Jefferson Lab
Thomas Jefferson National Accelerator Facility

CDC noise and BG

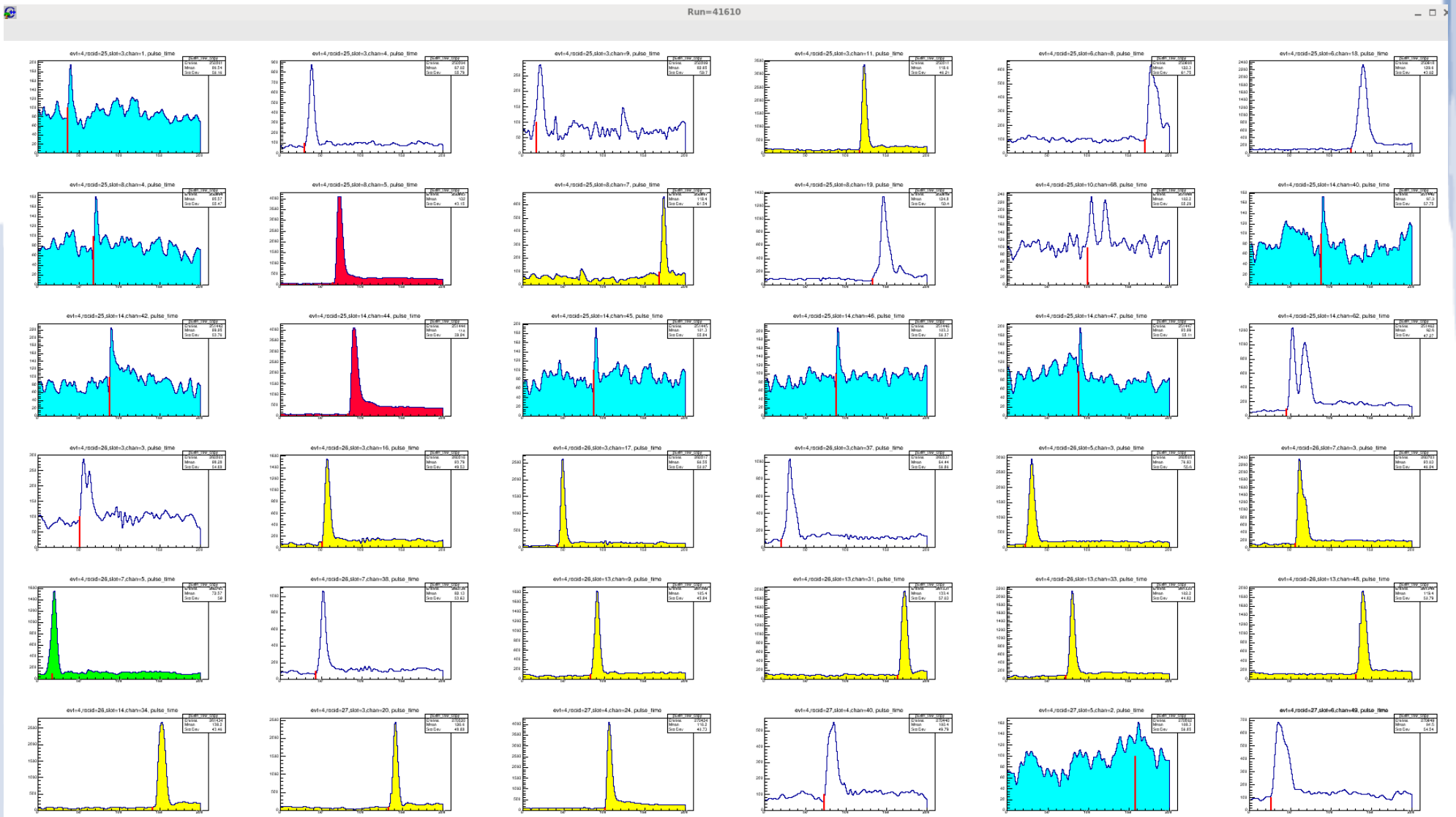
Sergey Furletov

Jefferson Lab

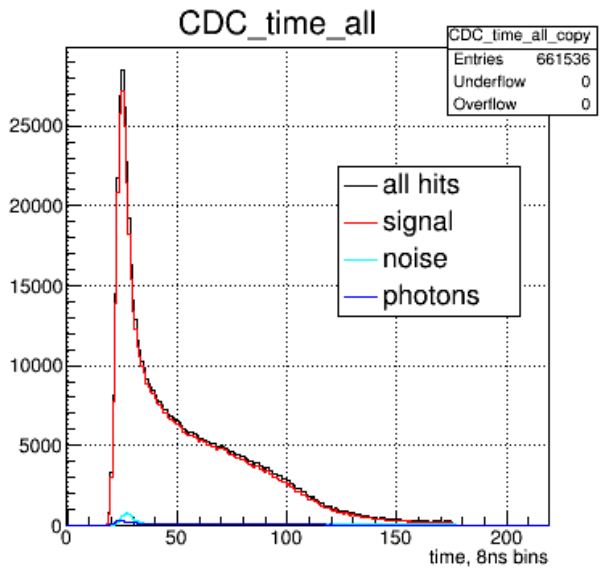
Tracking meeting (update)

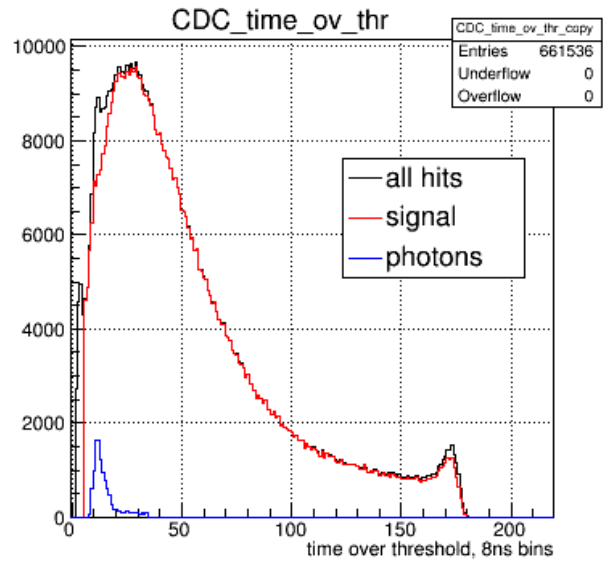
5 Apr 2018

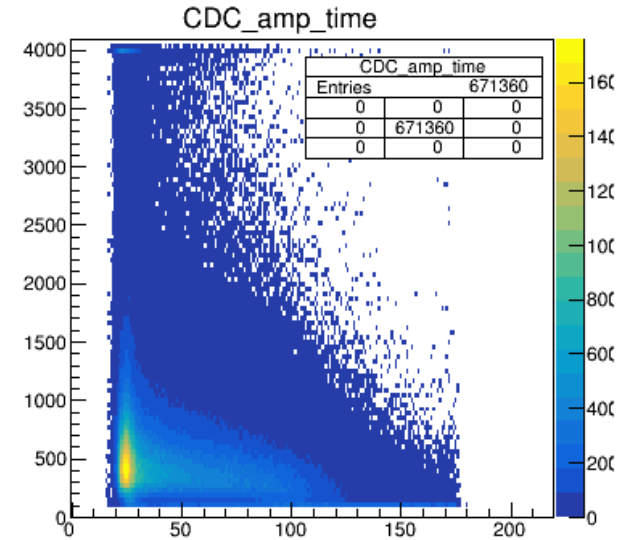
Physics run 41610

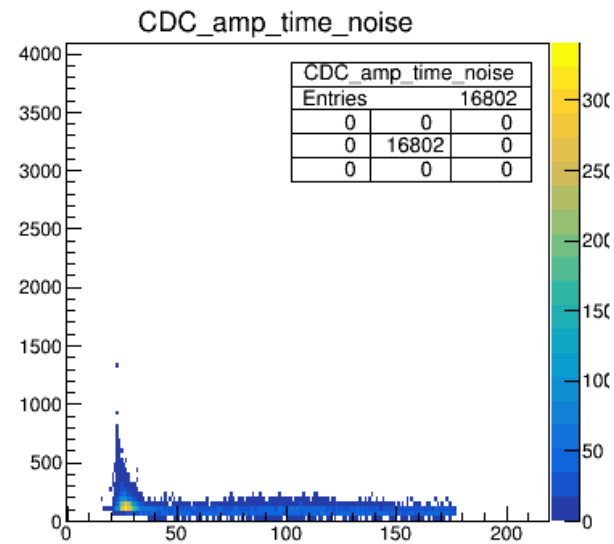


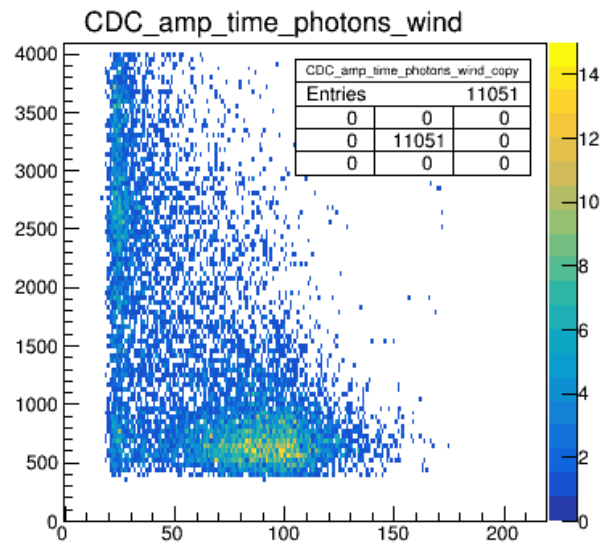
Cosmic run 40650

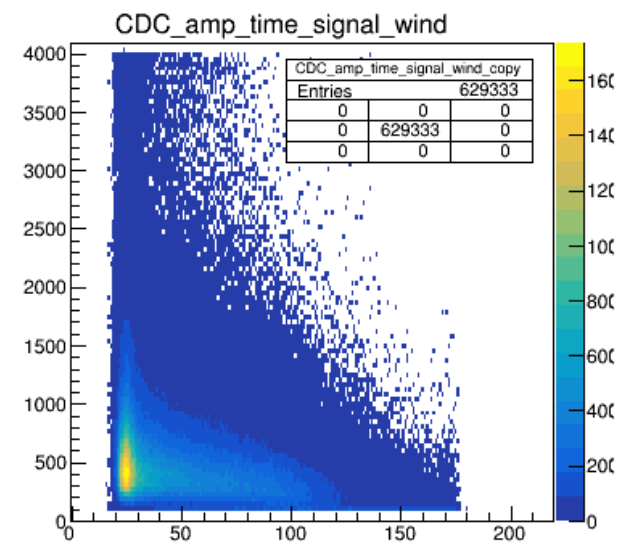












Physics run 41610 150nA

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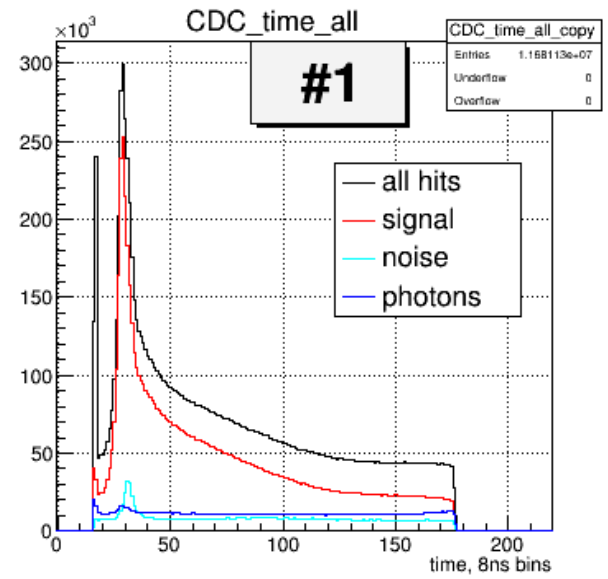

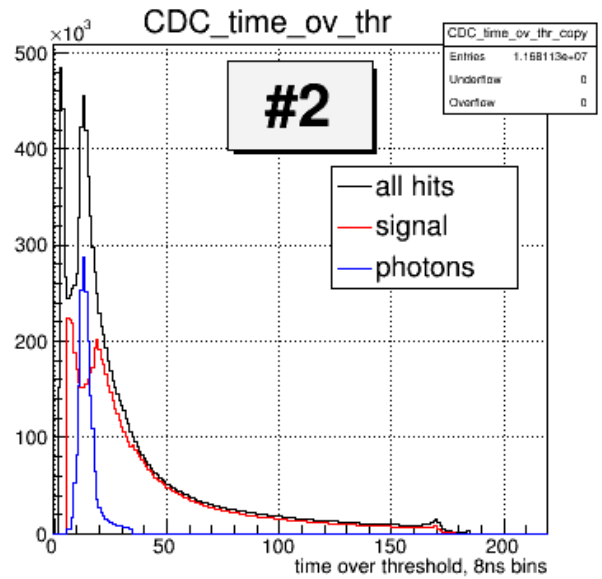

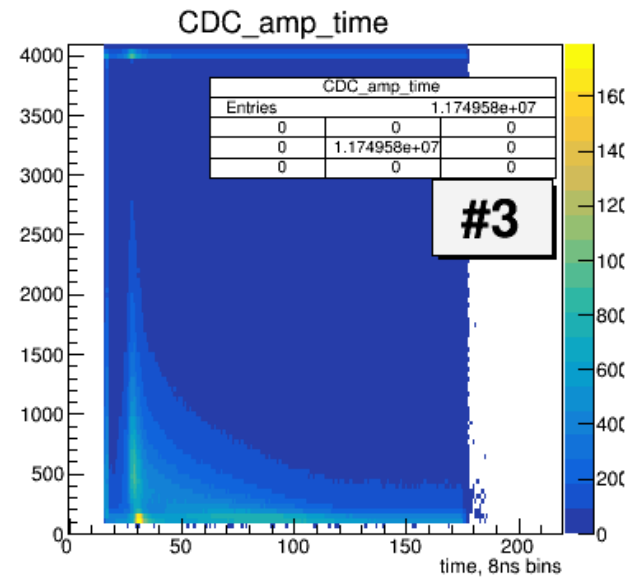

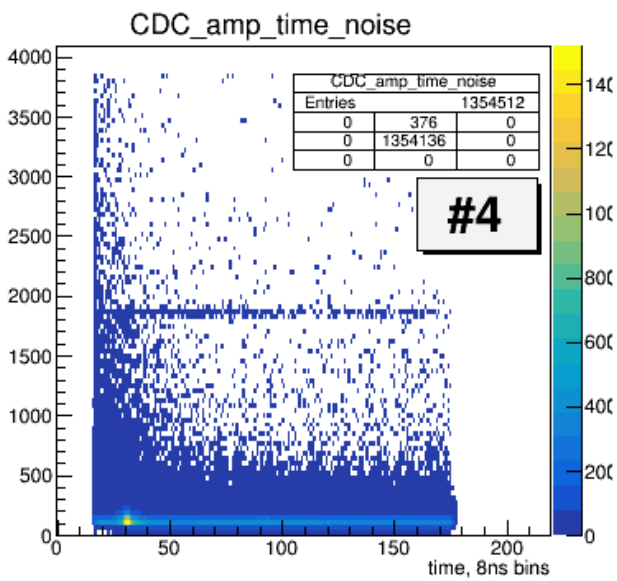

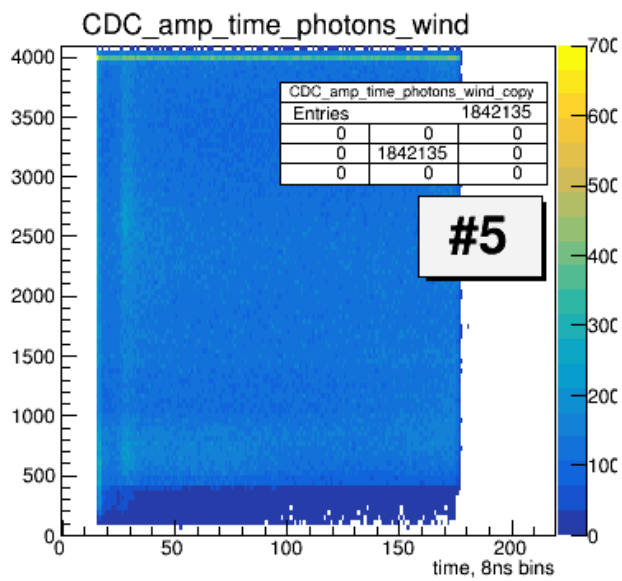

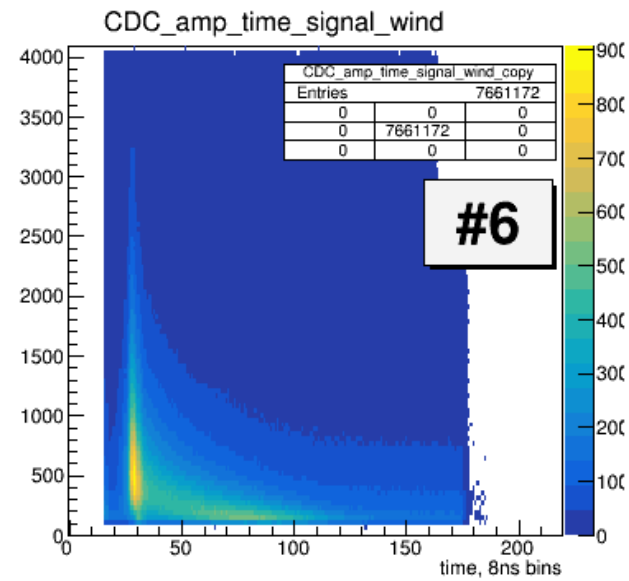

Pulse filtering

By Simon Taylor

Impact of pulse filtering

Run 41610 (raw mode) analyzed using Sergey Furletov's pulse shape analysis code, not using Beni's correlated noise filter code

Time cut = (60,900) ns

Macro	A=No pulse selection , no time cut	B=No pulse selection, with time cut	C=Pulse selection, no time cut	D=Pulse selection, with time cut	C/A	D/B	D/A
p2pi_hists	3.43	3.92	4.10	4.43	1.20	1.13	1.29
p3pi_hists	0.42	0.48	0.44	0.47	1.05	0.98	1.12

New tests

CDC noise statistic

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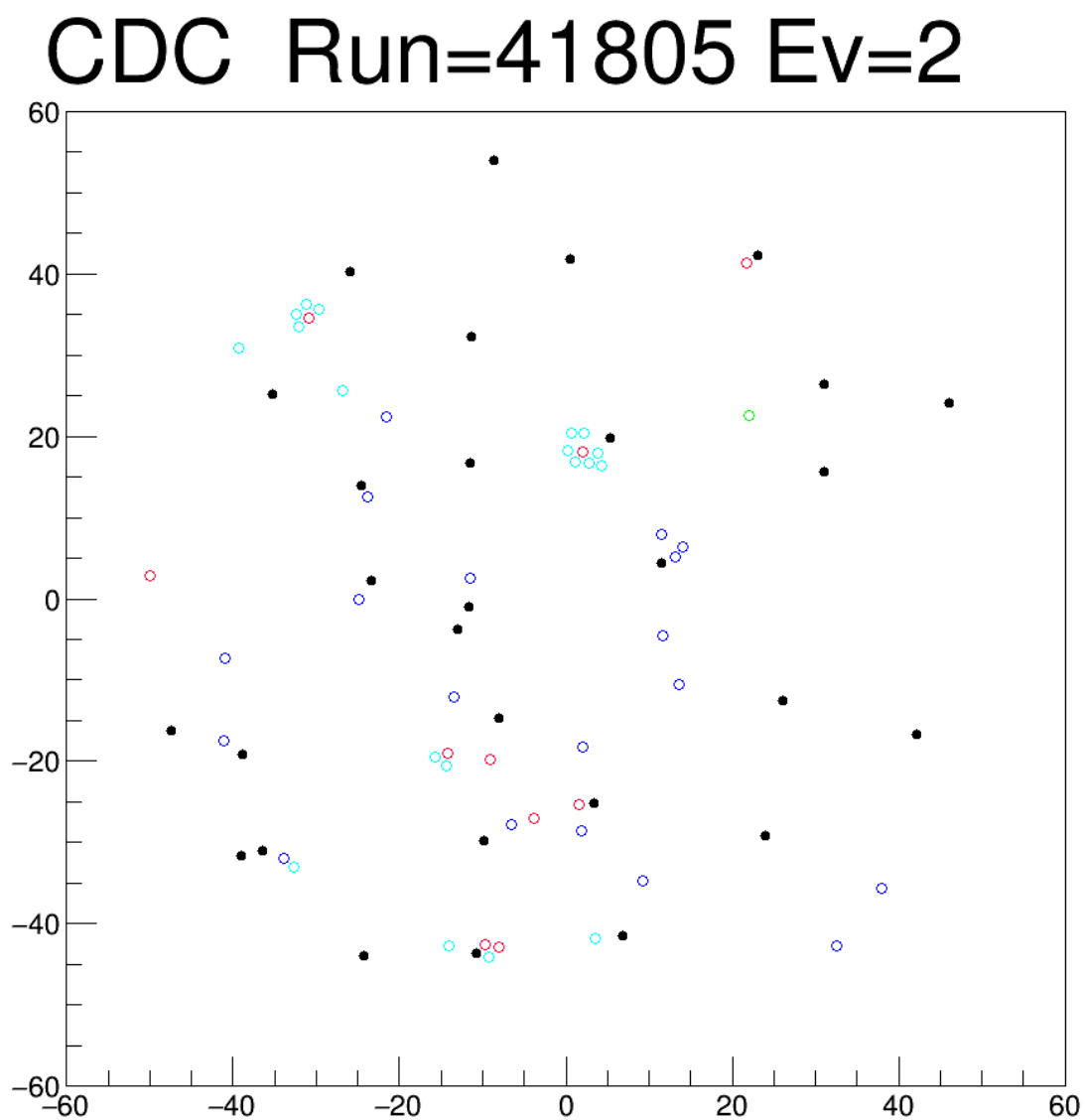
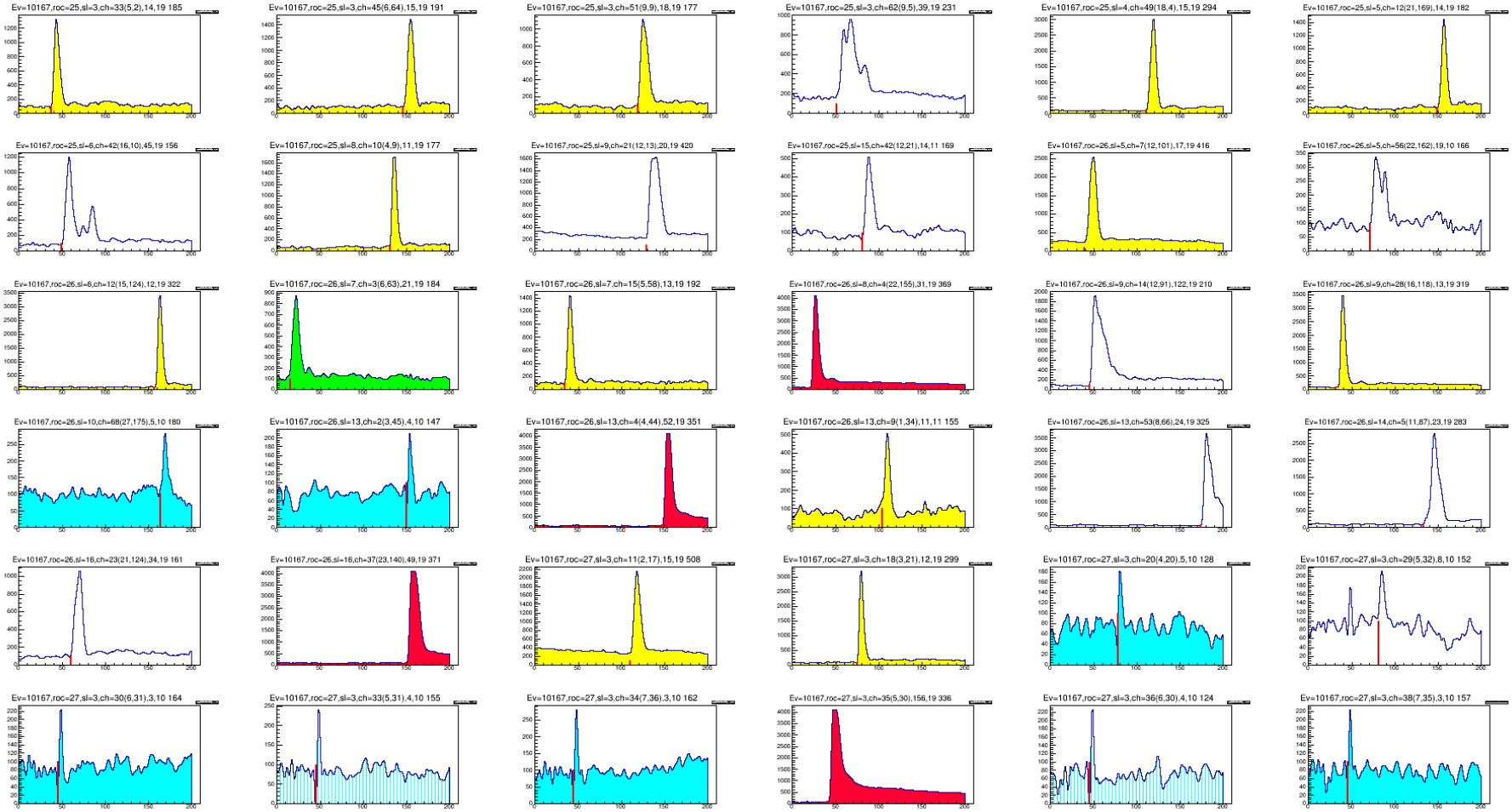
run	photons	noise	early	overflow	total	occup. Row 1	current	radiator	target	other	trigger	comment
41801	13.3	6.9	2	4.9	27.1	10.50%	150	JD70-100	full	std	Phys=1	
41801	23.4	10.1	3.6	7.3	44.4	5.50%	150	JD70-100	full	std	Phys=0	time flat
41802	8.5	5.4	1.1	3.6	18.6	7.00%	50	JD70-100	full	std	Phys=1	
41802	23.8	10.5	3.6	7.3	45.2	2.20%	50	JD70-100	full	std	Phys=0	
41803	12.1	6.2	1.6	4.3	24.2	9.00%	100	JD70-100	full	std	Phys=1	
41803	24.7	10	3.7	7.2	45.6	4.00%	100	JD70-100	full	std	Phys=0	
41805	16	7.2	2.3	5.3	30.8	11.00%	200	JD70-100	full	std	Phys=1	
41805	24.4	9.6	3.7	7.2	44.9	8.00%	200	JD70-100	full	std	Phys=0	
41806	5.8	42.1	0.8	1.1	49.8	<0.004	0	none	full	No beam	Phys=0	
41806	38.9	5.9	3.6	5.8	54.2	1.40%	200	none	full		Phys=0	cos
41810	16.3	18.1	3.4	11.2	49	0.07%	200	none	full	W-foil	Phys=0	
41812	14.7	7	2.4	5.9	30	12.00%	200	Al 4x10-4	full		Phys=1	no b/m
41812	22.2	9.6	3..7	8.2	40	4.00%	200	Al 4x10-4	full		Phys=0	no b/m
41815	8.5	6.1	1.3	4.3	20.2	3.00%	200	Al 4x10-4	empty		Phys=1	
41815	19.6	10.2	3.6	7.2	40.6	1.20%	200	Al 4x10-4	empty		Phys=0	
41816	37.7	11.1	3.1	4.5	56.4	0.15%	200	none	empty		Phys=0	shad cos
41817	8.6	33.3	1.8	5.5	49.2	0.01%	200	nonel	empty	W-foil	Phys=0	
41818	9.2	6.2	1.4	4.1	20.9	3.30%	200	JD70-100	empty		Phys=1	no b/m
41818	20.4	10.1	3.7	6.4	40.6	1.40%	200	JD70-100	empty		Phys=0	no b/m
41820	8.8	6.2	1.4	4.1	20.5	3.30%	200	JD70-100	empty	no TPOL	Phys=1	
41820	20.4	10.2	3.7	6.4	40.7	1.20%	200	JD70-100	empty	no TPOL	Phys=0	

Event display 200nA Phys=0

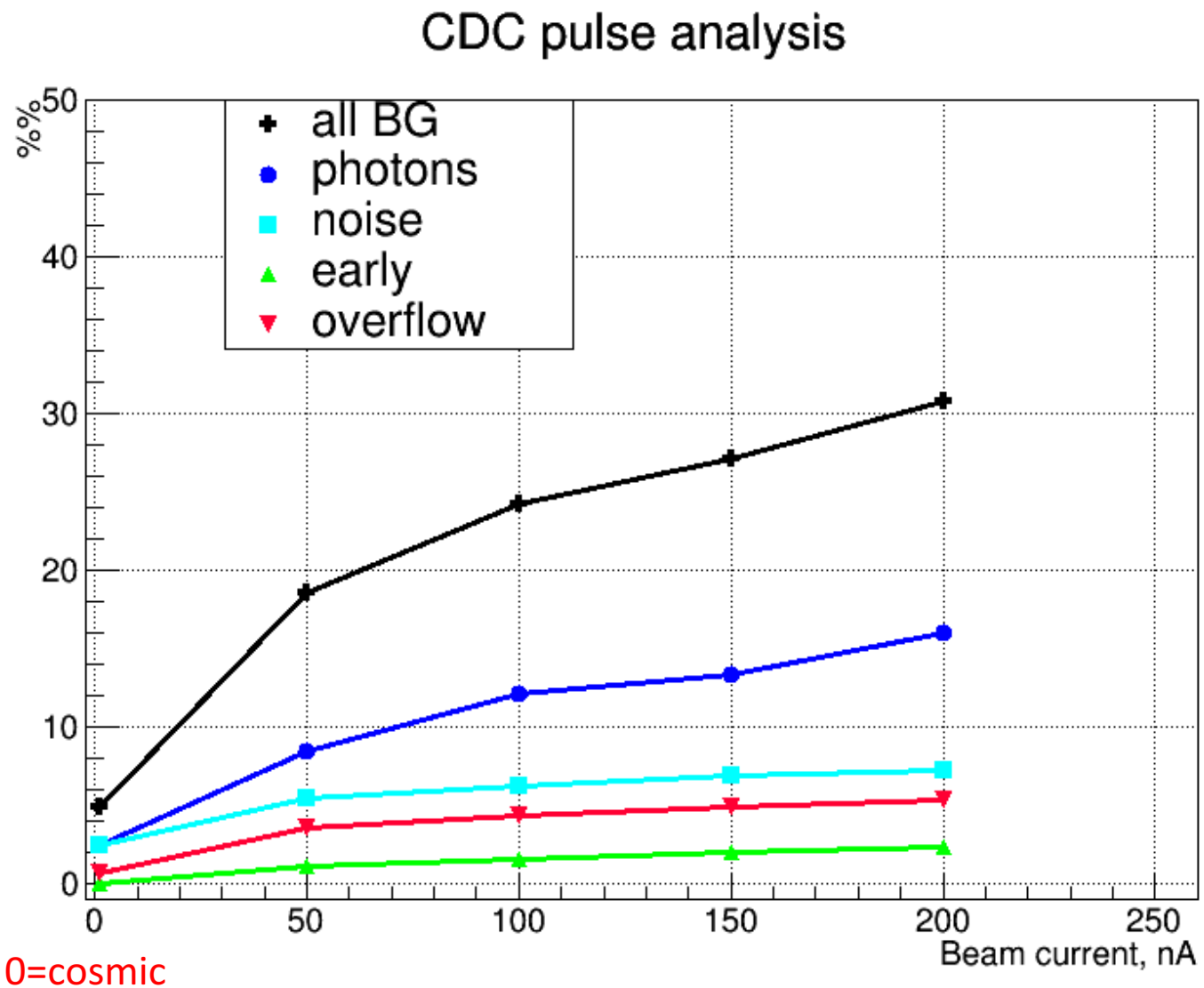
STD production run
Trigger = pulser



Run 41805 200nA Phys=0

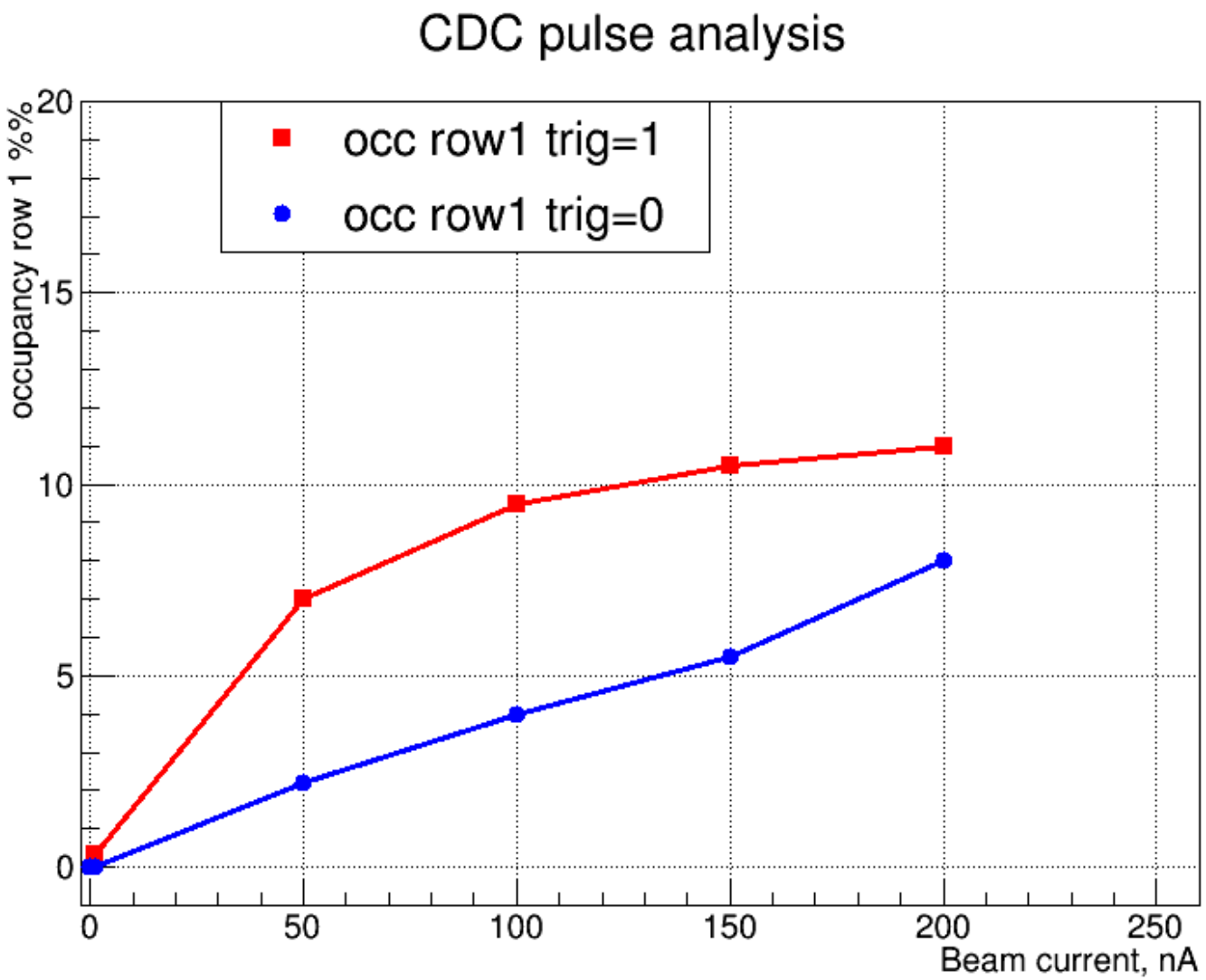


CDC pulse statistic

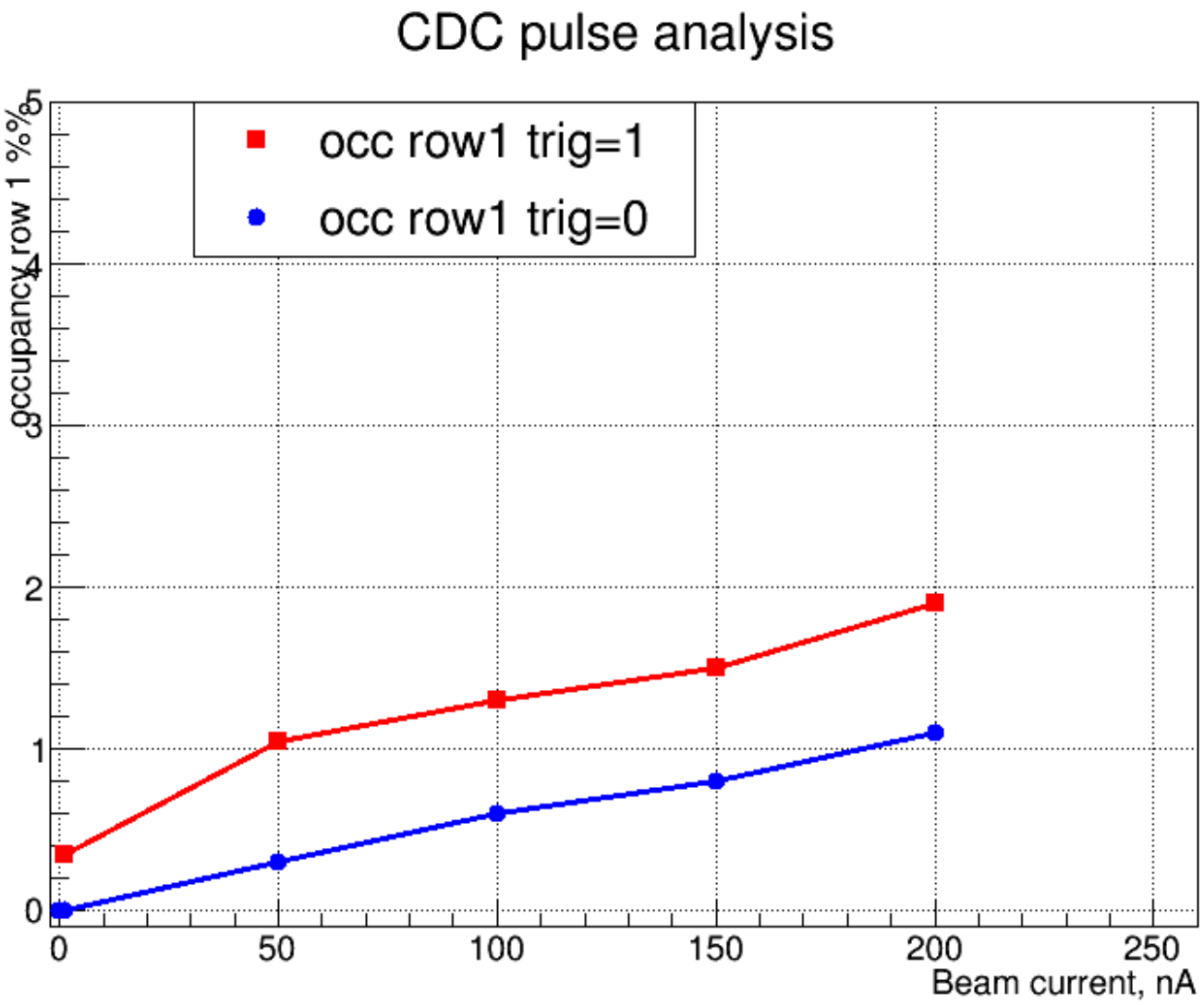


0=cosmic

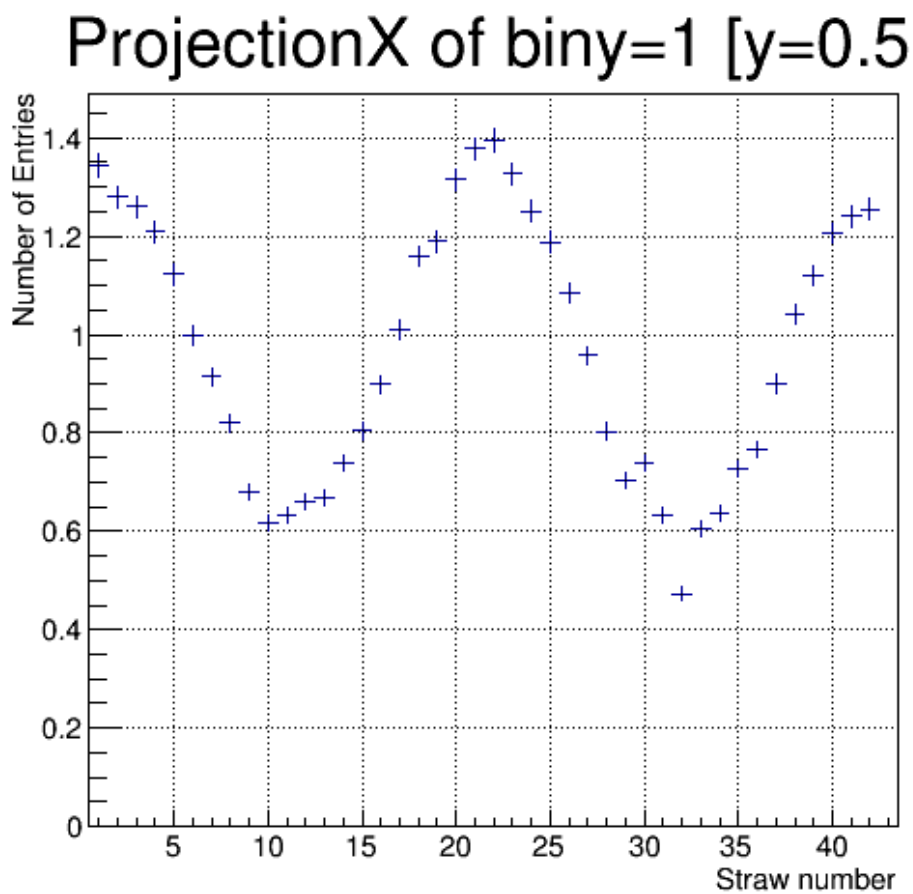
CDC ring _1 occupancy

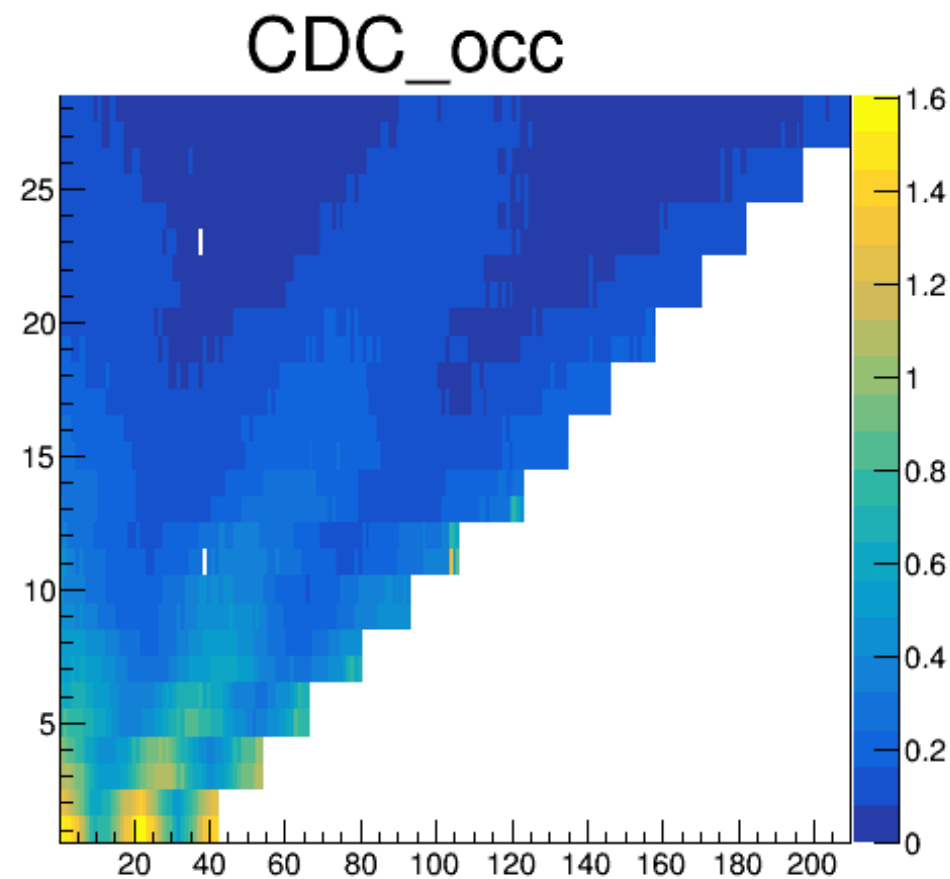


CDC occupancy ring 20

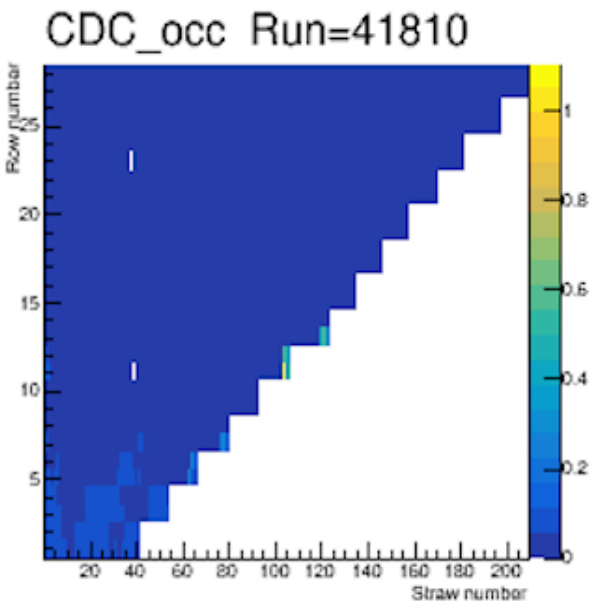


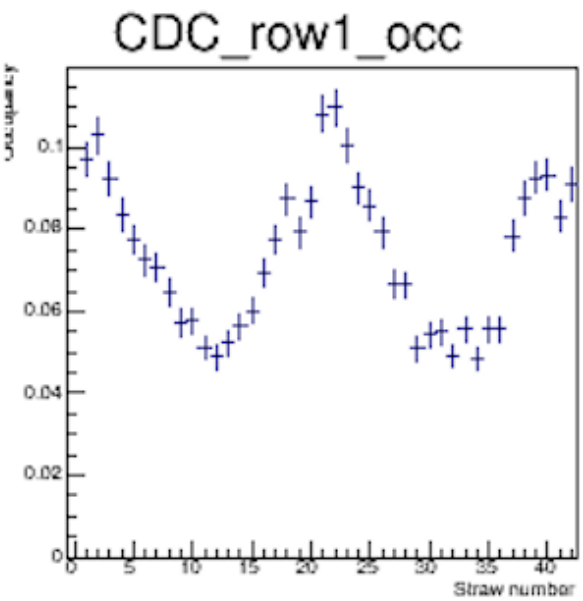
Run 41806, 200nA, no radiator





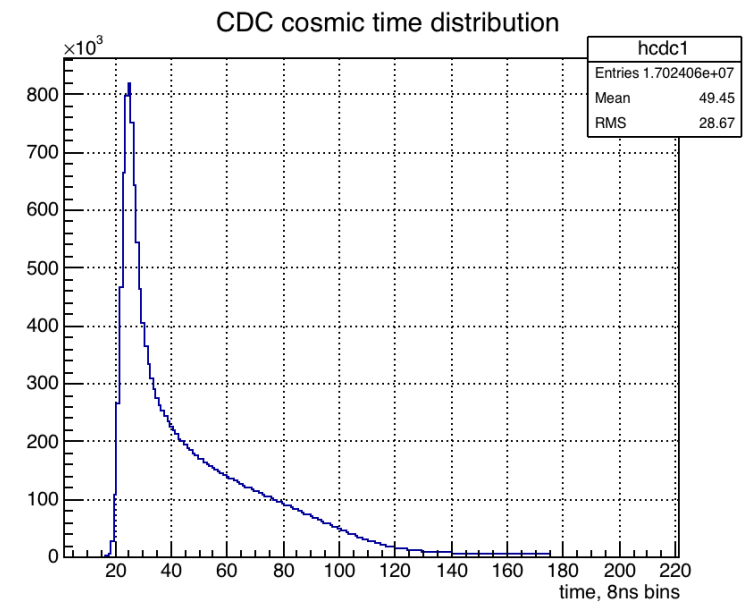
Run 41810, 200nA + W foil

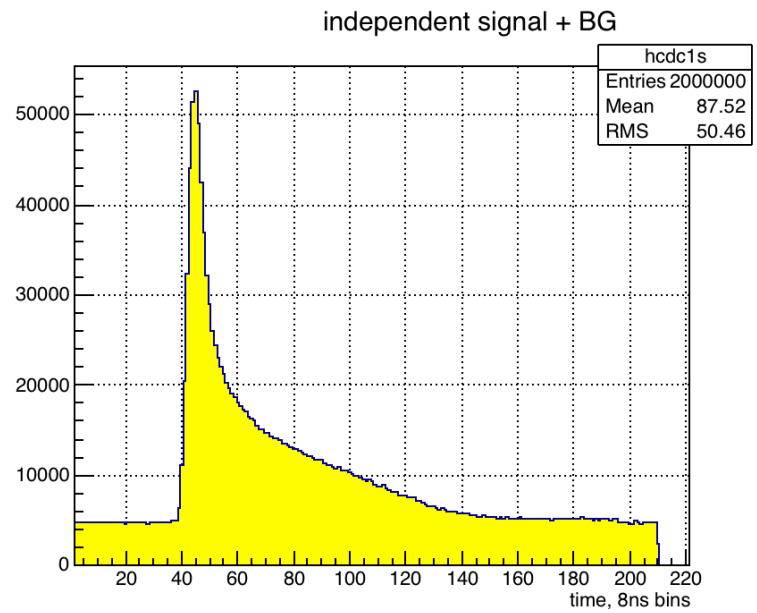


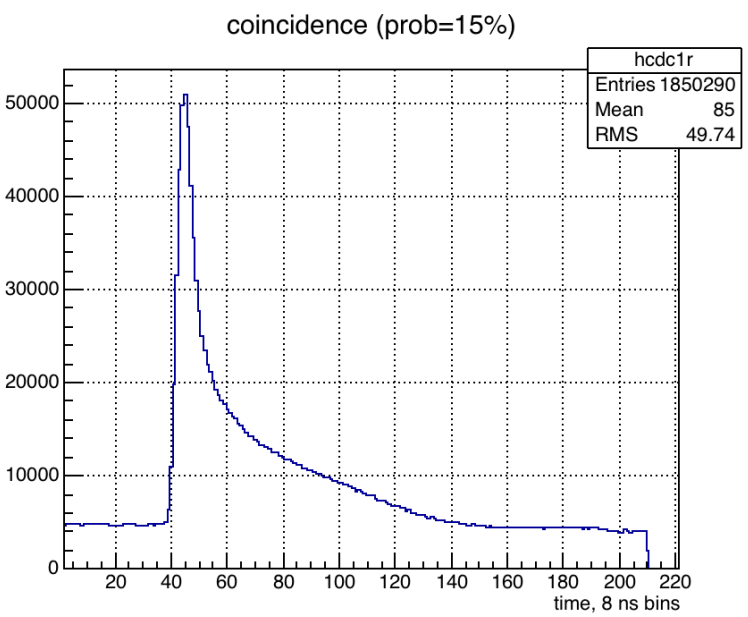


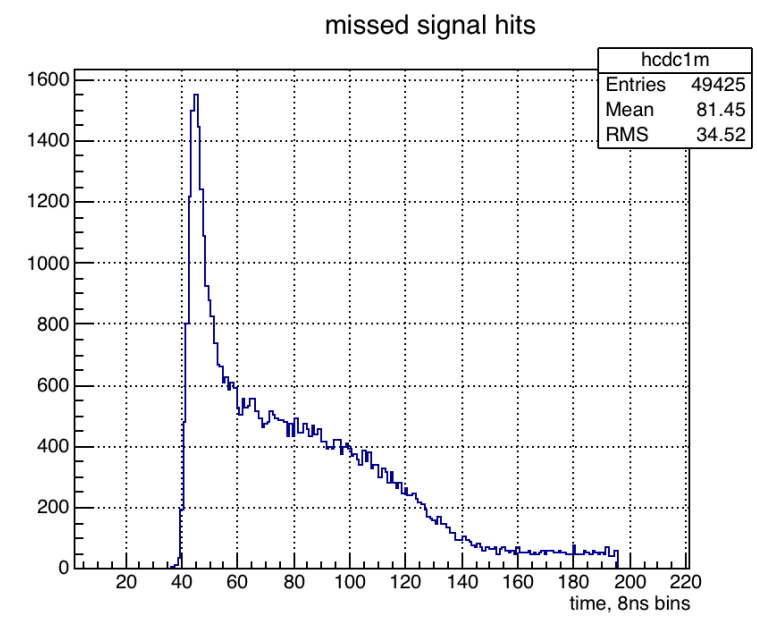
Signal and BG pulses in the same straw

BG simulation

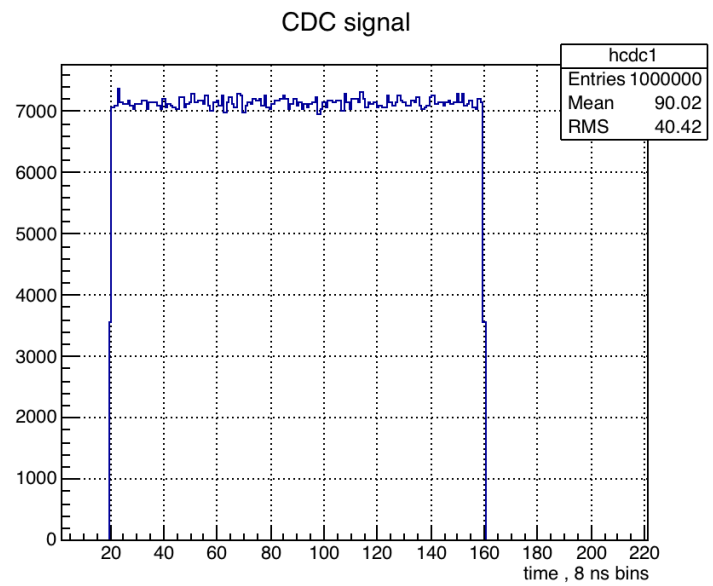


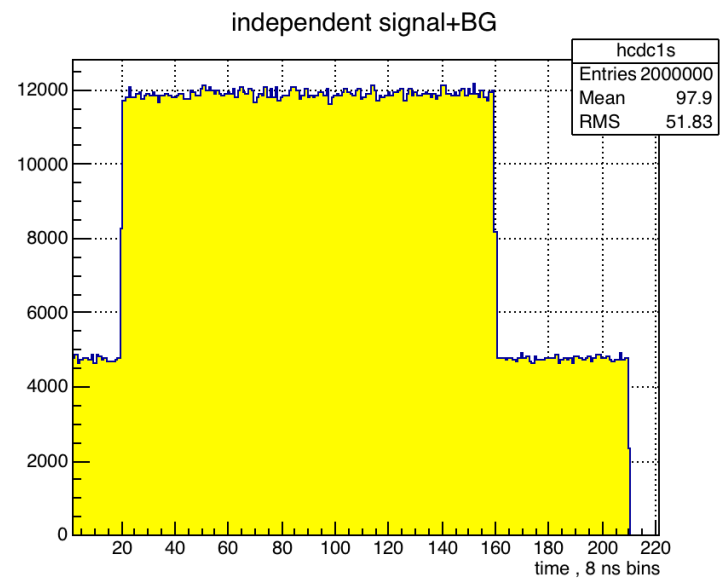


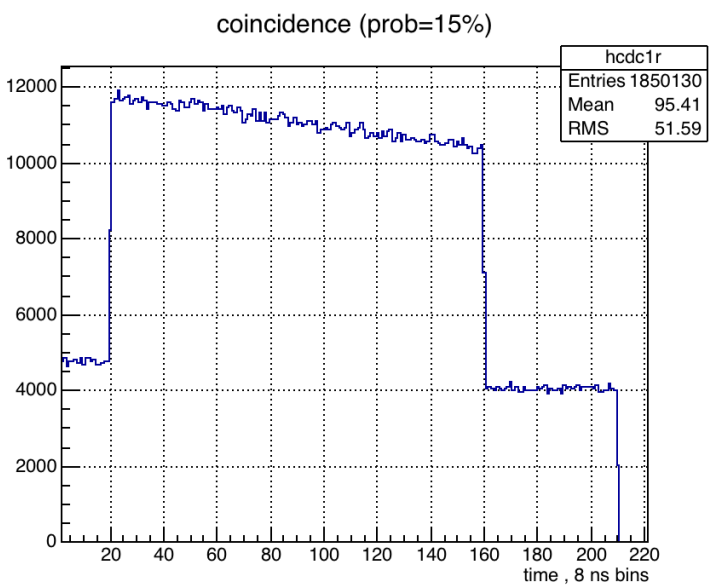


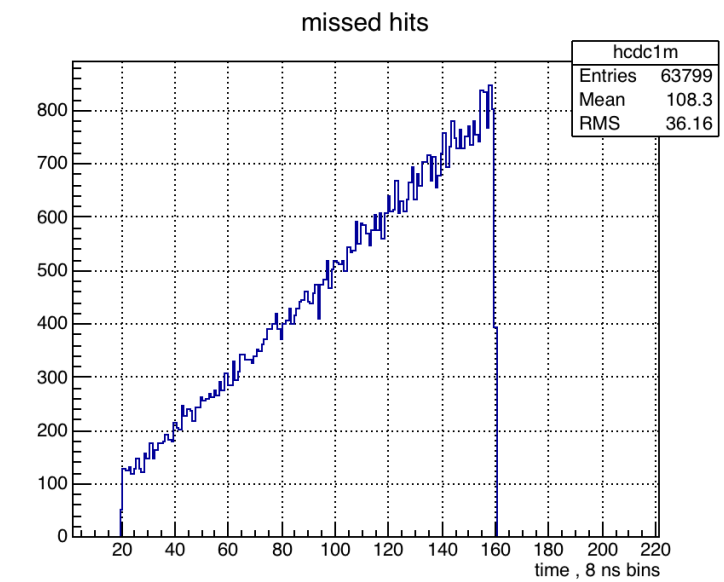


CDC BG test simulation

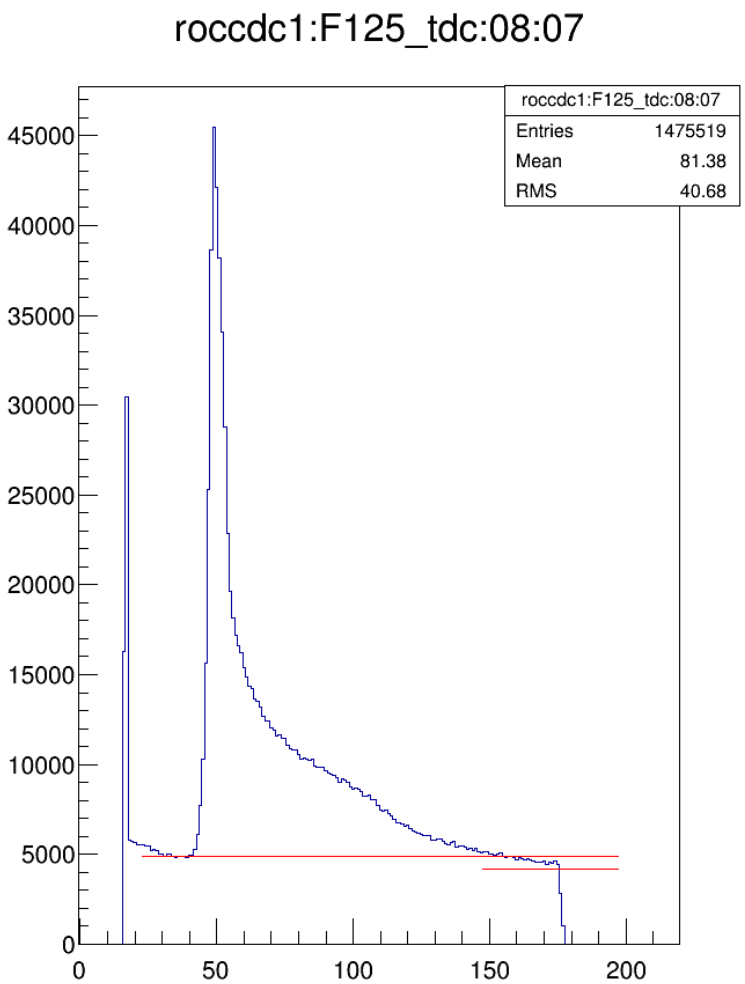




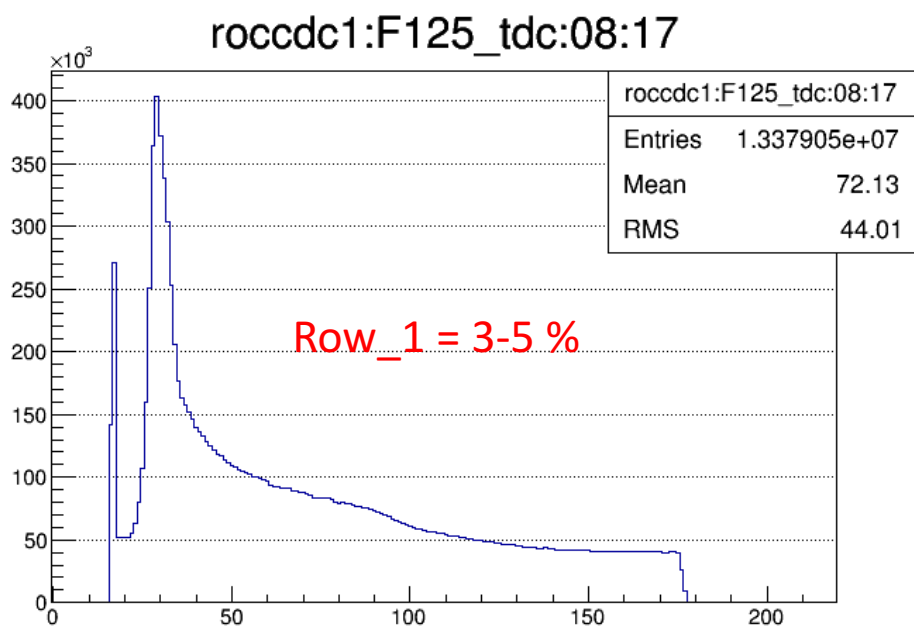


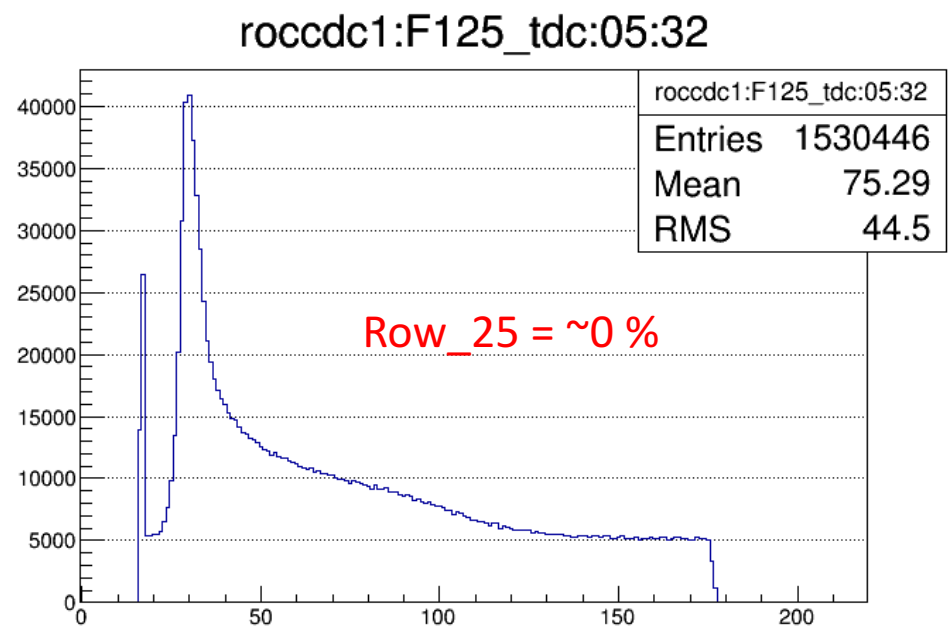


Signals overlap



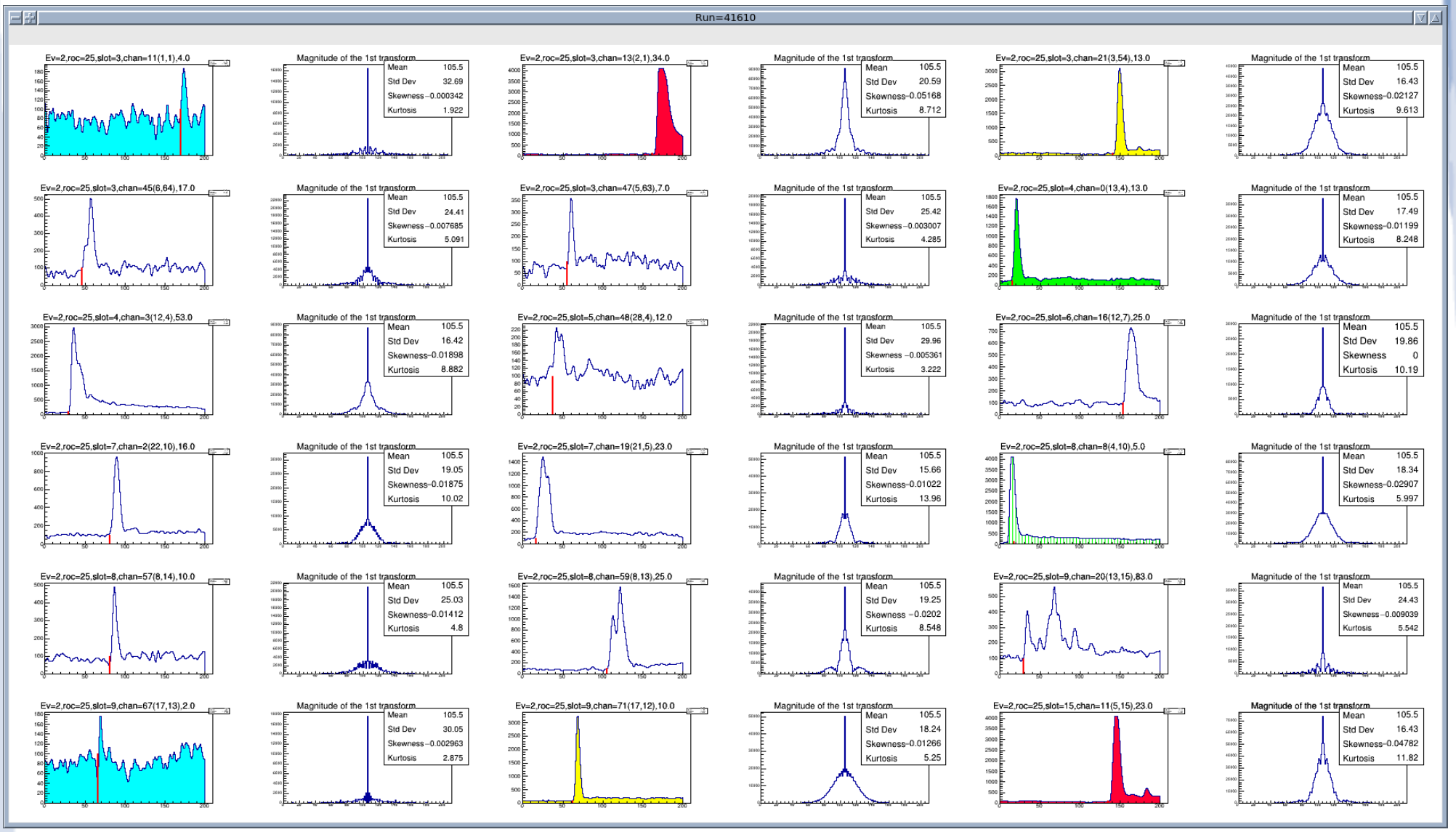
Probability of losing signal





Backup

FFT


Run=41610
Ev=2,roc=25,slot=3,chan=11(1,1),4.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 32.69
Skewness −0.000342
Kurtosis 1.922
Ev=2,roc=25,slot=3,chan=13(2,1),34.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 20.59
Skewness −0.05168
Kurtosis 8.712
Ev=2,roc=25,slot=3,chan=21(3,54),13.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 16.43
Skewness −0.02127
Kurtosis 9.613
Ev=2,roc=25,slot=3,chan=45(6,64),17.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 24.41
Skewness −0.007685
Kurtosis 5.091
Ev=2,roc=25,slot=3,chan=47(5,63),7.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 25.42
Skewness −0.003007
Kurtosis 4.285
Ev=2,roc=25,slot=4,chan=0(13,4),13.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 17.49
Skewness −0.01199
Kurtosis 8.248
Ev=2,roc=25,slot=4,chan=3(12,4),53.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 16.42
Skewness −0.01898
Kurtosis 8.882
Ev=2,roc=25,slot=5,chan=48(28,4),12.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 29.96
Skewness −0.005361
Kurtosis 3.222
Ev=2,roc=25,slot=6,chan=16(12,7),25.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 19.86
Skewness 0
Kurtosis 10.19
Ev=2,roc=25,slot=7,chan=2(22,10),16.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 19.05
Skewness −0.01875
Kurtosis 10.02
Ev=2,roc=25,slot=7,chan=19(21,5),23.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 15.66
Skewness −0.01022
Kurtosis 13.96
Ev=2,roc=25,slot=8,chan=8(4,10),5.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 18.34
Skewness −0.02907
Kurtosis 5.997
Ev=2,roc=25,slot=8,chan=57(8,14),10.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 25.03
Skewness −0.01412
Kurtosis 4.8
Ev=2,roc=25,slot=8,chan=59(8,13),25.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 19.25
Skewness −0.0202
Kurtosis 8.548
Ev=2,roc=25,slot=9,chan=20(13,15),83.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 24.43
Skewness −0.009039
Kurtosis 5.542
Ev=2,roc=25,slot=9,chan=67(17,13),2.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 30.05
Skewness −0.002963
Kurtosis 2.875
Ev=2,roc=25,slot=9,chan=71(17,12),10.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 18.24
Skewness −0.01266
Kurtosis 5.25
Ev=2,roc=25,slot=15,chan=11(5,15),23.0
Magnitude of the 1st transform
Mean 105.5
Std Dev 16.43
Skewness −0.04782
Kurtosis 11.82