Film digitization
Contrast stretching method

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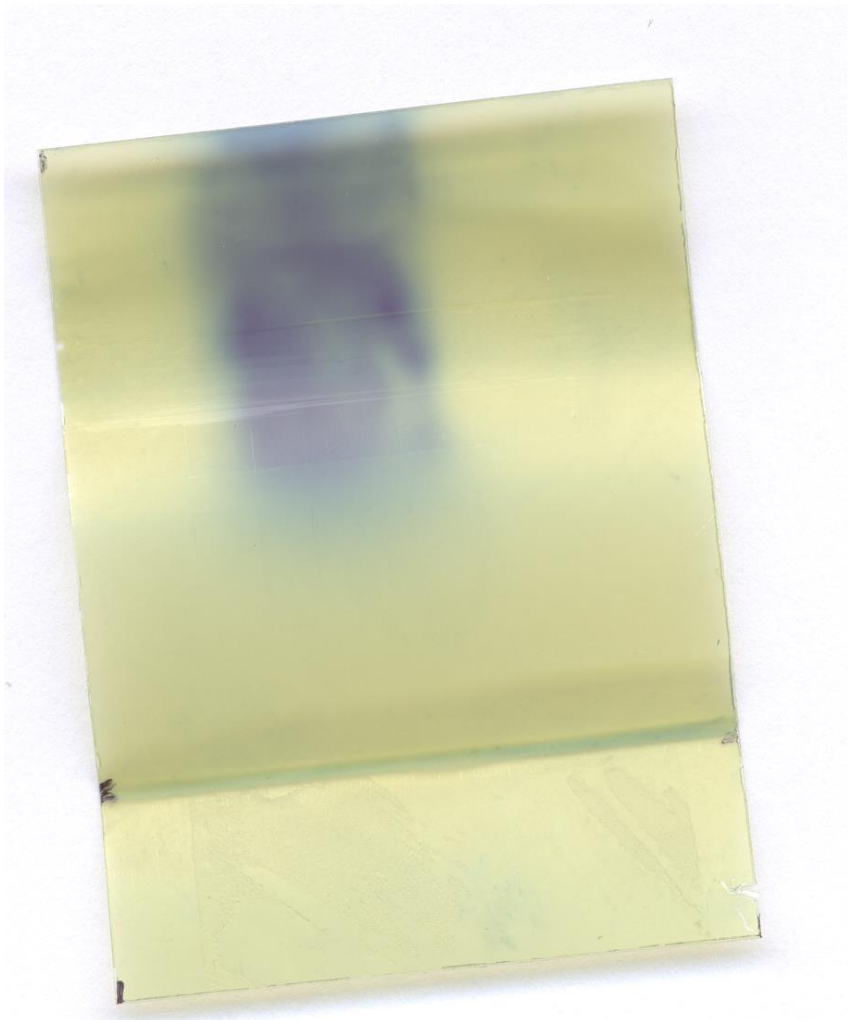
ATLAS-JINR FCalPulse project meeting

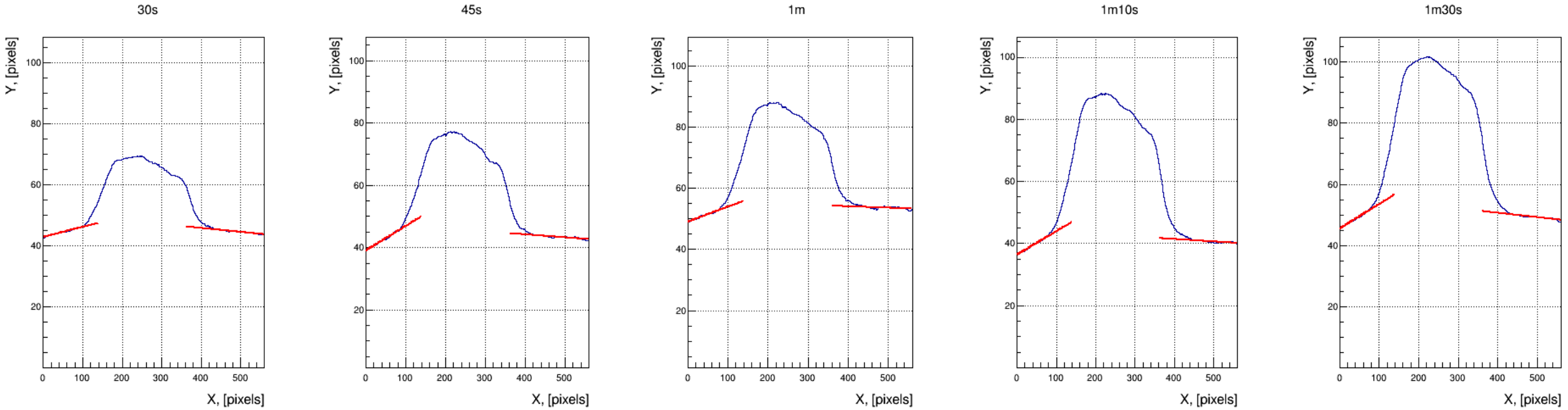
2 February 2023

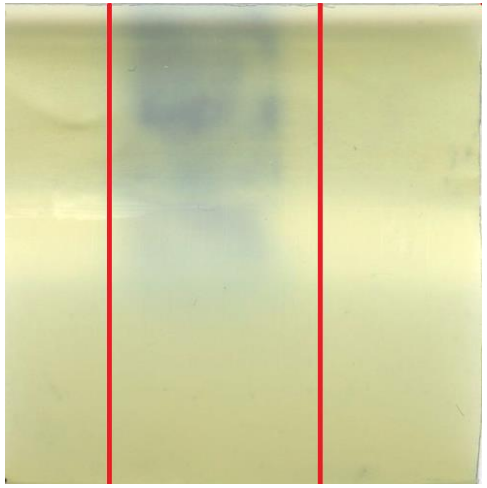
Adobe Photoshop



Dimension: 560x600 pixels OR 22.05x23.62 mm

Background removal algorithm using linear interpolation



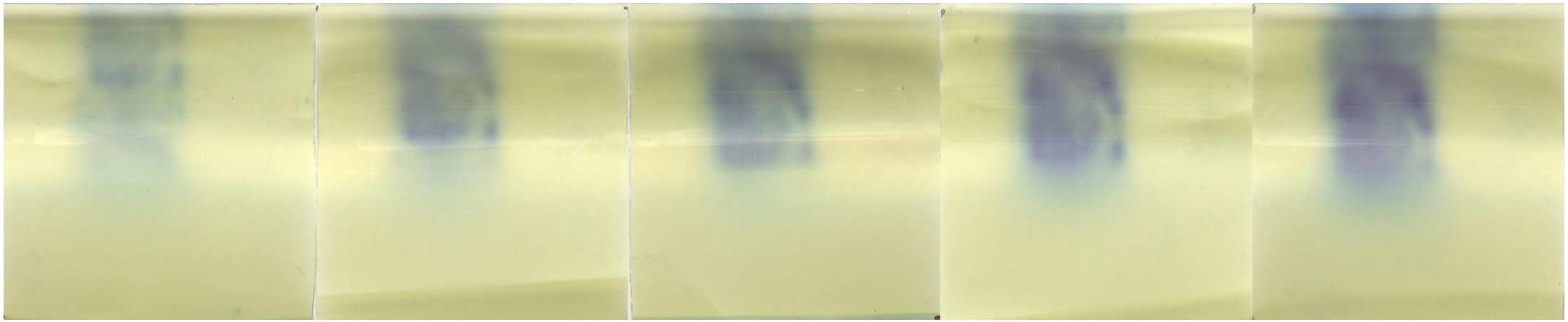


$$x_1 = 80 \div 100$$

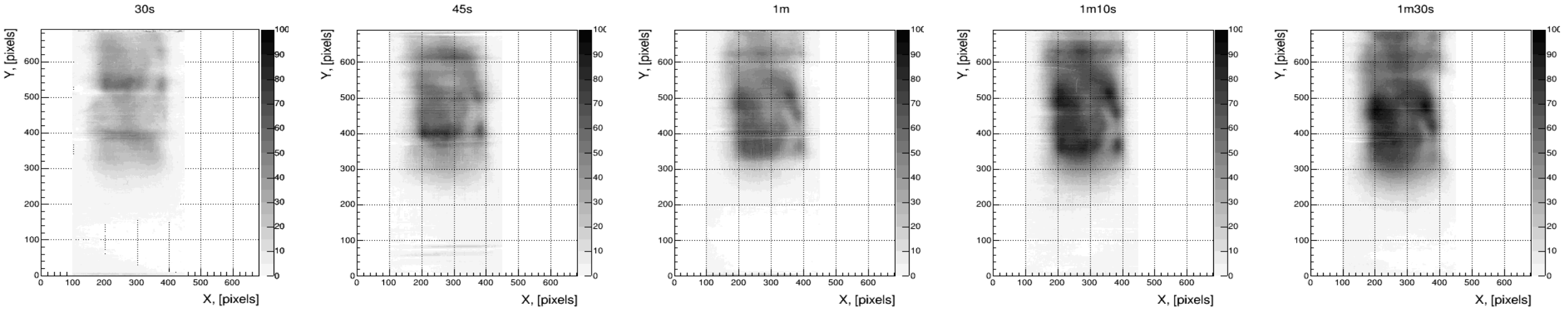
$$x_2 = 420 \div 440$$

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

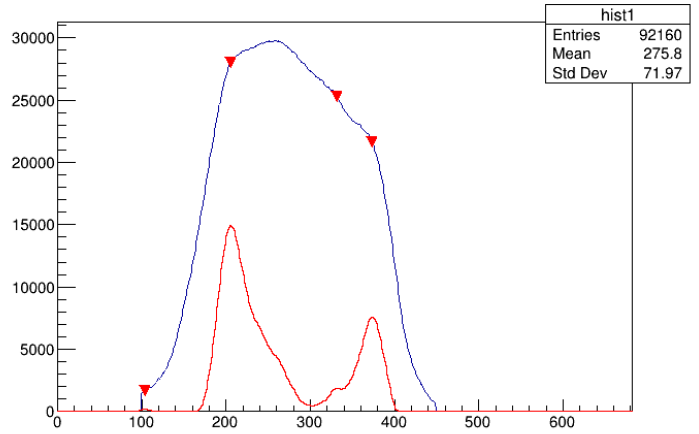
Original images:



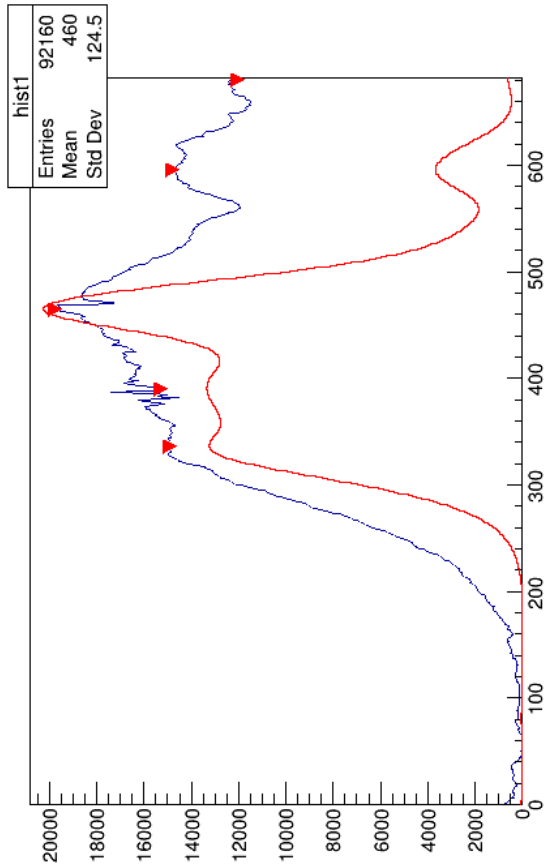
After removing backgrounds:

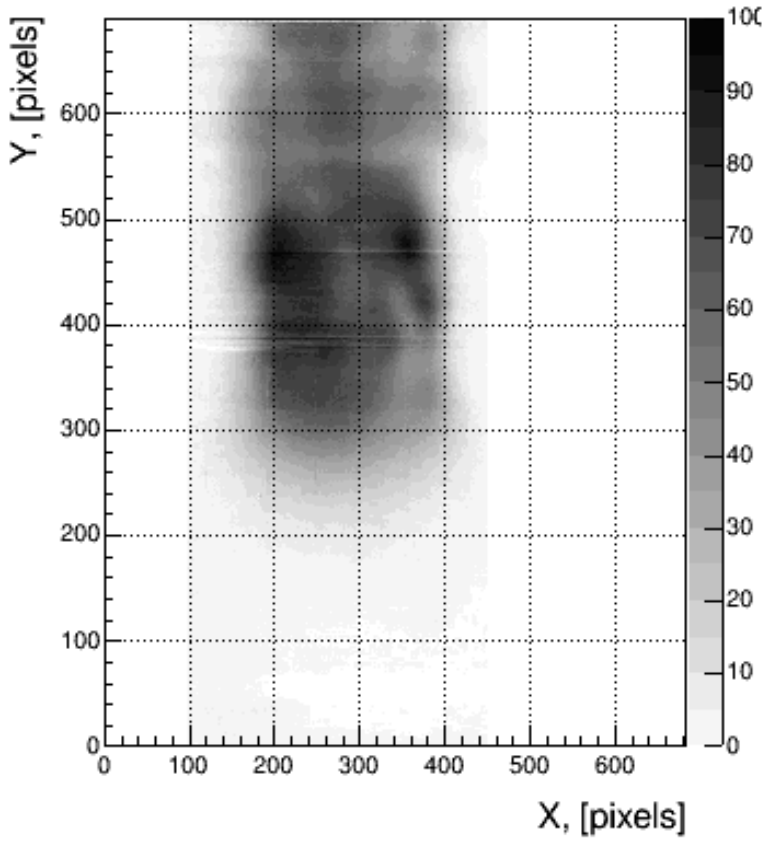


Alignment method

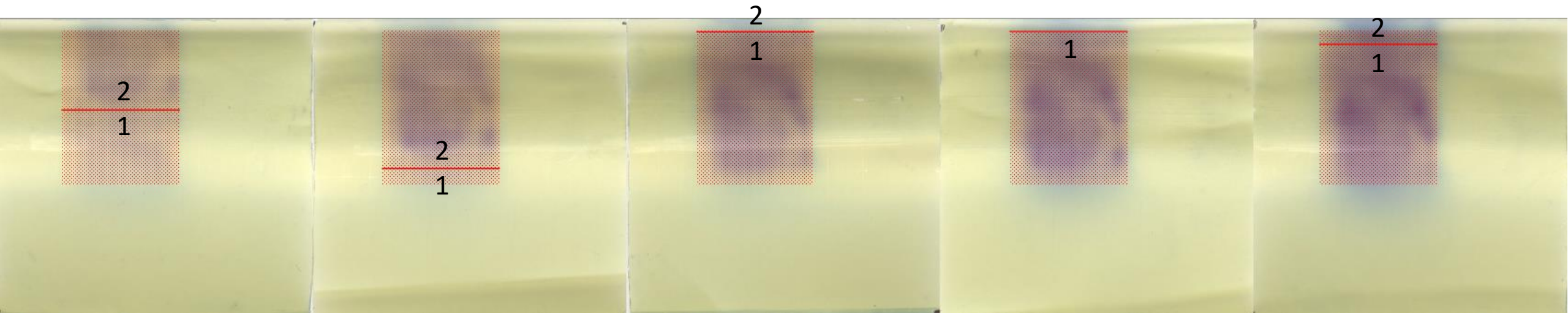


1m30s

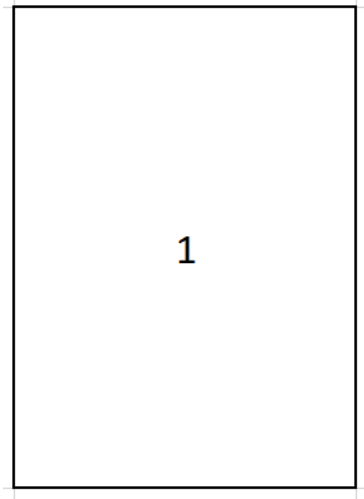


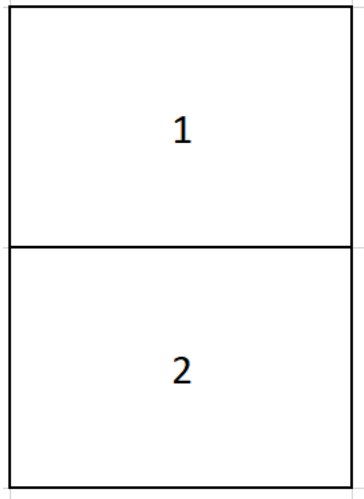


Active part is made from copper foil with the following dimensions:
10,0±0,1 mm x 13,9±0,1 mm



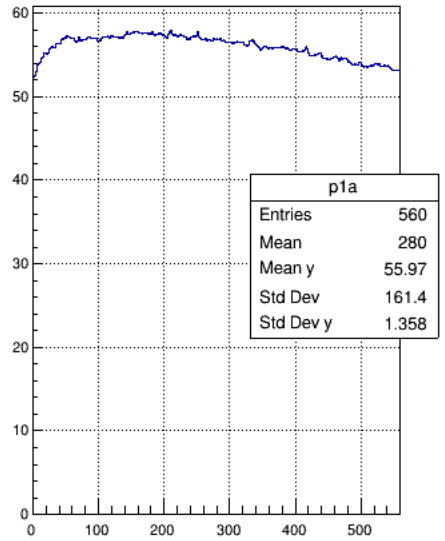
Our selected area: 256 pixel x 360 pixel OR 10.08 mm x 14.17 mm



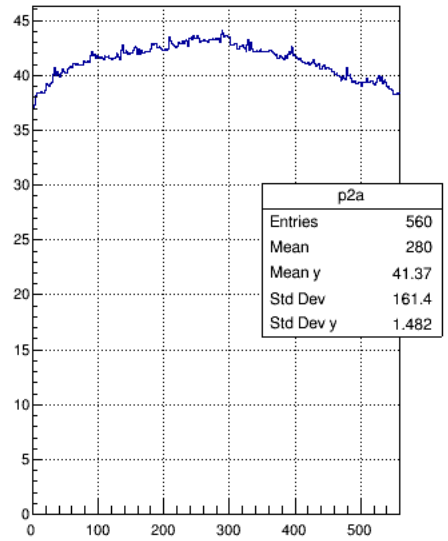


Background removal method using TProfile along x-axis

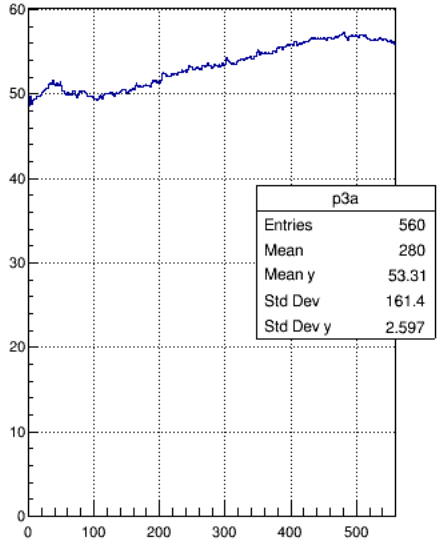
30s



45s



60s



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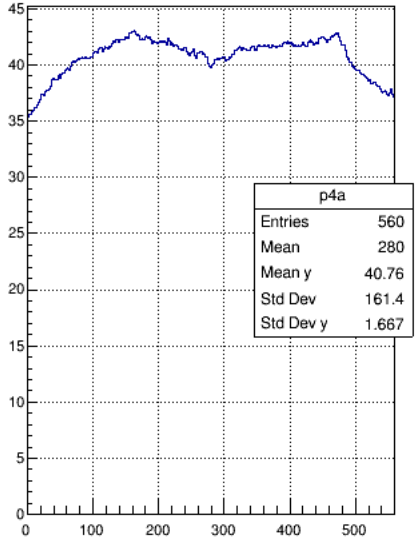

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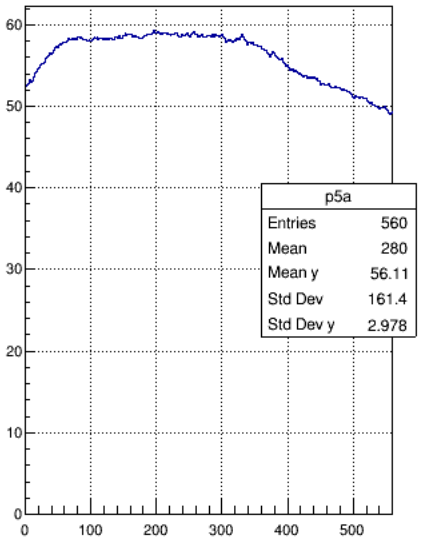

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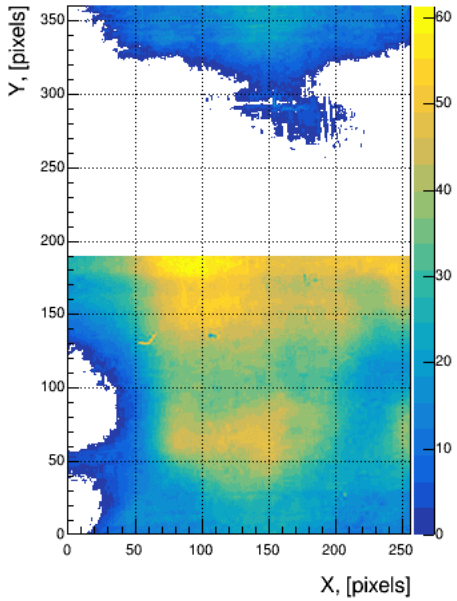

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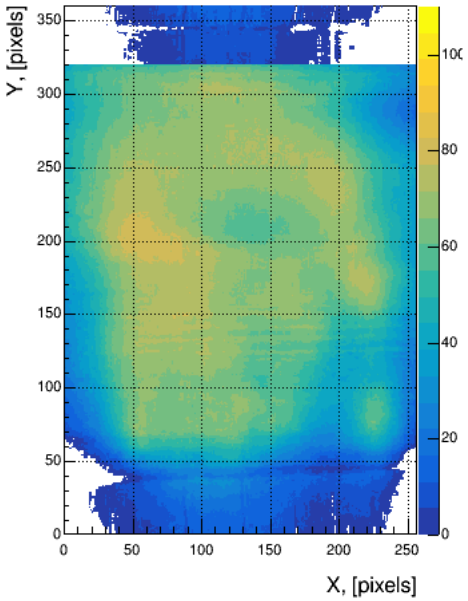
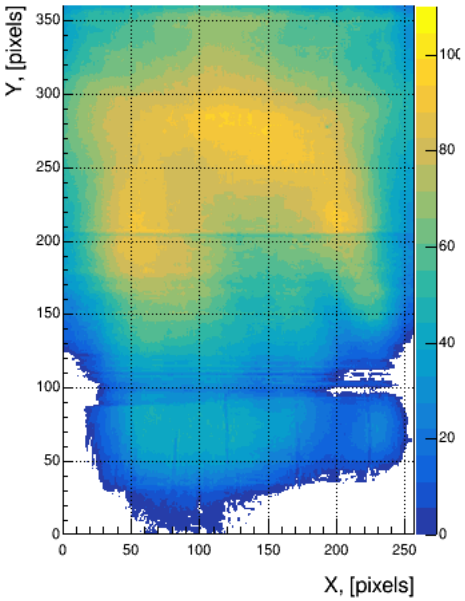


1m



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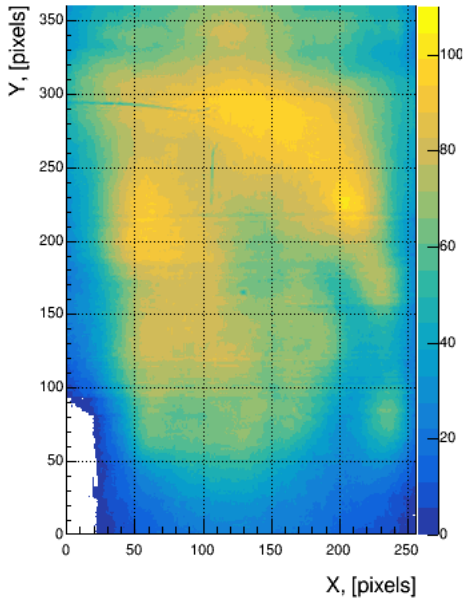

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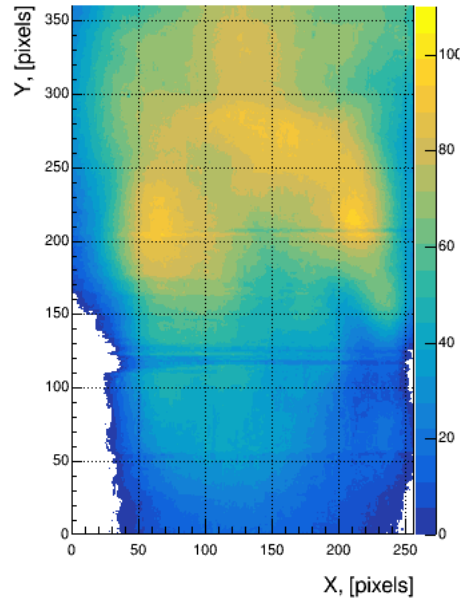
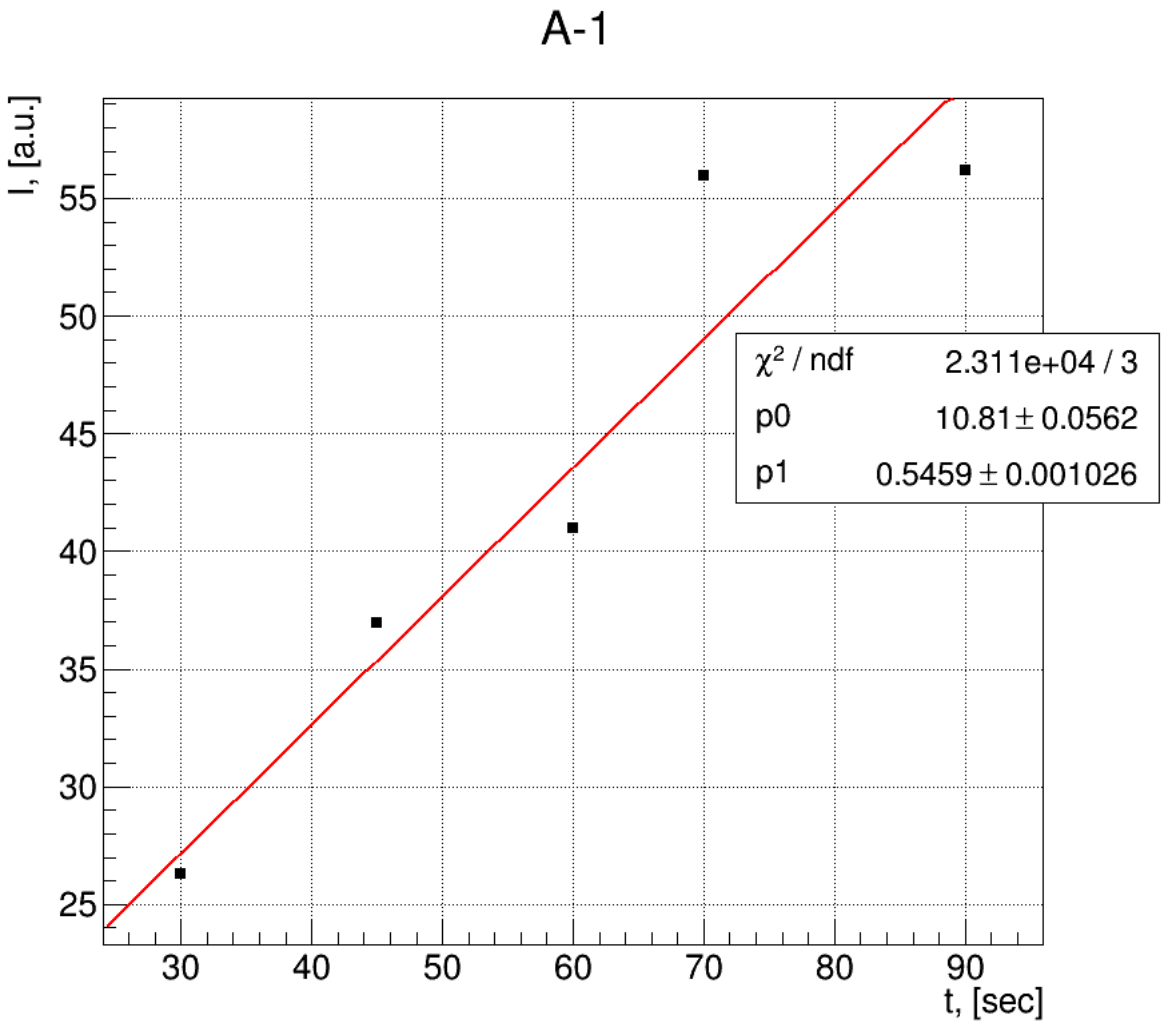
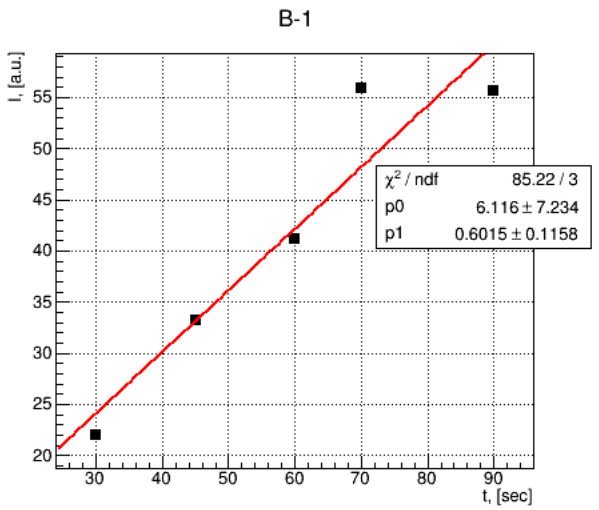
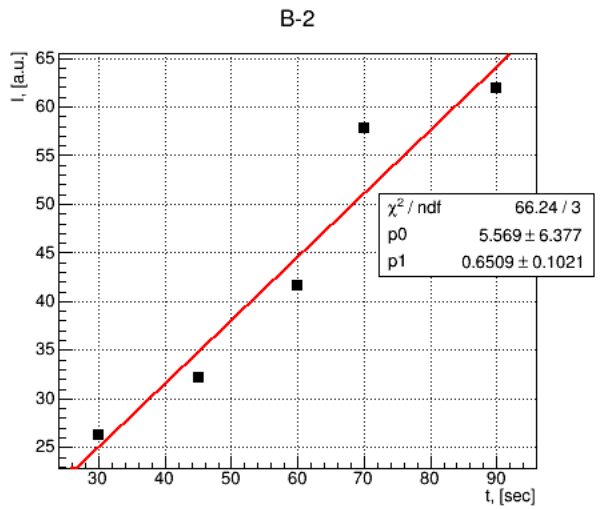
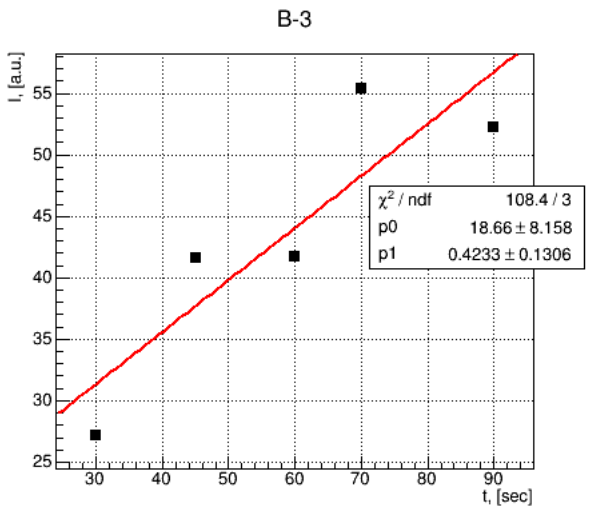


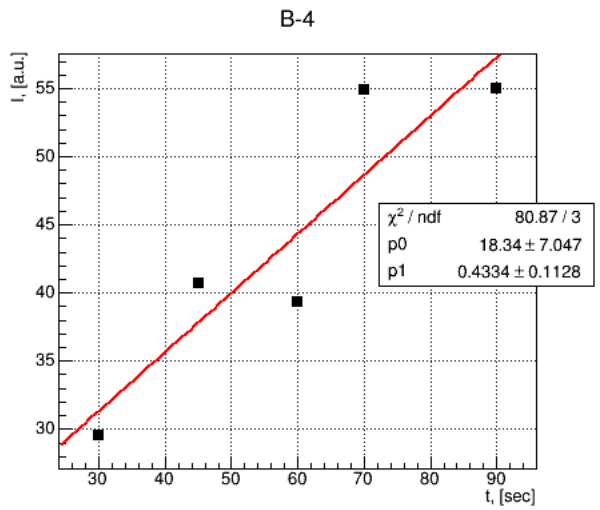
Linear interpolation method



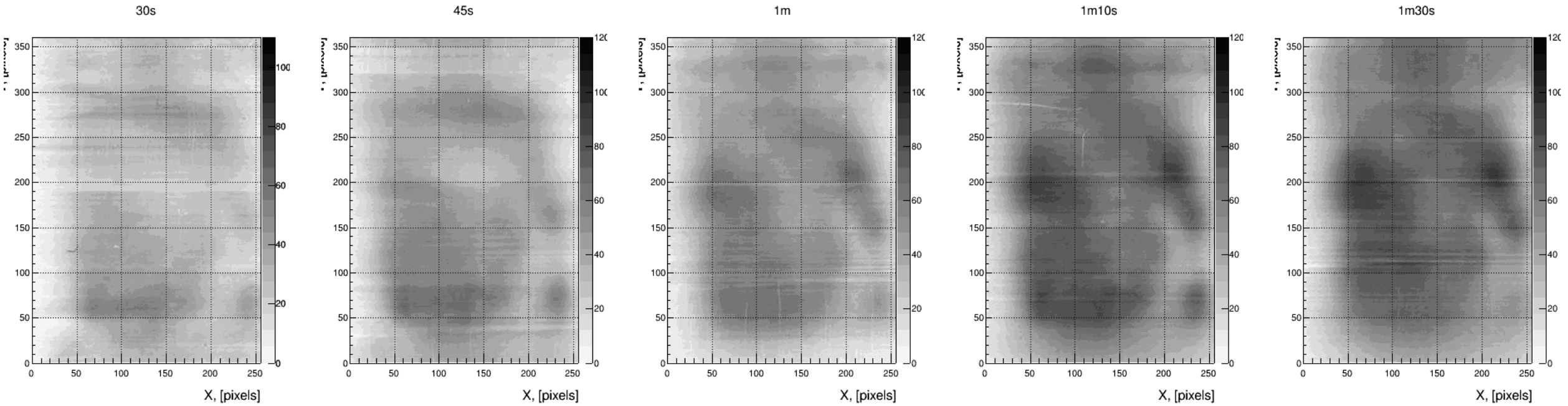








After alignment and background removal:



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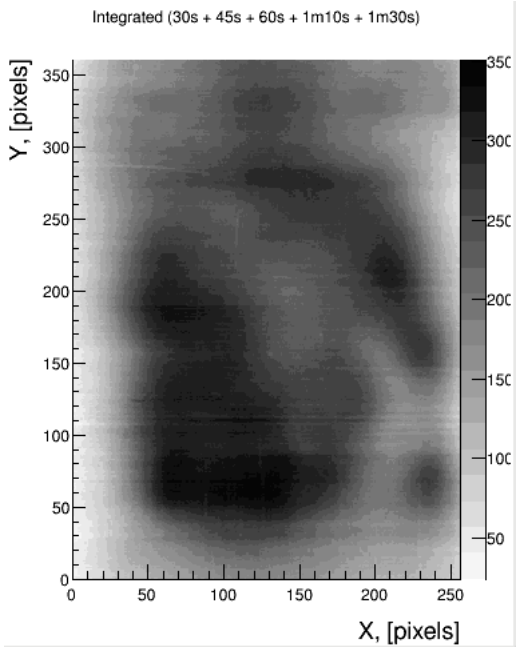

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$c_3 = 0.189$
$c_4 = 0.259$
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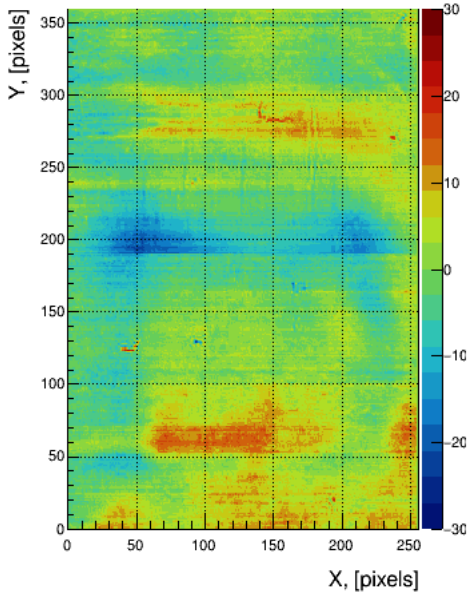
30s



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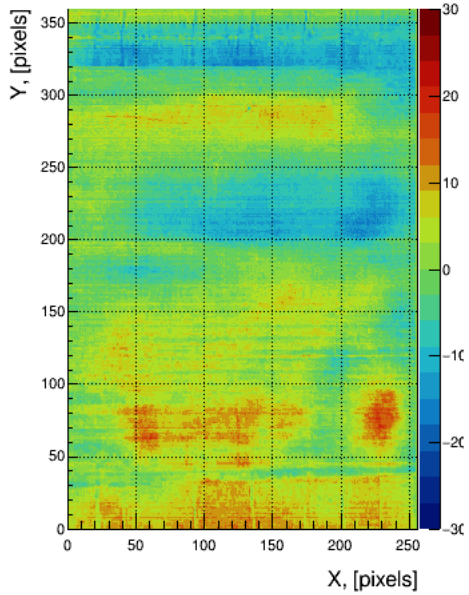
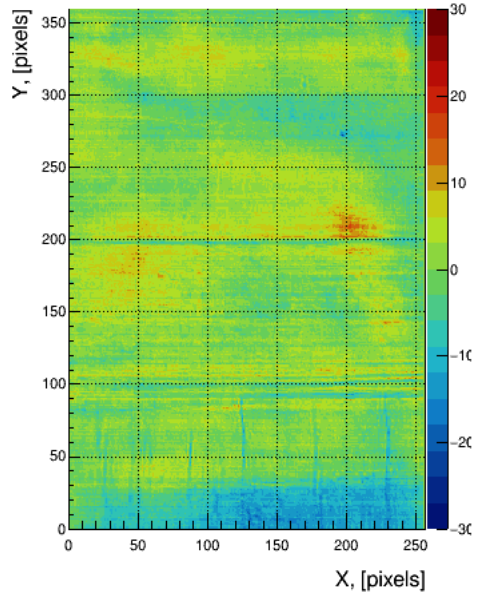


1m



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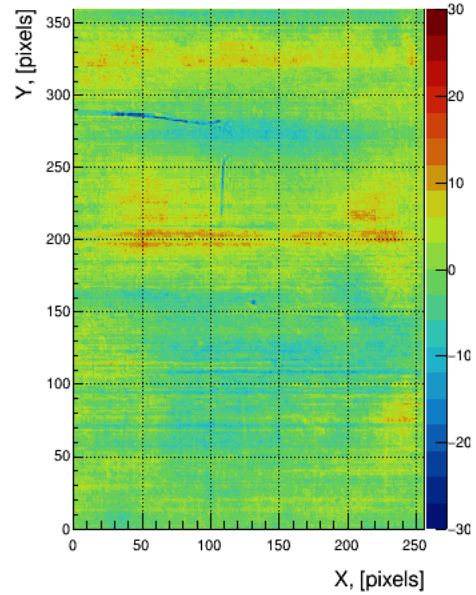

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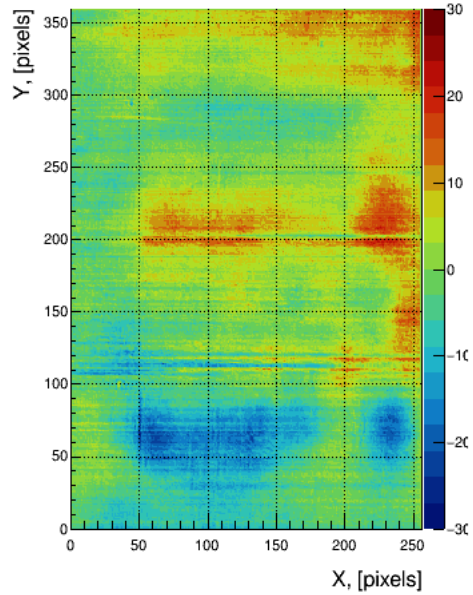

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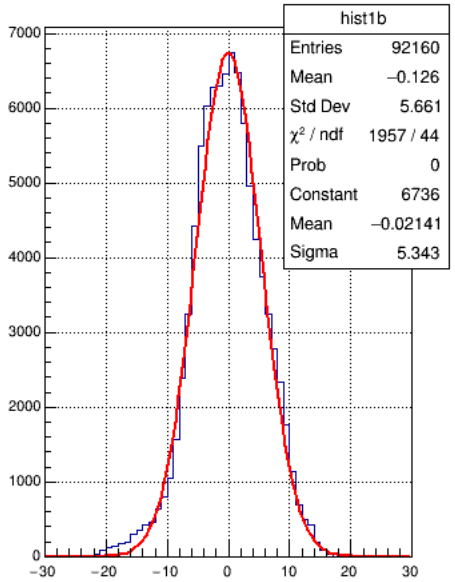

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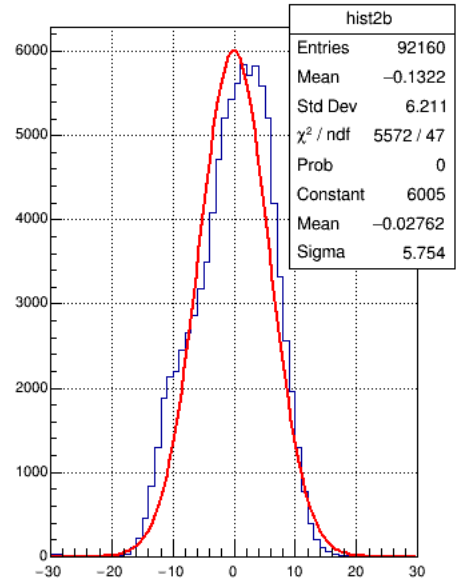

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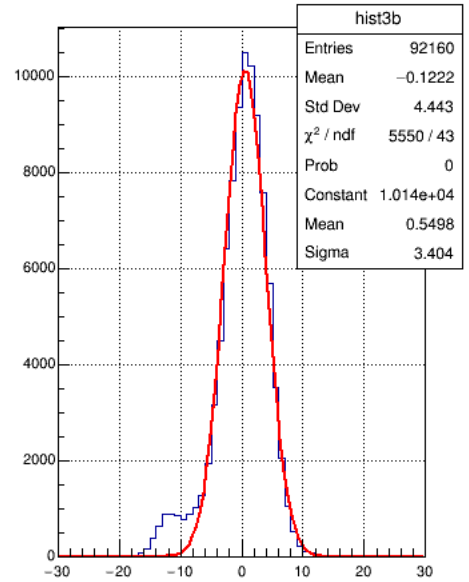

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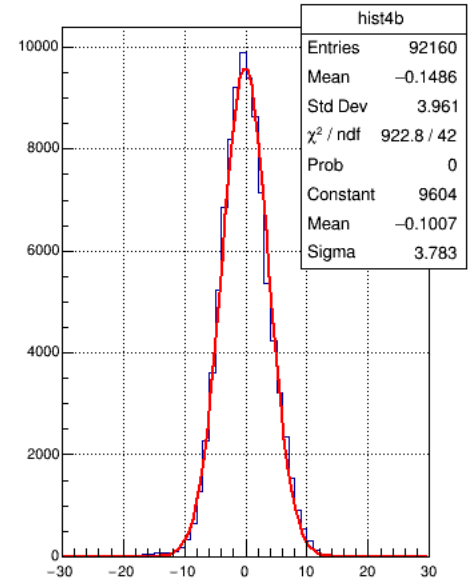

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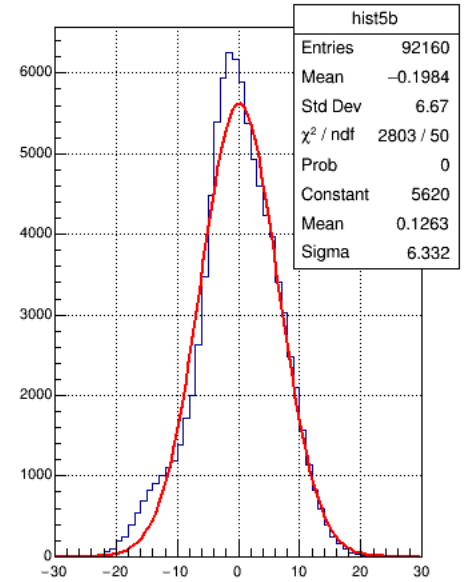
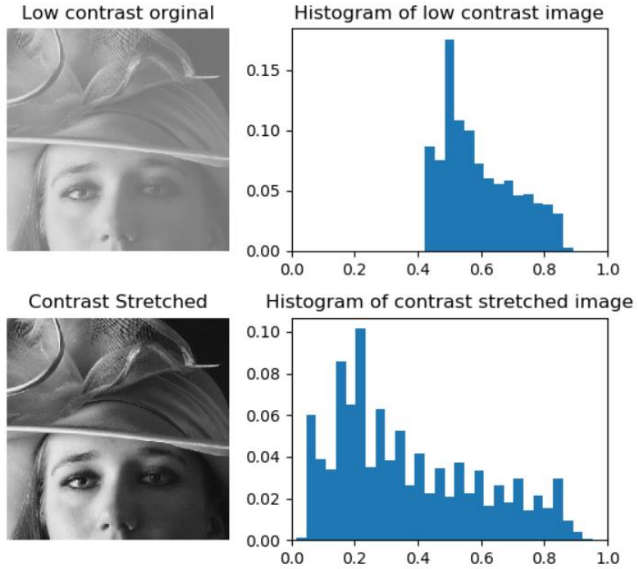
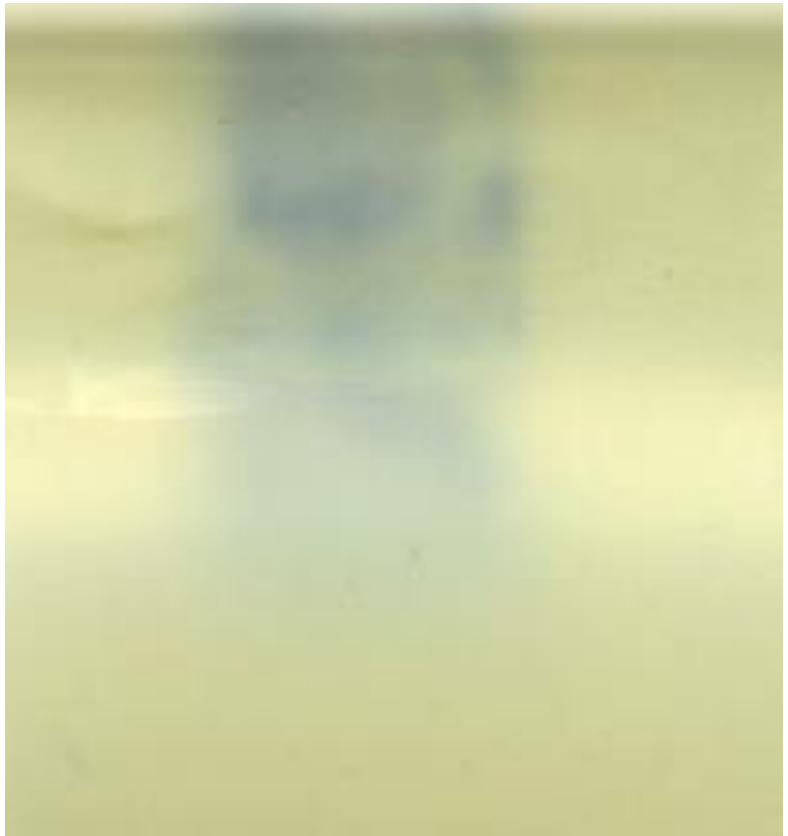
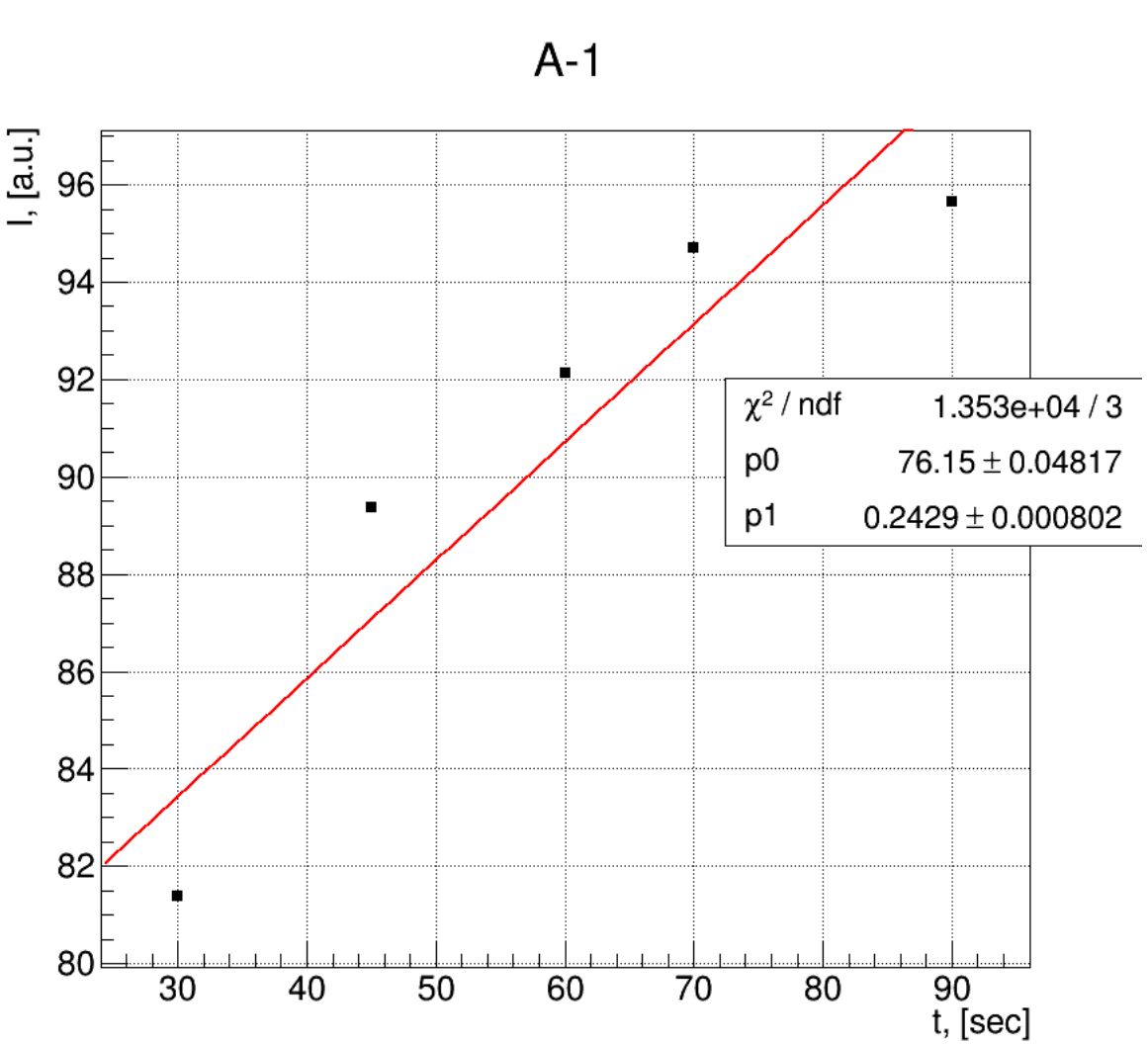


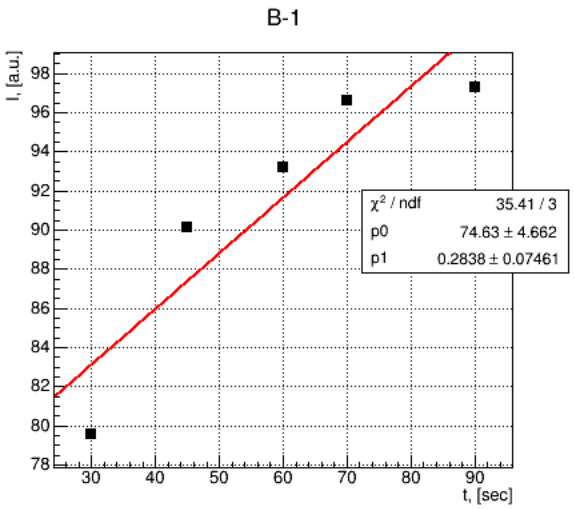
Contrast stretching method

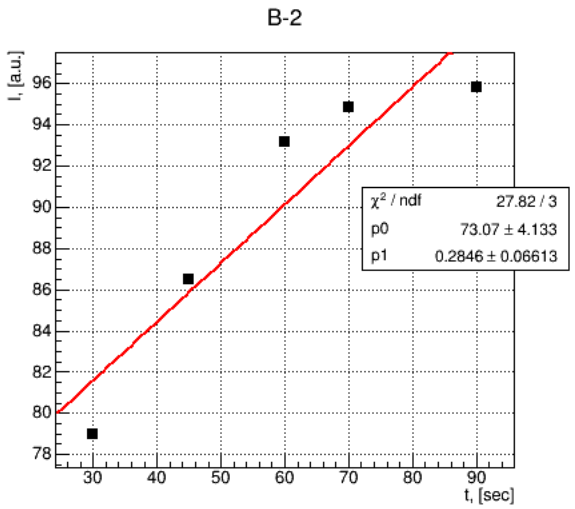


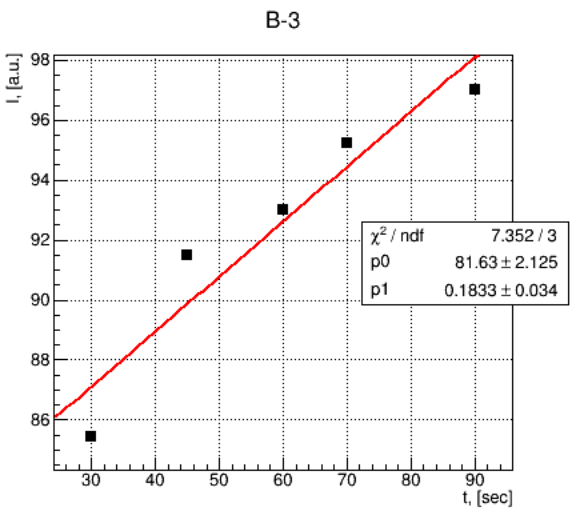


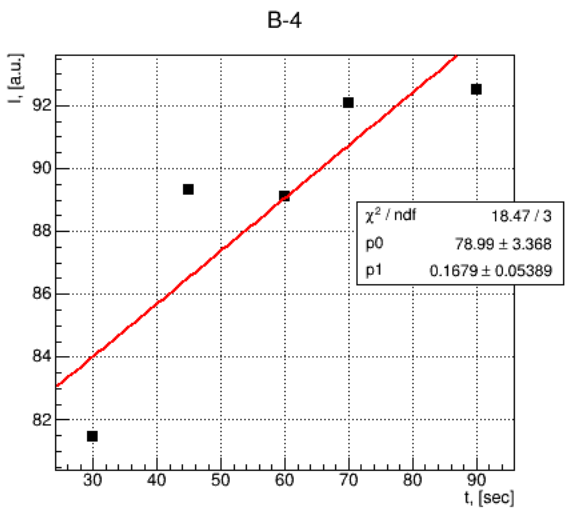
Contrast stretching method



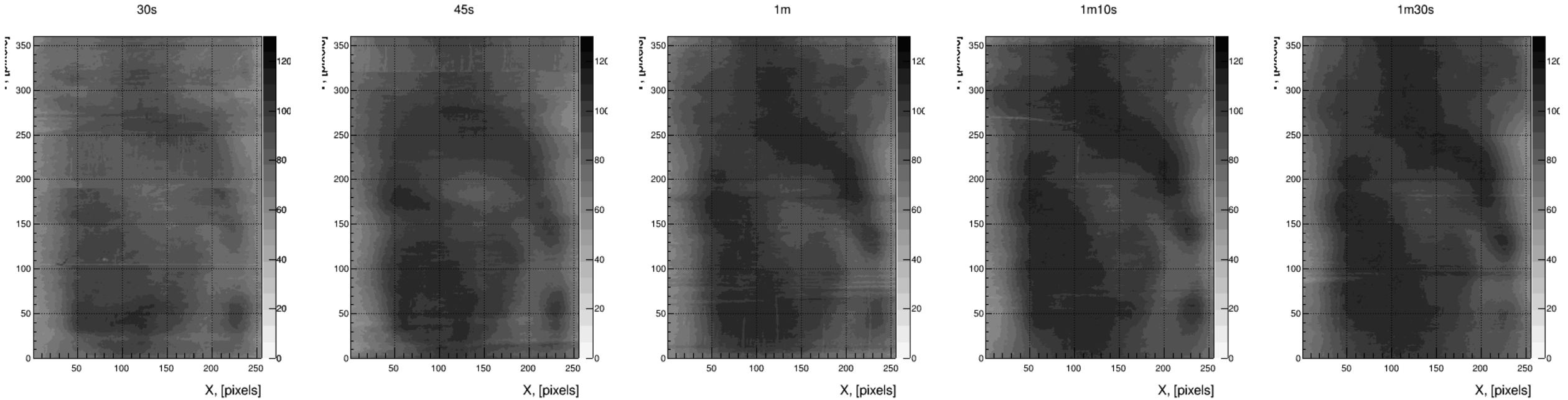




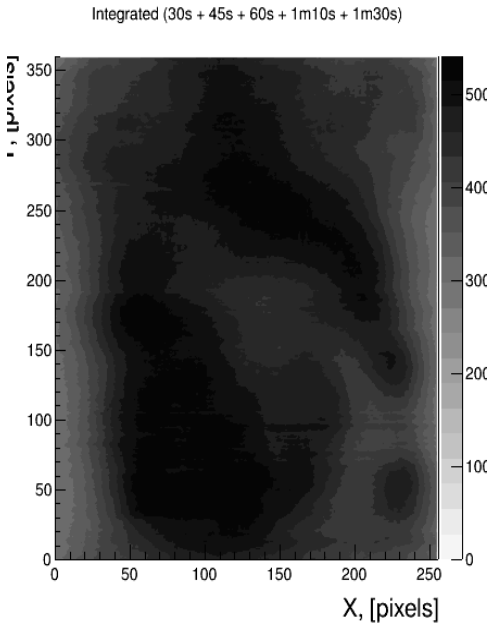




After alignment:



Integrated data (∑) of all 5 images above:



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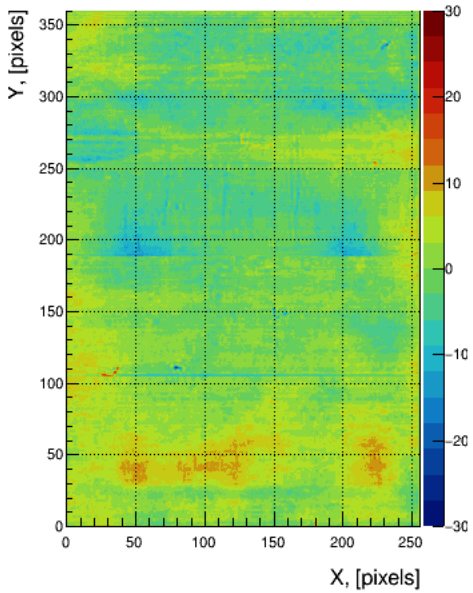
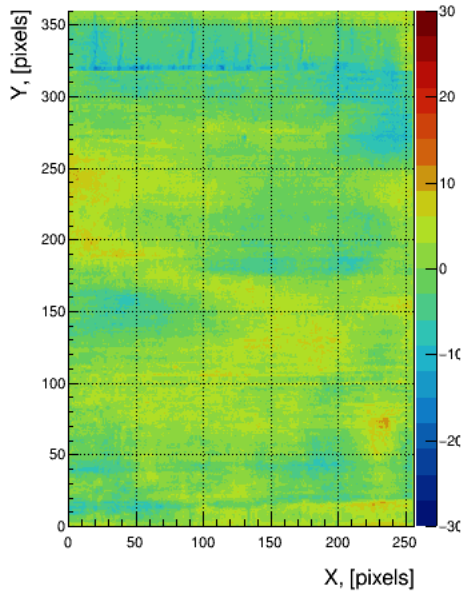
$$c_3 = 0.203$$
$$c_4 = 0.209$$
$$c_5 = 0.211$$

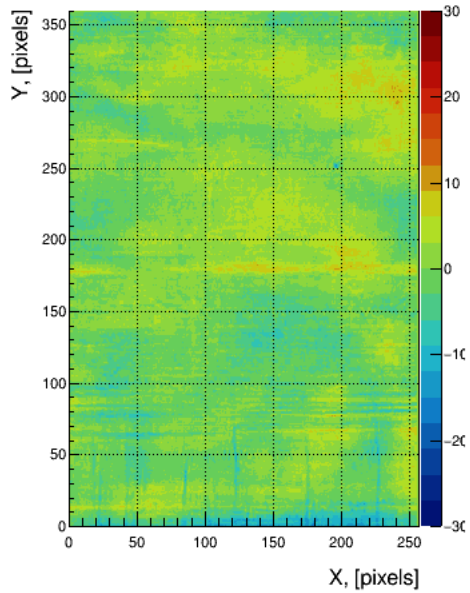
30s



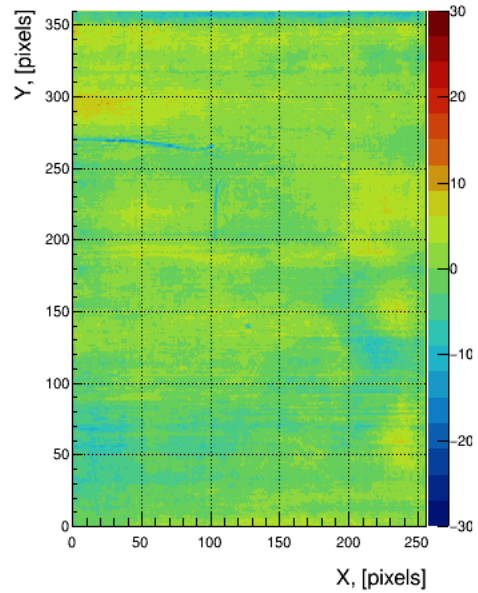
45s



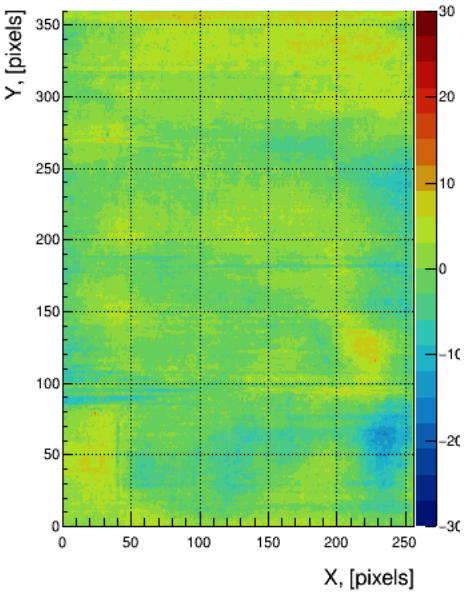
1m



1m10s



1m30s



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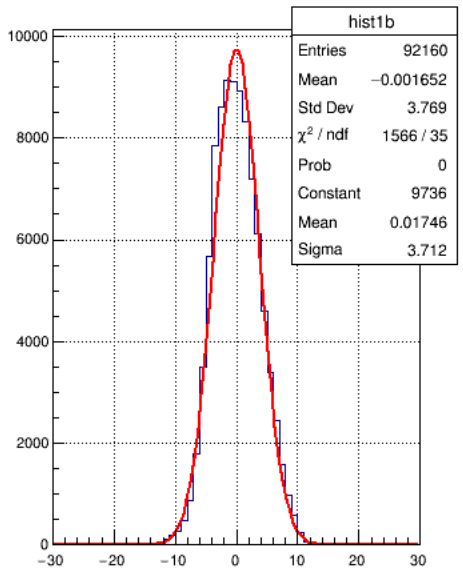
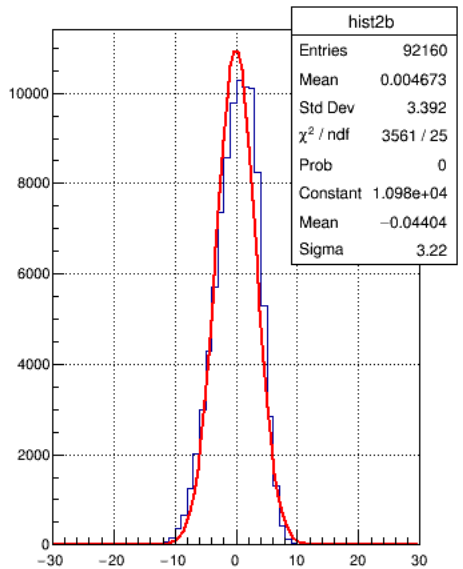


45s



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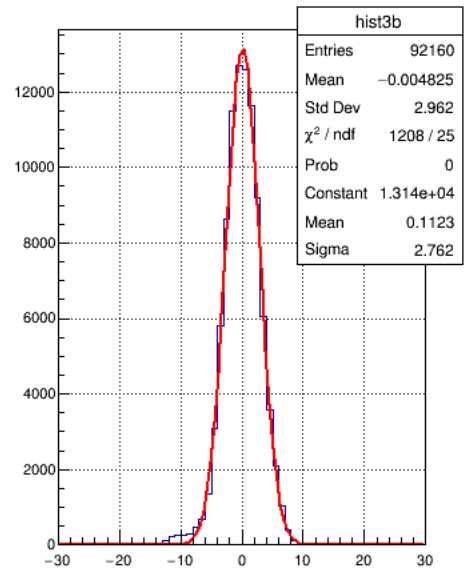

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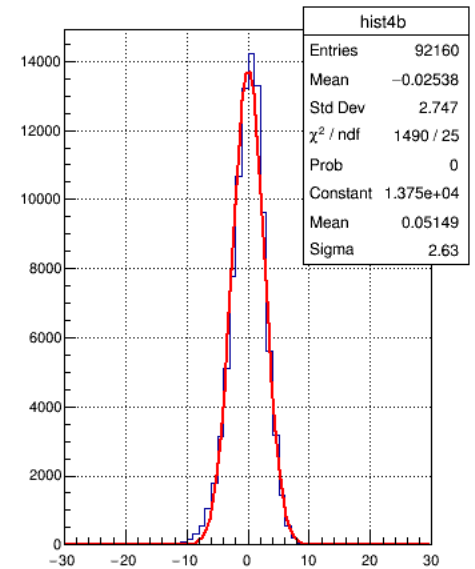

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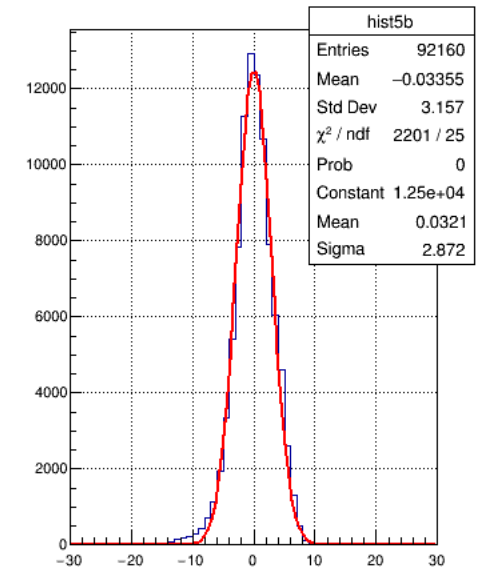
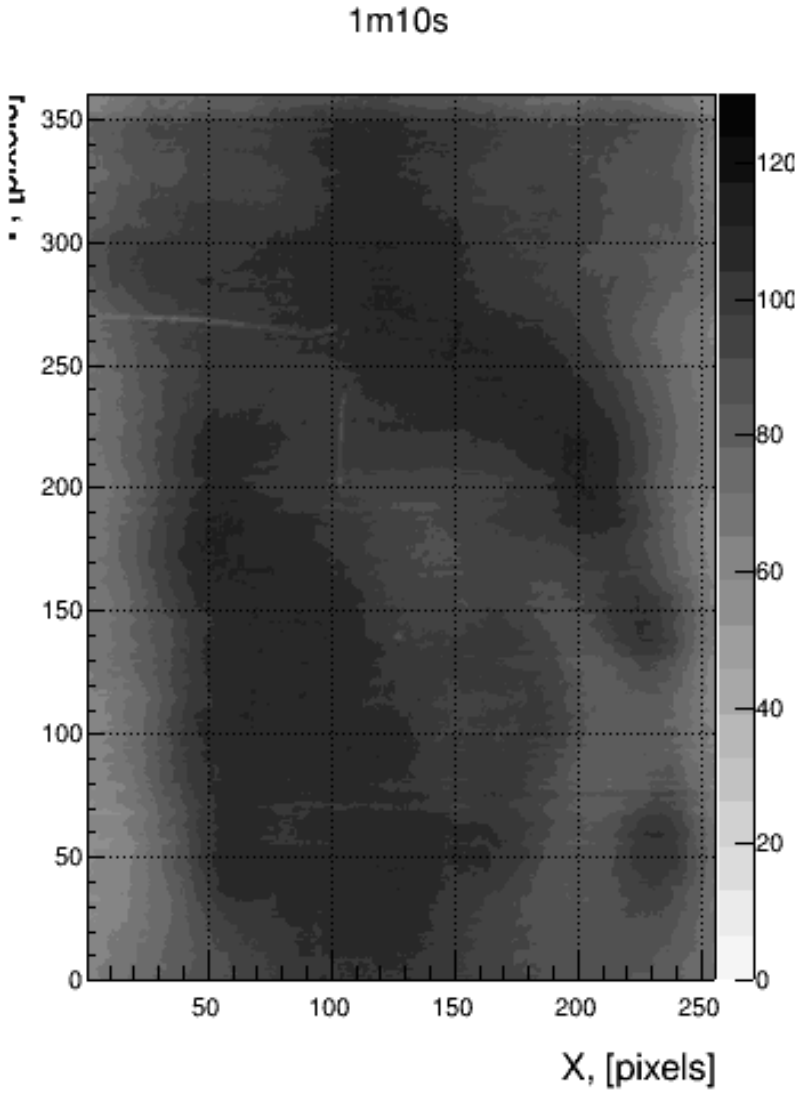
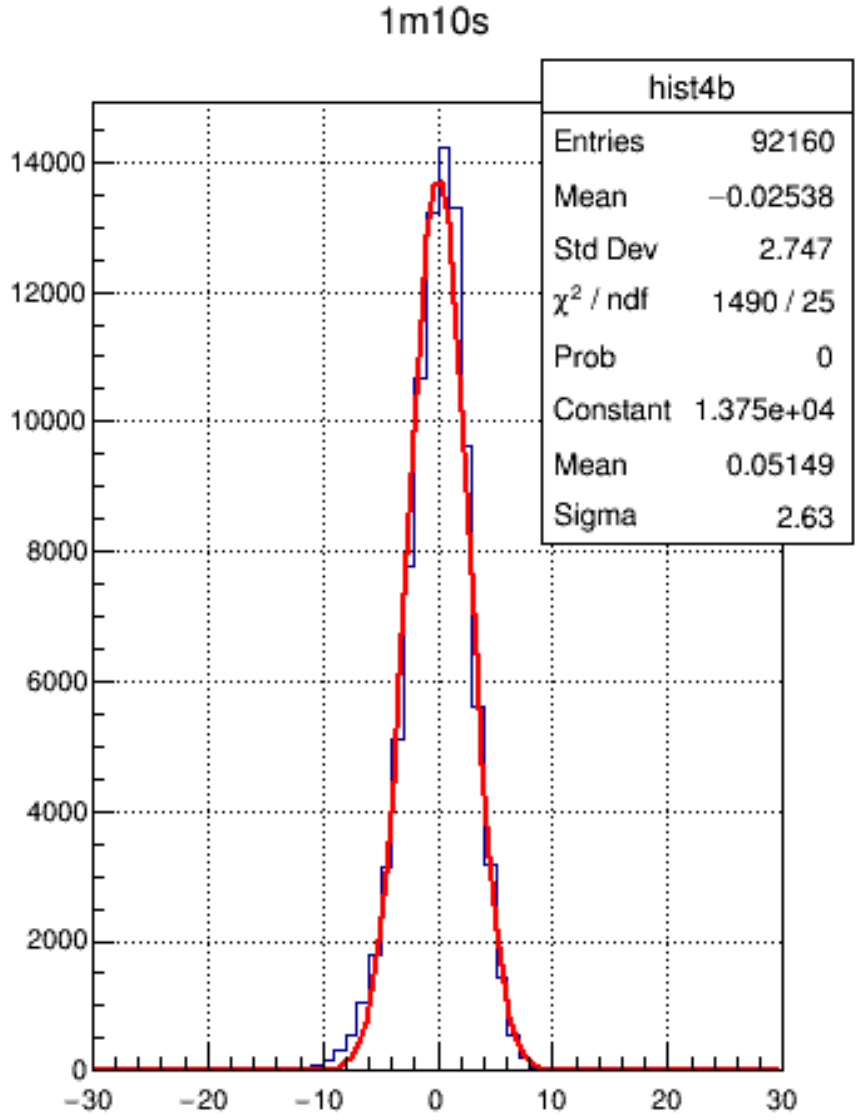


The final result for simulation

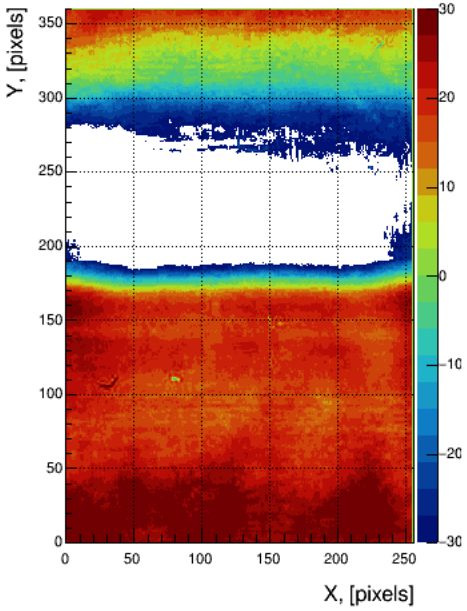




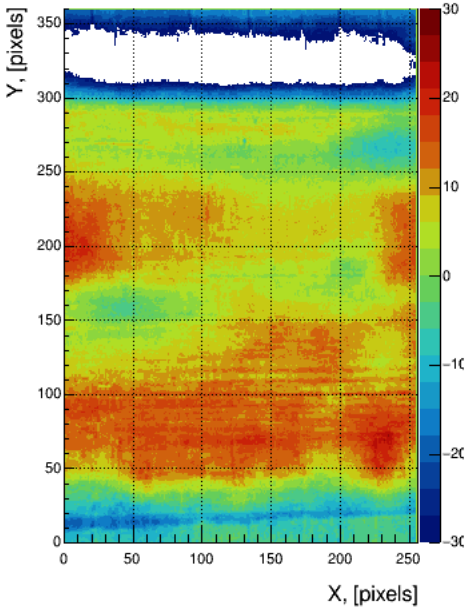
Точность: $\frac{\sigma}{\bar{n}} = \frac{2.63}{94.21} = 0.028\ or\ 2.8\%$

Results without background removal or contrast stretching method

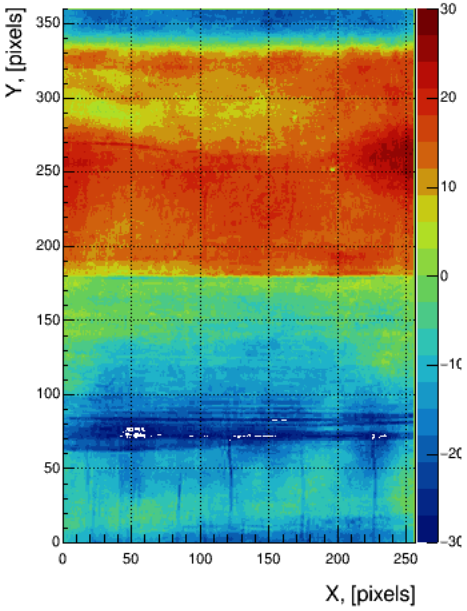
30s



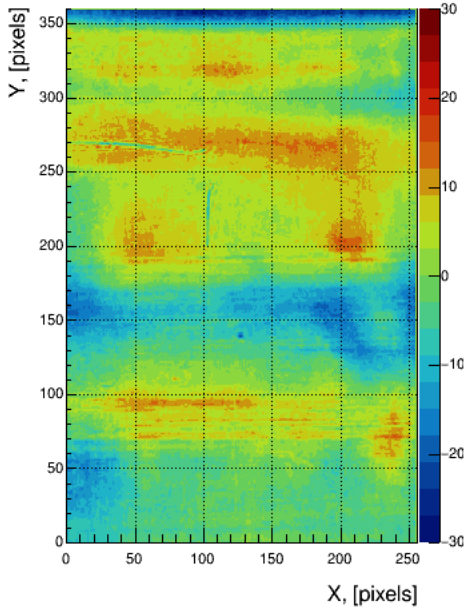
45s



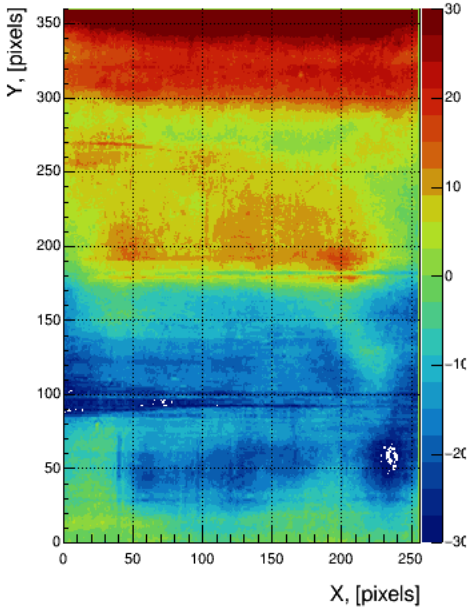
1m



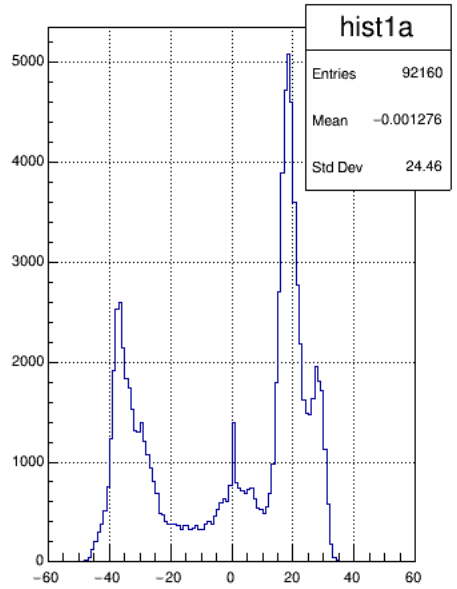
1m10s



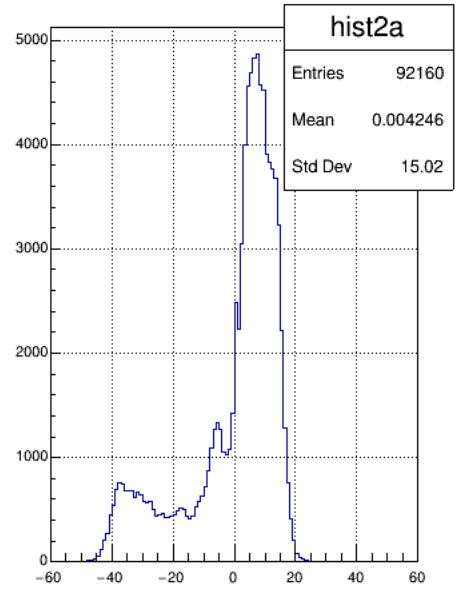
1m30s



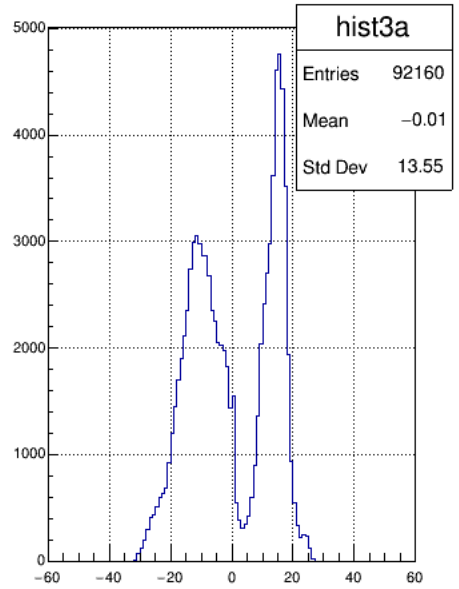
30s



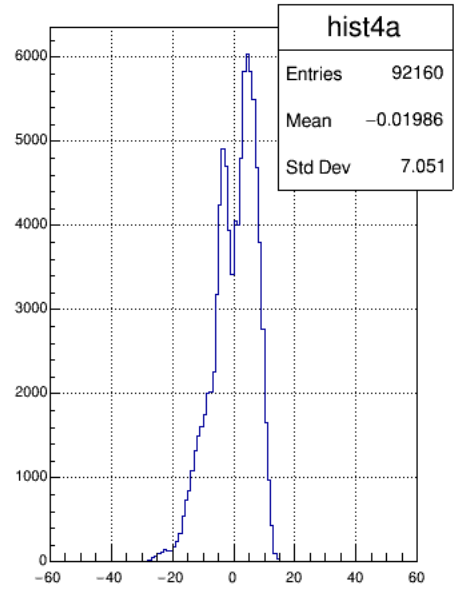
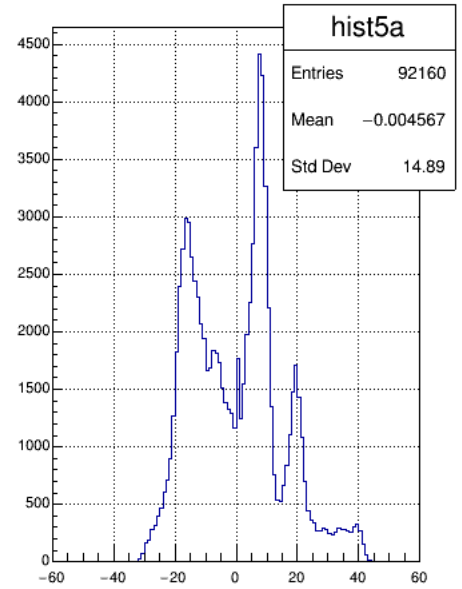
45s



60s



1m10s



1m30s