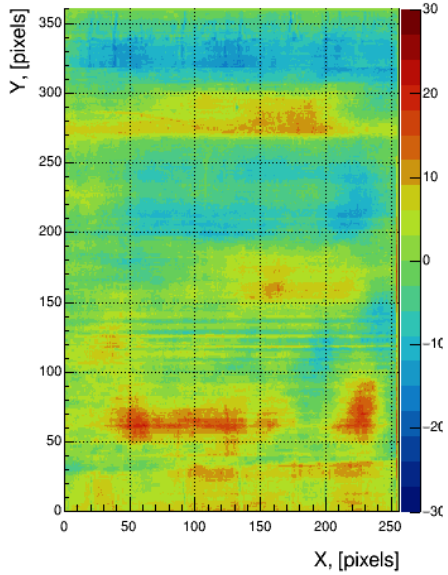


$c_1 = 0.121$
$c_2 = 0.181$
$c_3 = 0.184$
$c_4 = 0.257$
$c_5 = 0.257$

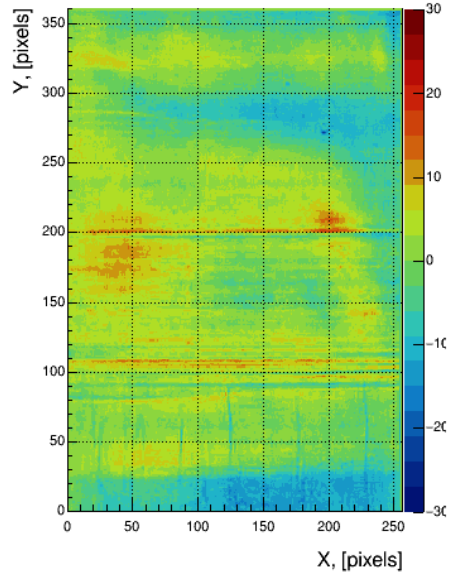
30s



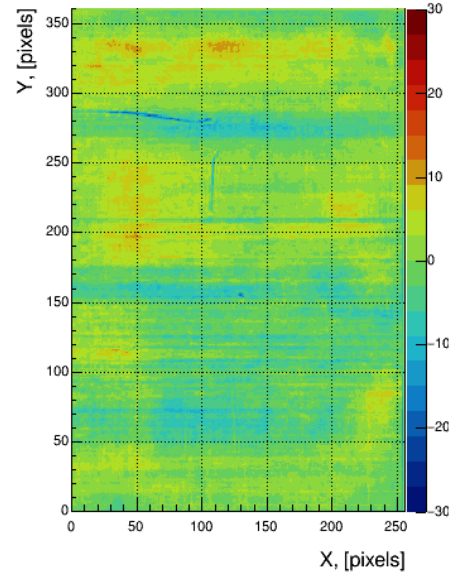
45s



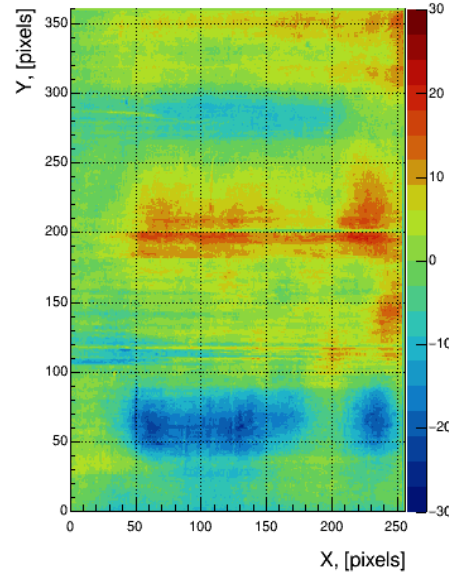
1m



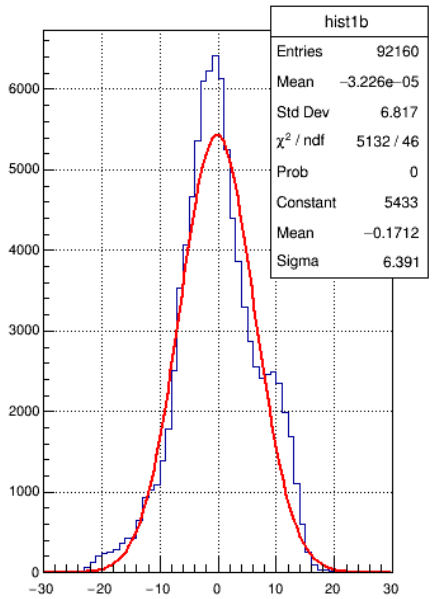
1m10s



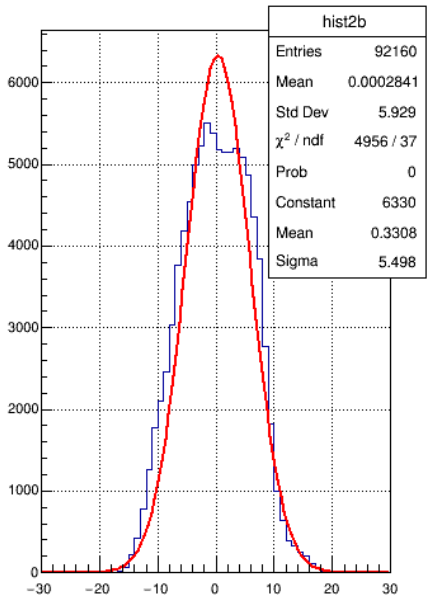
1m30s



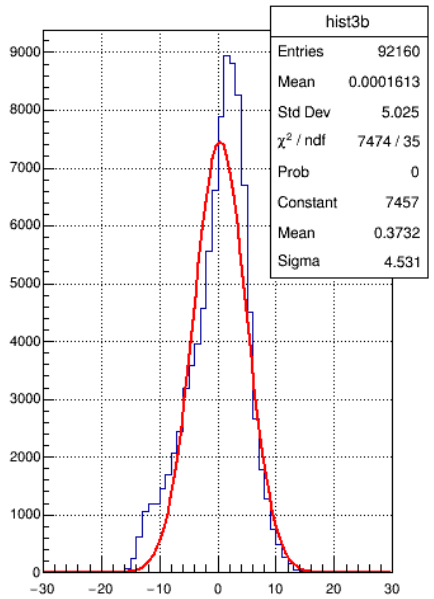
30s



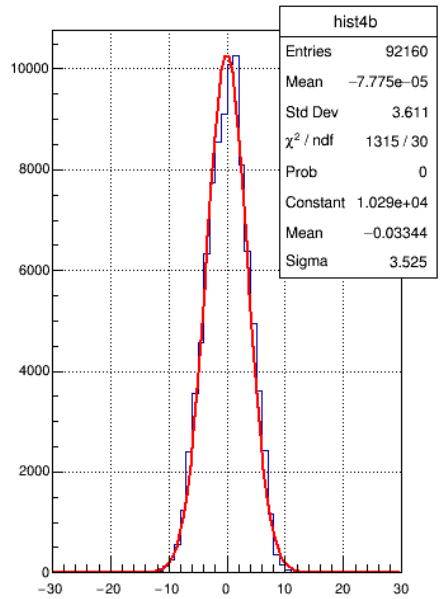
45s



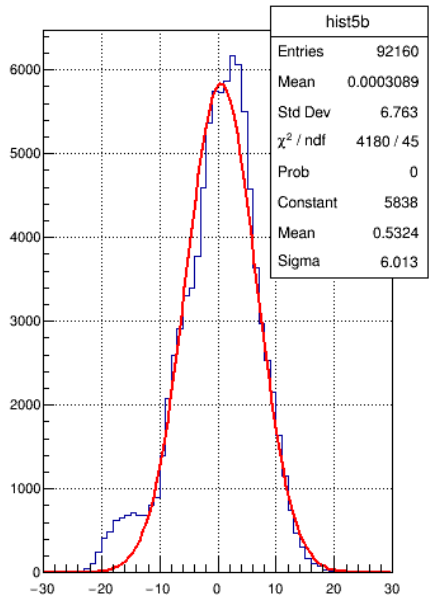
60s



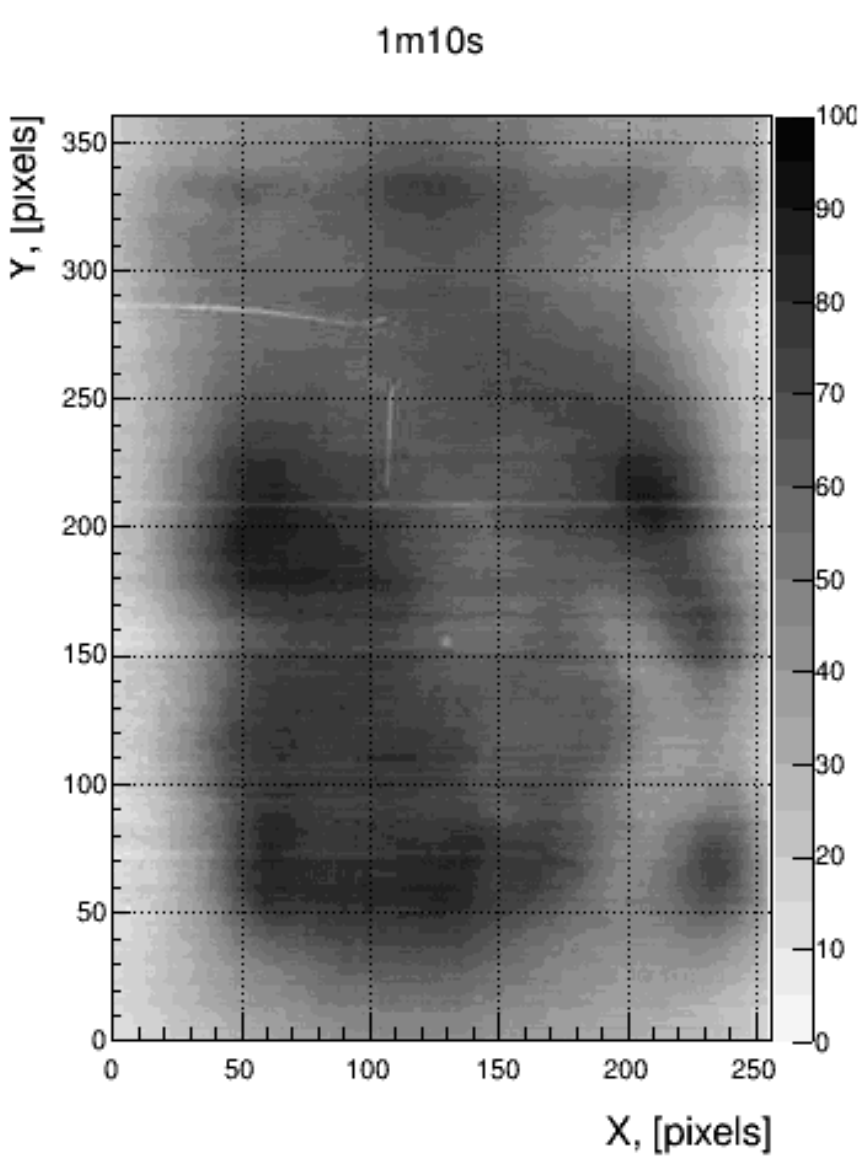
1m10s

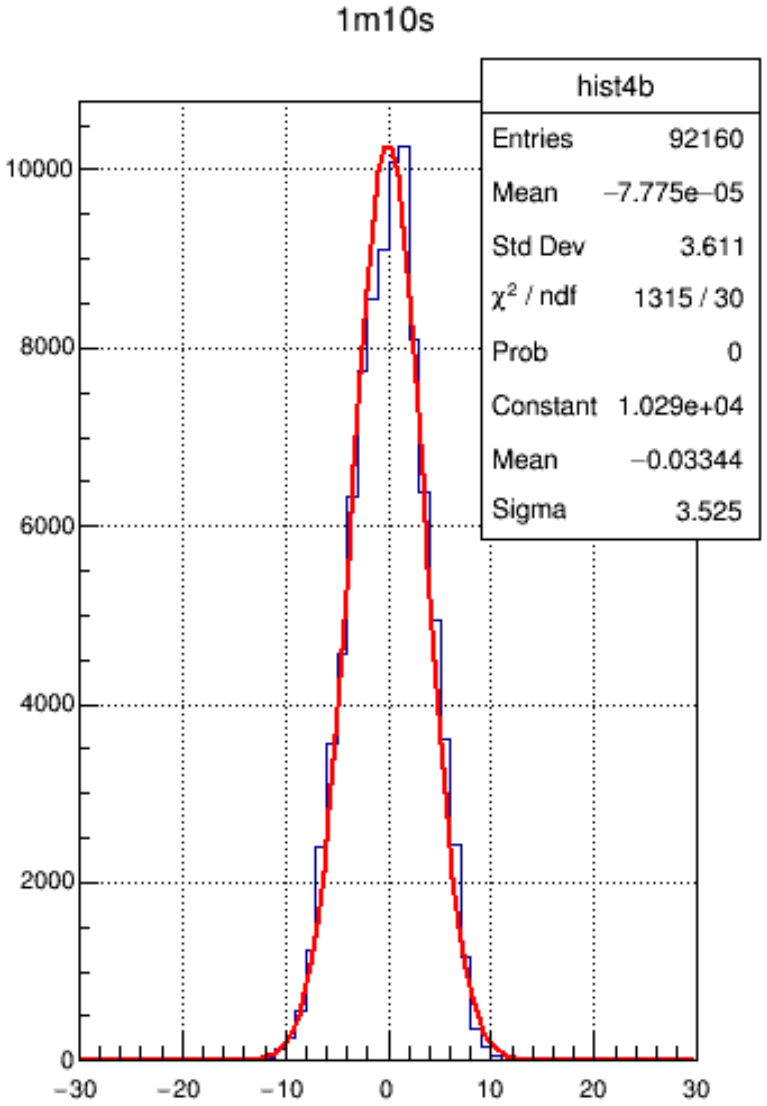


1m30s



The final result for simulation





Точность: $\frac{\sigma}{\bar{n}} = \frac{3.53}{55.12} = 0.64\ or\ 6.4\%$