2016 Test Beam data analysis

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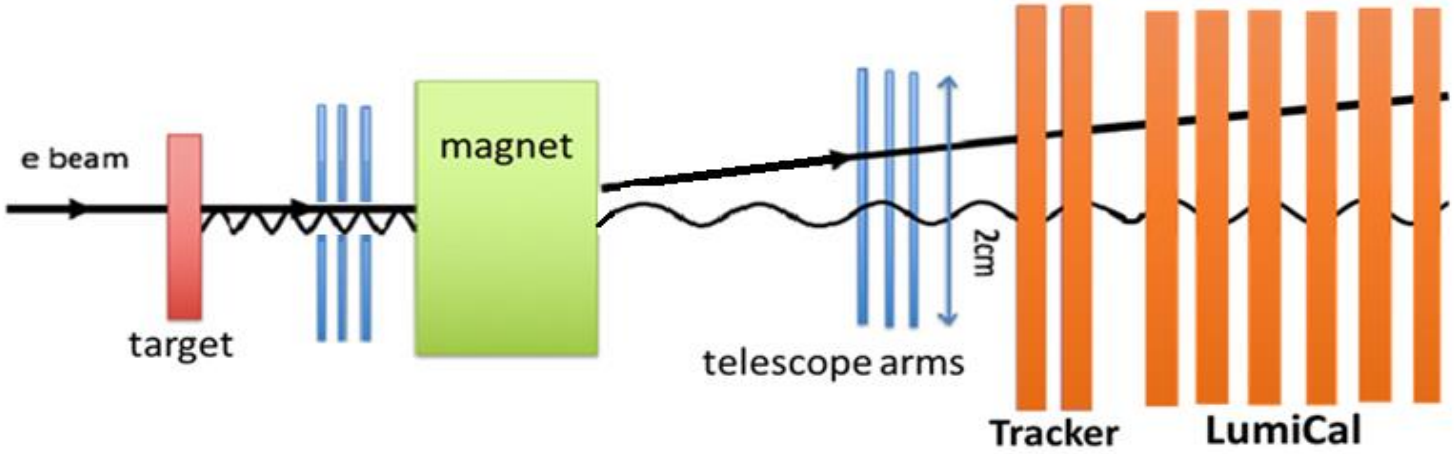
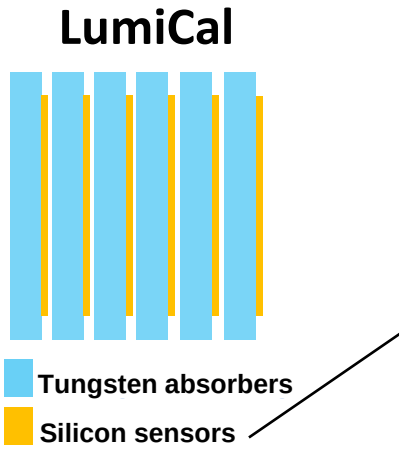
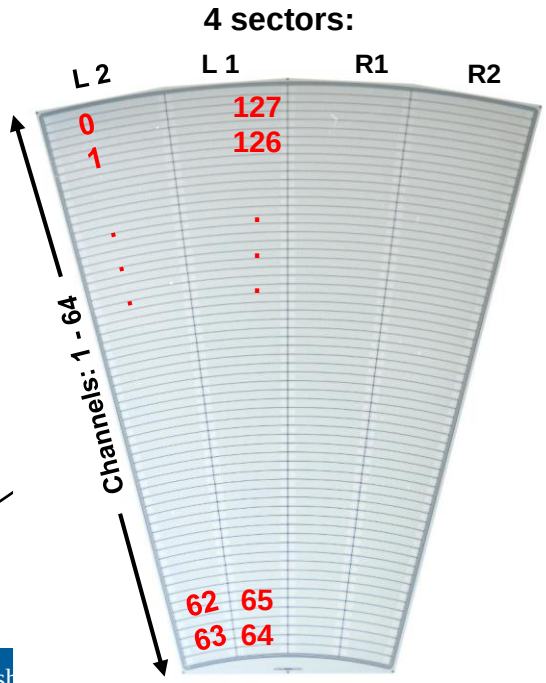
Experimental set-up



- Tracker planes consist of LumiCal sensors without absorber layers;
- Lumical calorimeter consists of 6 Si sensors with one absorber layer placed in front of each active sensor layer;
- During the running of the experiment we used different targets, were allowed to turn off the beam and analyze the signal when the sensor was not exposed to any electron beam.





Data analysis

✓ **Electron runs: 738*, 756* @ 5GeV, w/o target and w/o magnetic field**

*The charge divider circuit has been used. The trackers were without charge divider all the time.

✓ **I used the RunXXX_...._reco.root : Tree with extracted signal**

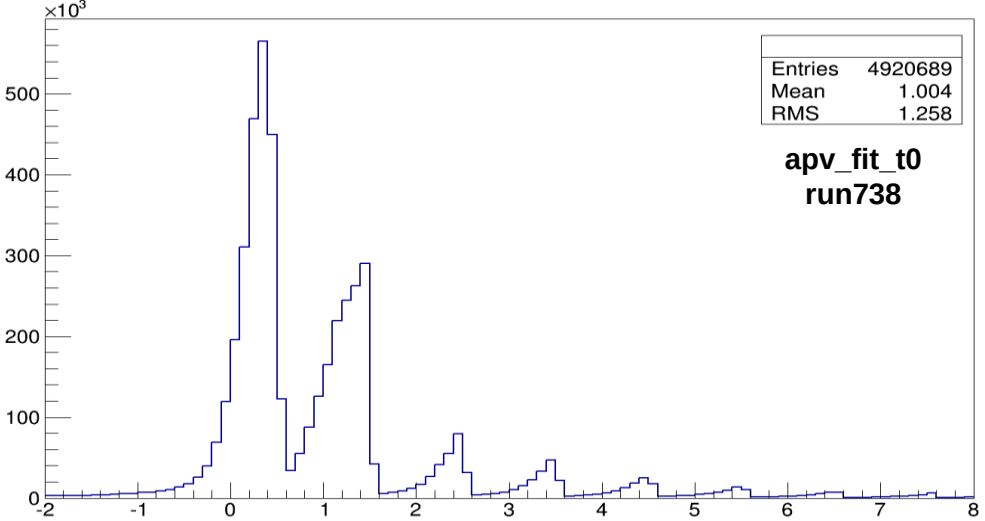
m_apv_signal_maxfit; // maximum of the fit with RC-CR response function

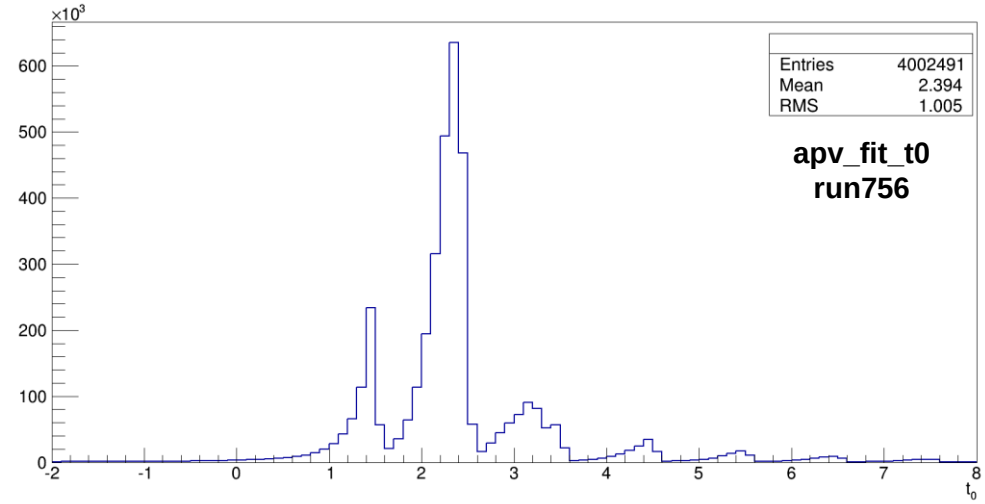
m_apv_signal_bint1; // maximum of the first time bin

✓ **Signal selection criteria:**

- Neural network NN – different values (0.5, 0.8, 0.9);
- t_0 and *tau* – different values;
- Signal > 100ADC;

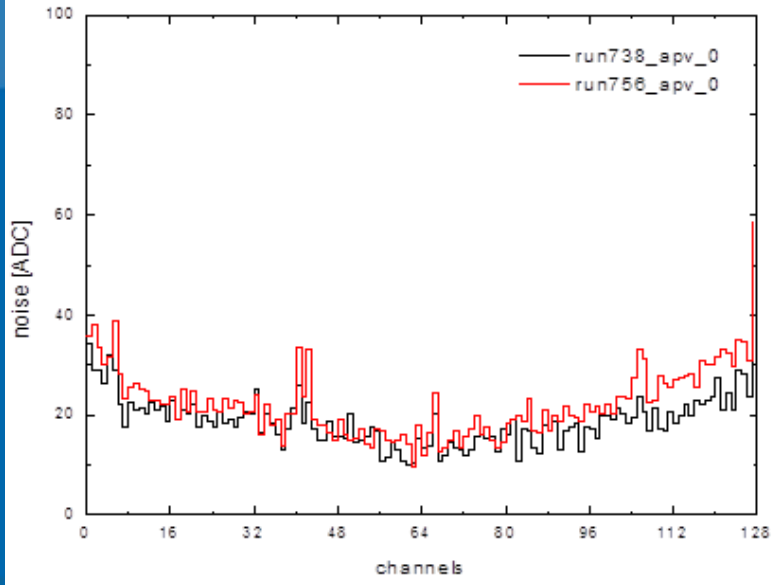
Cut parameters

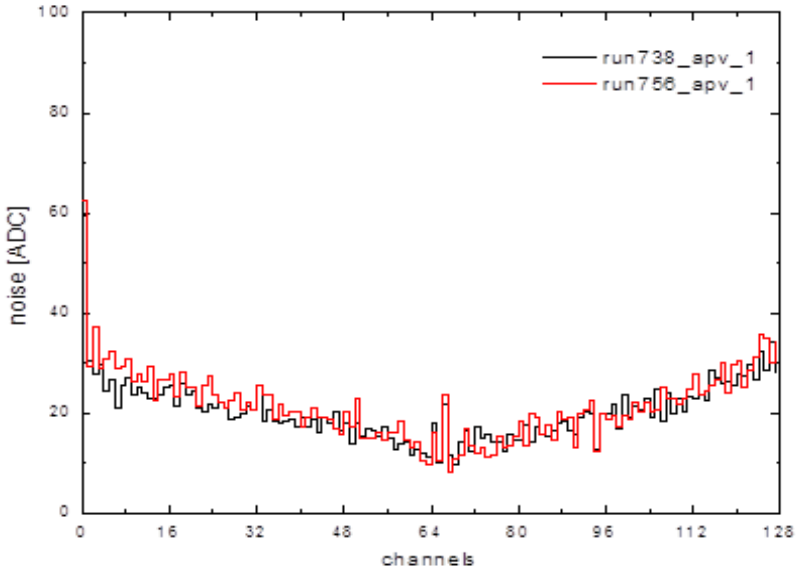


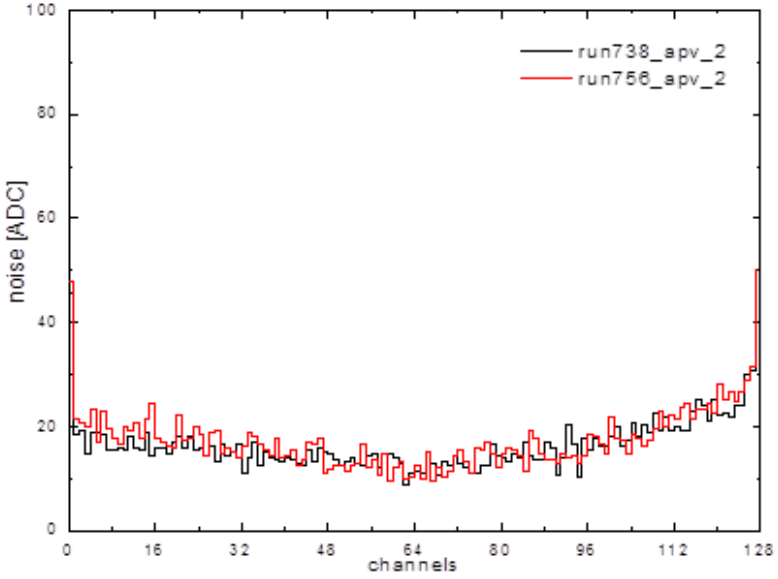


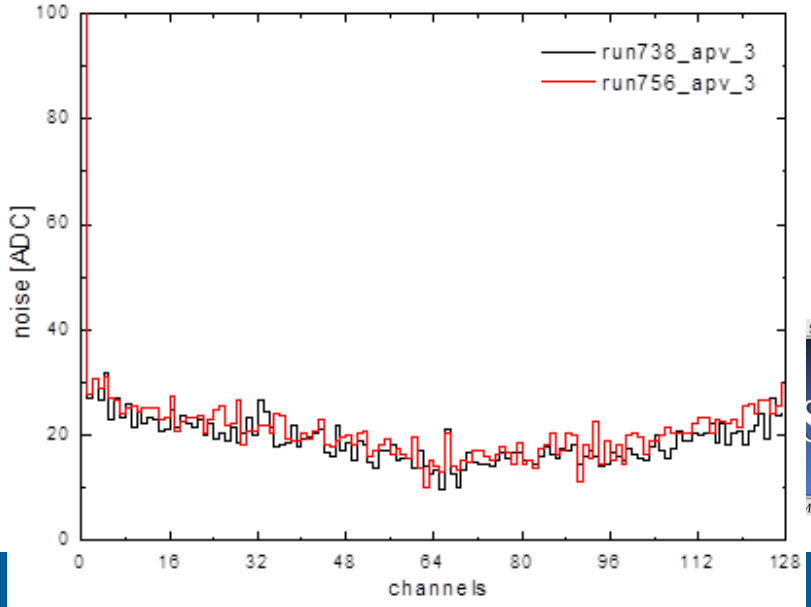
Run	nn cuts	t_0 cuts	tau cuts
738	0.5	-0.3 – 0.8	0.5 - 3
	0.8		
	0.9		
756	0.5	1.5 – 2.7	1 - 3
	0.8		
	0.9		

Noise distribution

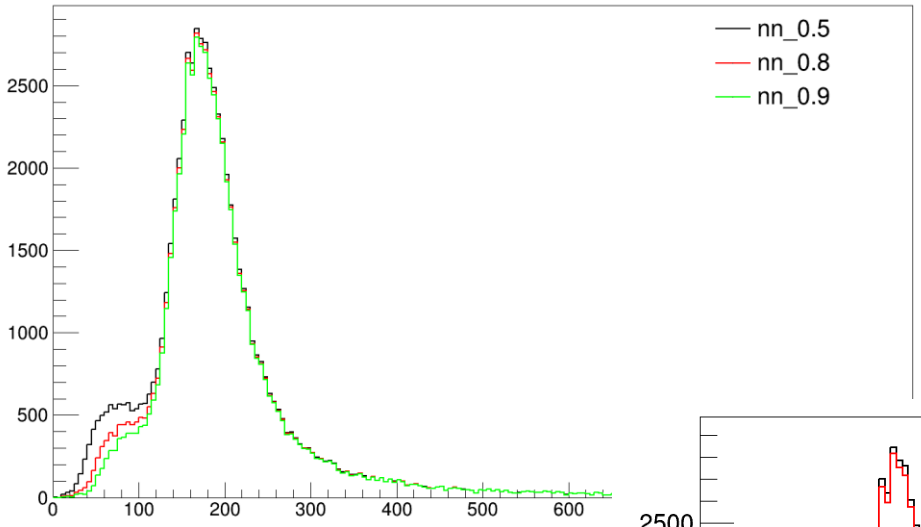




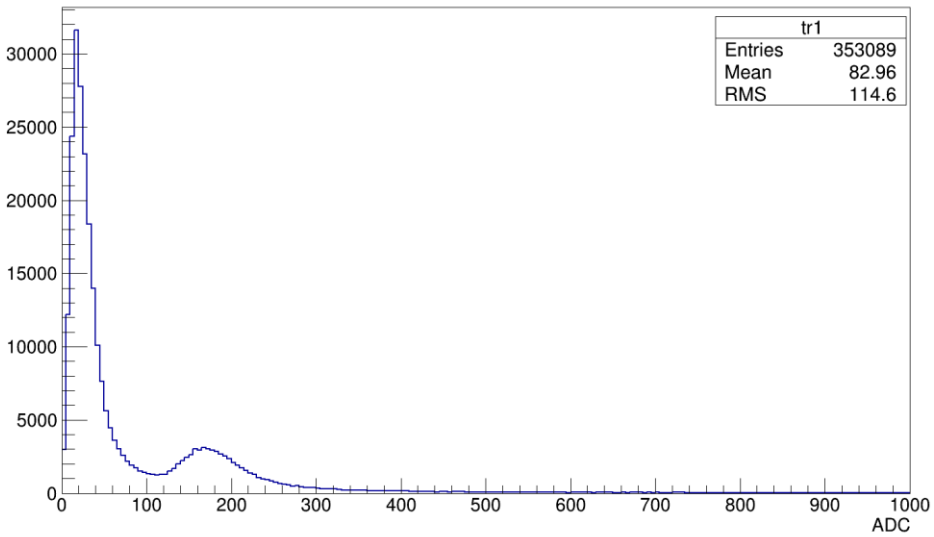




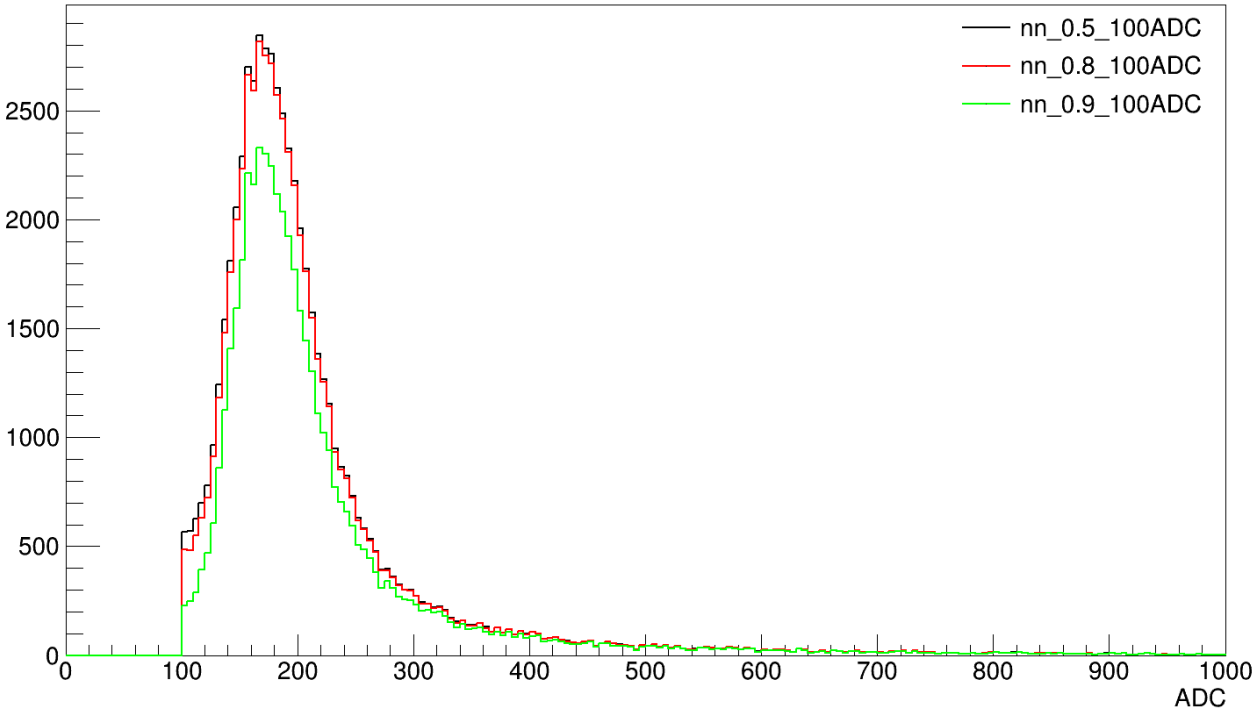
Data analysis

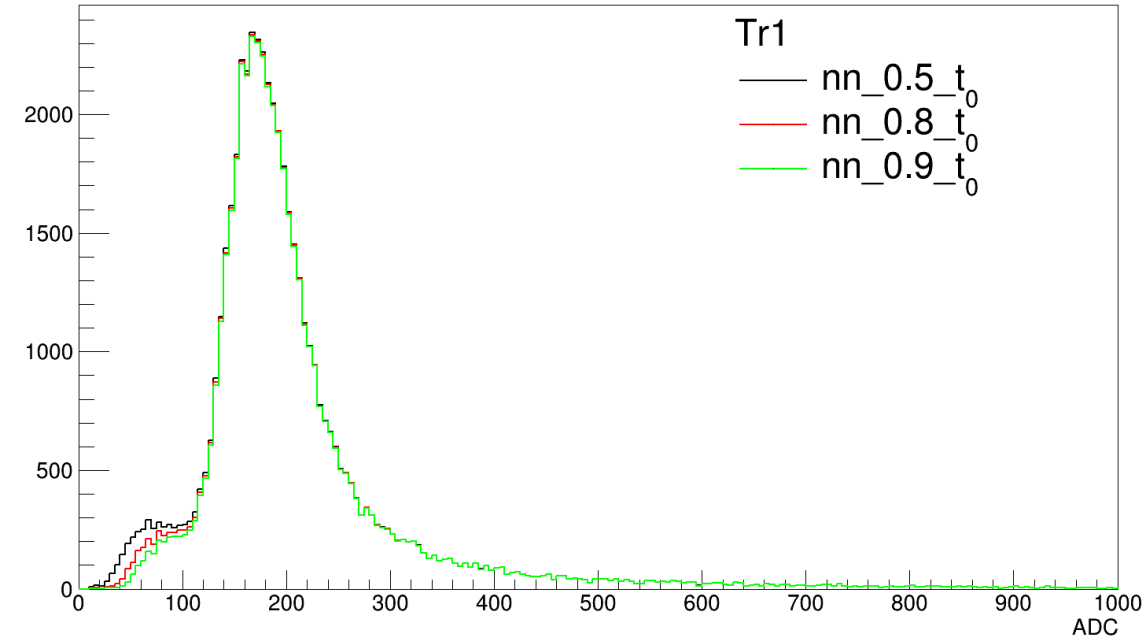


Energy deposited in tracker sensor w/ neural network cuts



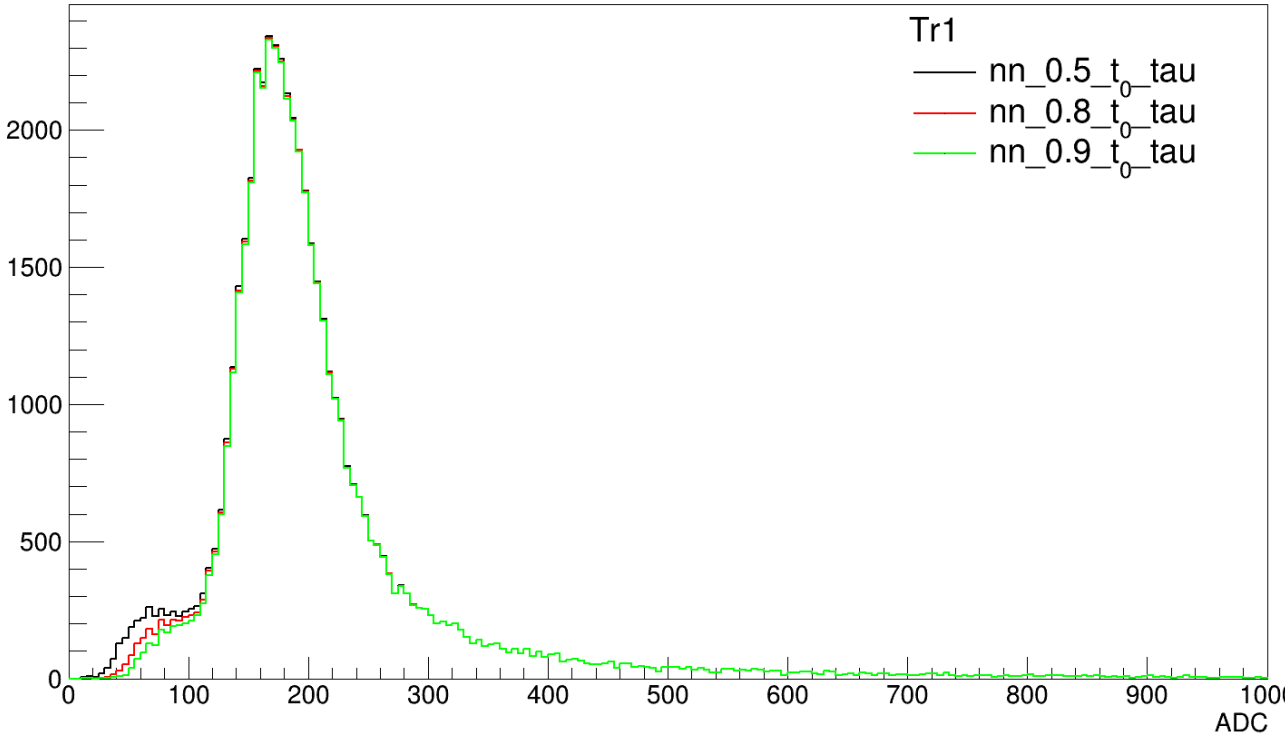
Energy deposited in tracker sensor without cuts



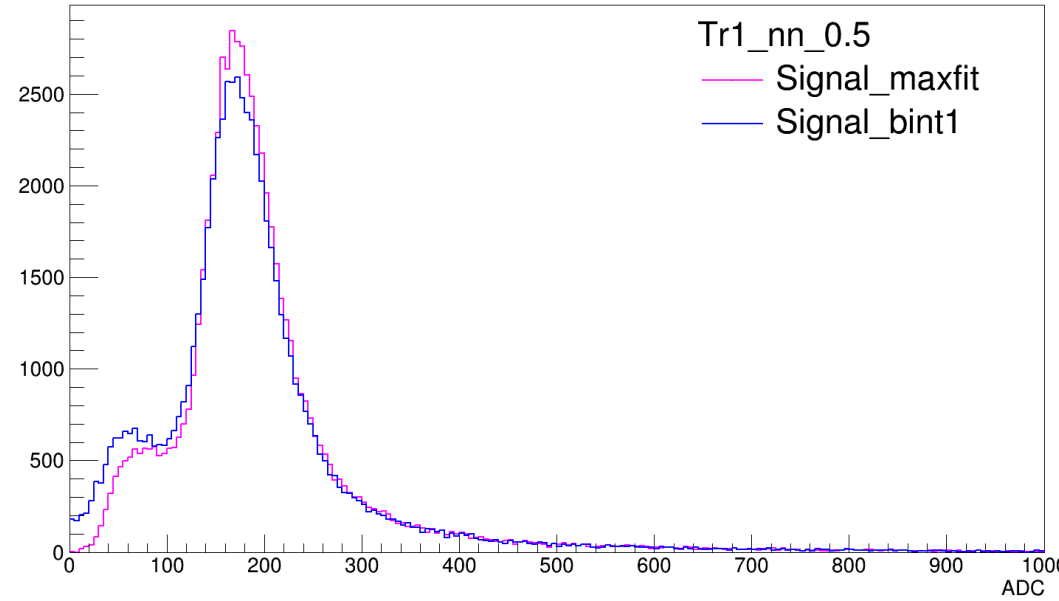


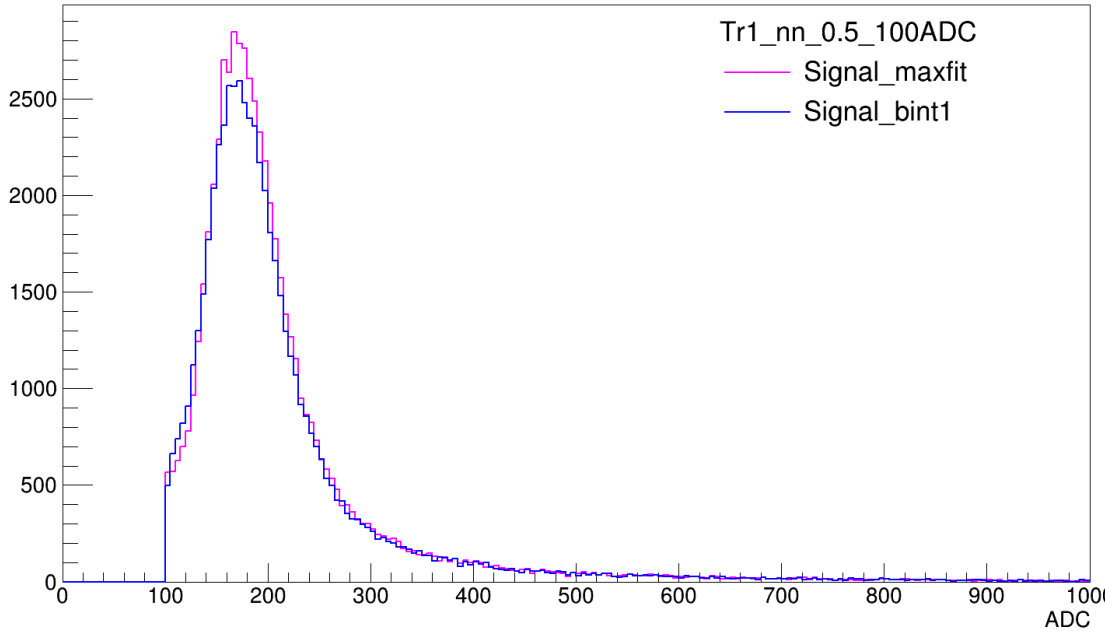
Energy deposited in tracker sensor
w/ *neural network* and t_0 cuts

Energy deposited in tracker sensor
w/ *neural network* , t_0 and *tau* cuts



Data analysis





Data analysis

		events										
Run	**nn cuts**	**nn**	**nn_ADC**	**nn_t0**	**nn_t0_ADC**	**nn_t0_tau**	**entries**	**Eff 1**	**Eff 2**	**Eff 3**	**Eff 4**	**Eff 5**
738	0.5	67571	60913	51037	47872	50239	51263	131.81%	118.82%	**99.56%**	93.39%	98.00%
	0.8	63463	59139	49737	47521	49124	51263	123.80%	115.36%	97.02%	92.70%	95.83%
	0.9	61255	47273	48983	47273	48479	51263	119.49%	92.22%	95.55%	92.22%	94.57%
					events							
756	0.5	56009	50630	45803	42240	44844	50212	111.55%	100.83%	91.22%	84.12%	89.31%
	0.8	52944	50102	44125	42134	43535	50212	105.44%	**99.78%**	87.88%	83.91%	86.70%
	0.9	51904	42066	43564	42066	43096	50212	103.37%	83.78%	86.76%	83.78%	85.83%

$$\text{Eff} = \frac{number\ of\ events\ from\ different\ cuts}{entries}$$

Conclusions

- For tracker detectors the pedestal standard deviation is almost constant and the value doesn't exceed 40 ADC;
- The cuts should be use for signal selection;
- Must to decide which are the best cuts for signal selection…

Acknowledgement

THANK YOU FOR ATTENTION!

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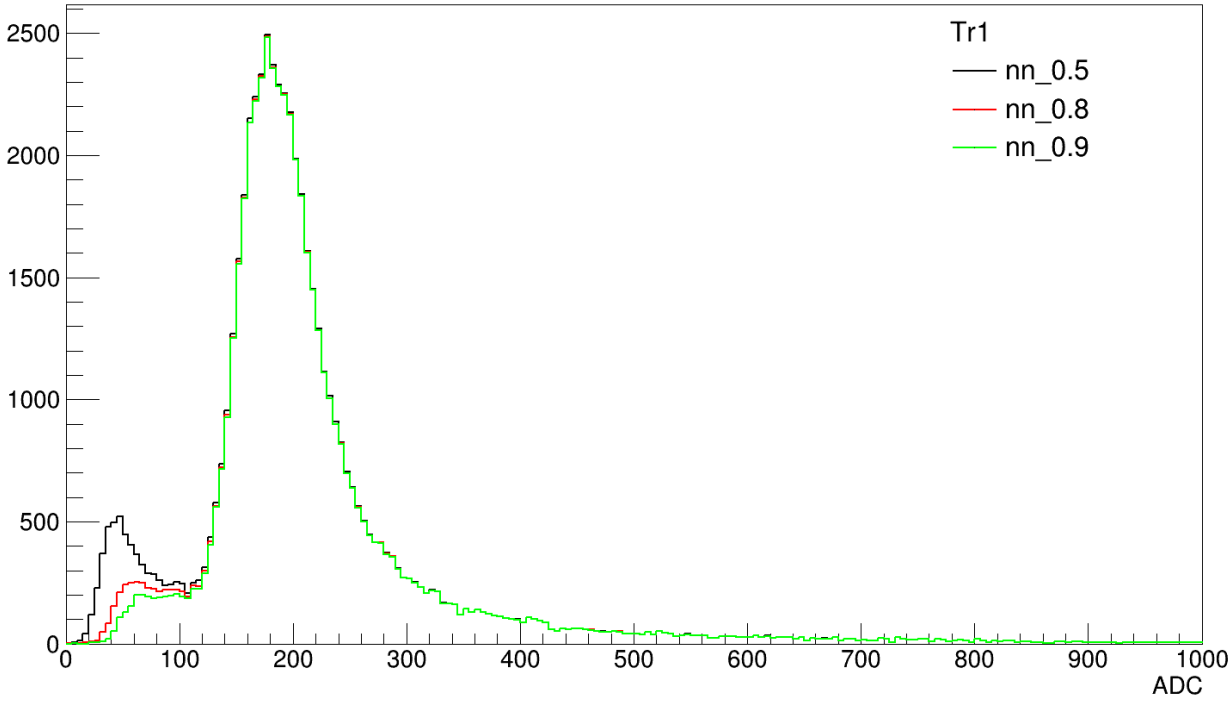
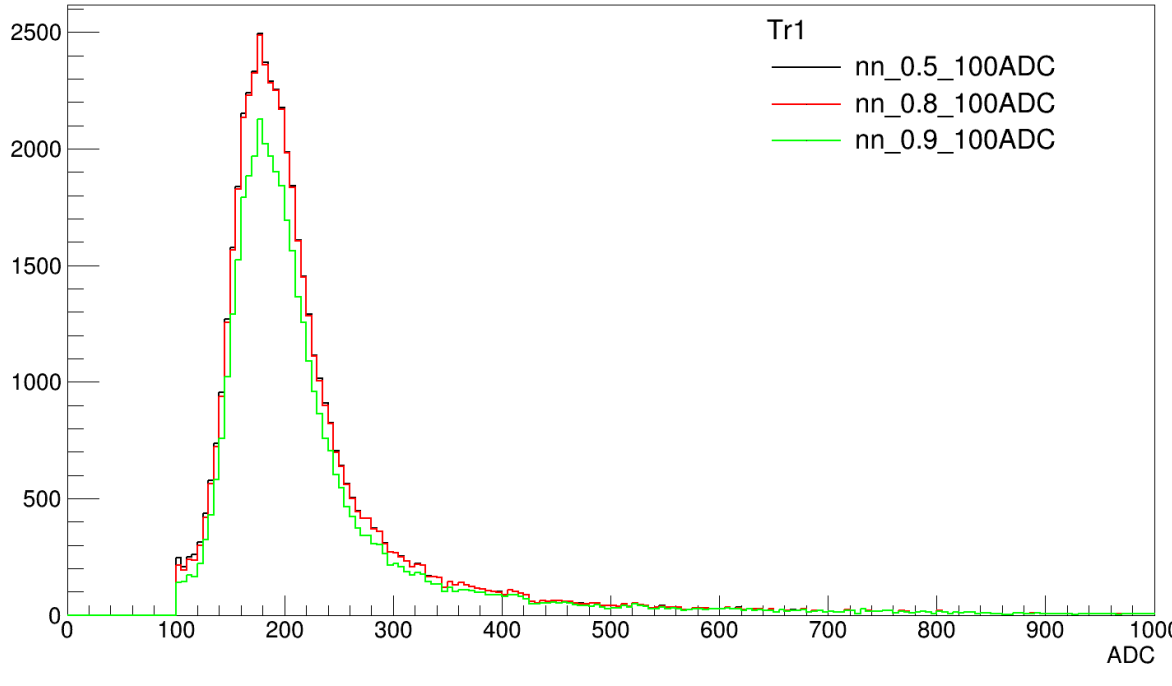
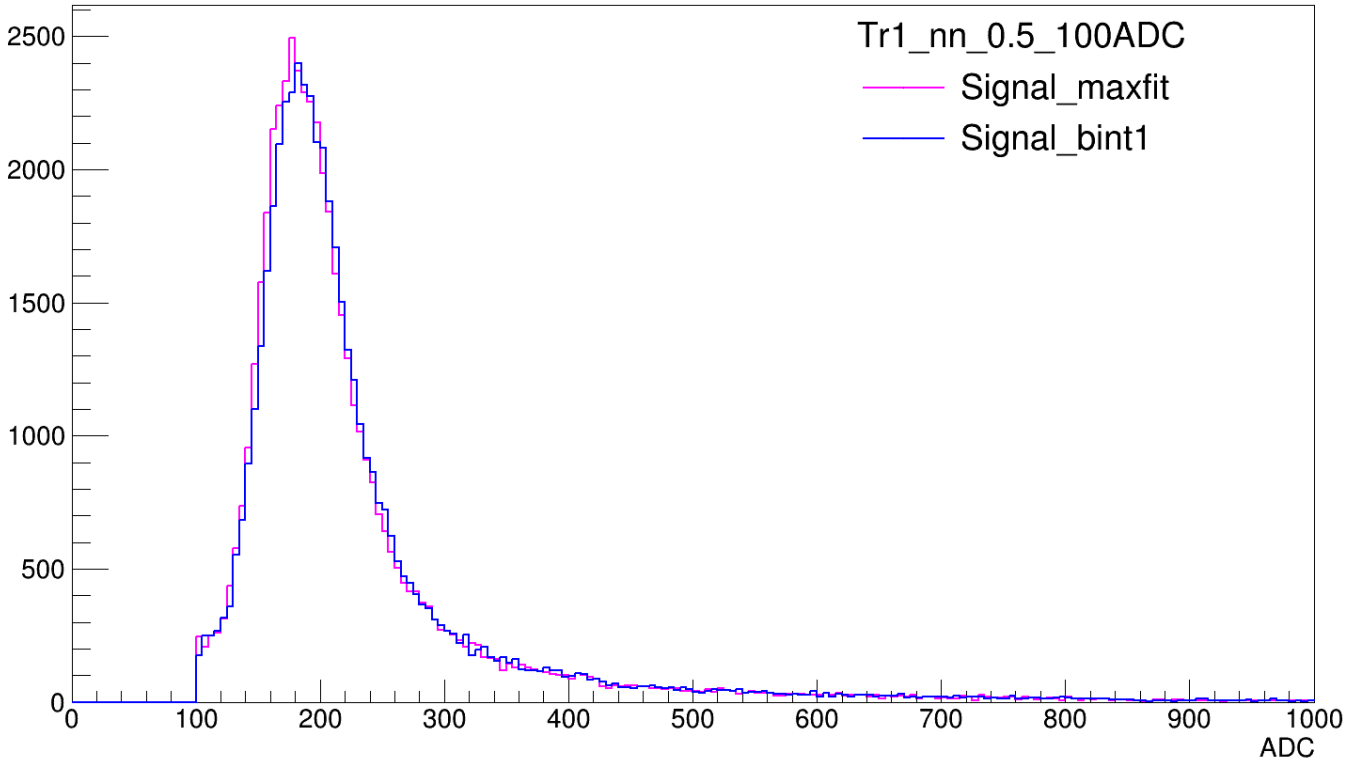
Collaboration
High precision design

run756





run756


Tr1_nn_0.5_100ADC
Signal_maxfit
Signal_bint1
2500
2000
1500
1000
500
0
0
100
200
300
400
500
600
700
800
900
1000
ADC