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16-April-2016

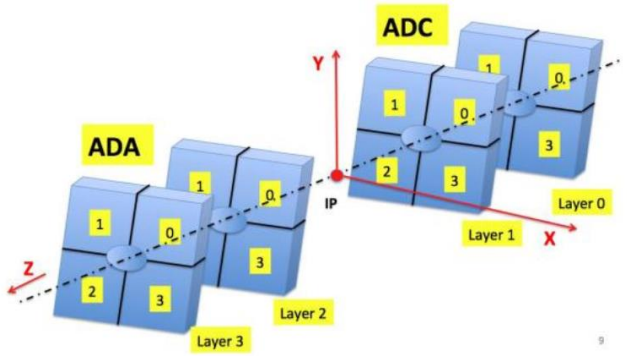
Notice that for all the next plots:

- The channel number corresponds to the offline label (ADs).
- The Run Number: **226062**.
- For minimum Bias I use :

CINT10-B-NOPF-ALLNOTRD || COSMB-B-NOPF-ALLNOTRD
(ADC || V0C || SPD || V0A || ADA)

Condition:	Number of Events
Total number of events:	2995914
After Minimum Bias:	1508819
ADC & ADA	883565
V0C & V0A	1020070
SPD	1348154

Pad Labels



Offline Ch	Position	Offline Ch	Position
Ch00	C-Side	Ch08	A-Side-Top
Ch01	C-Side	Ch09	A-Side-Top
Ch02	C-Side	Ch12	A-Side-Top
Ch03	C-Side	Ch13	A-Side-Top
Ch04	C-Side	Ch10	A-Side-Bott
Ch05	C-Side	Ch11	A-Side-Bott
Ch06	C-Side	Ch14	A-Side-Bott
Ch07	C-Side	Ch15	A-Side-Bott

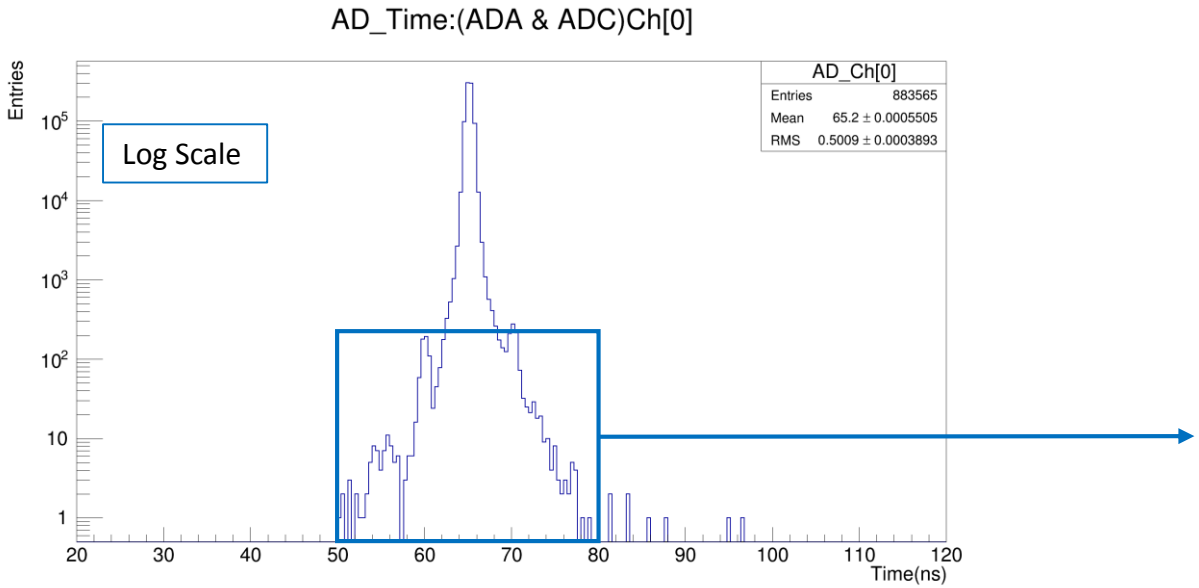
Summary

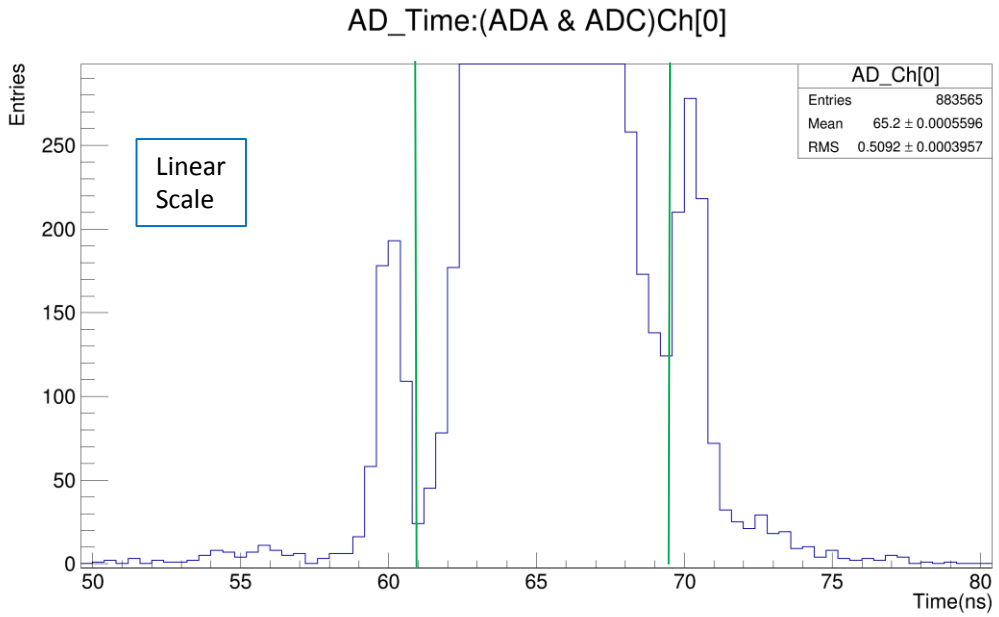
What has been done:

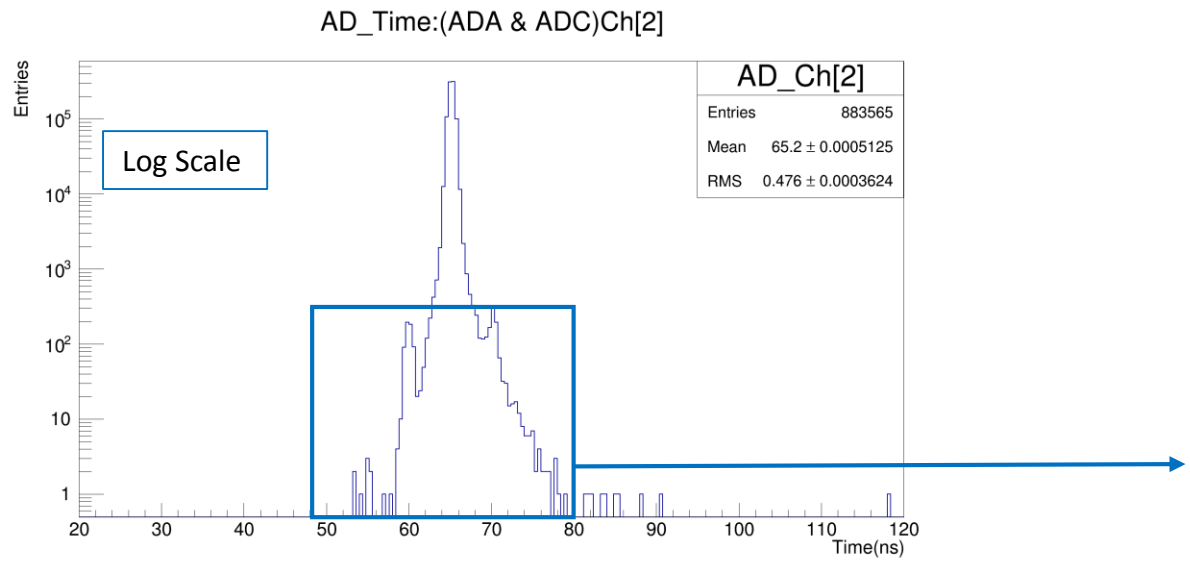
- We saw the 32 mutually exclusive combinations between ADs, V0s and SPD.
- Then we took a look at the time information in ADs
- A different cut was defined for each side of the detector.
- We saw the time information for V0s, and use V0-BG-Rejection to clean up.
- Finally taking a look at SPD, we used Pile-Up rejection to clean the sample.
- After each step I obtain the number of triggers (events) for these 32 combinations.

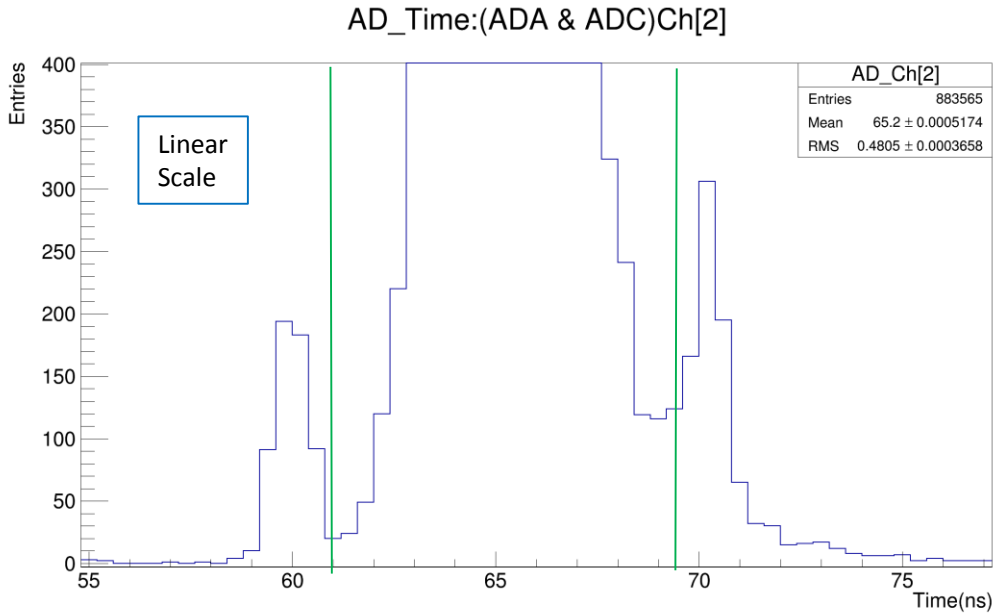
Run: 226062

Cut defined for AD-C-Side



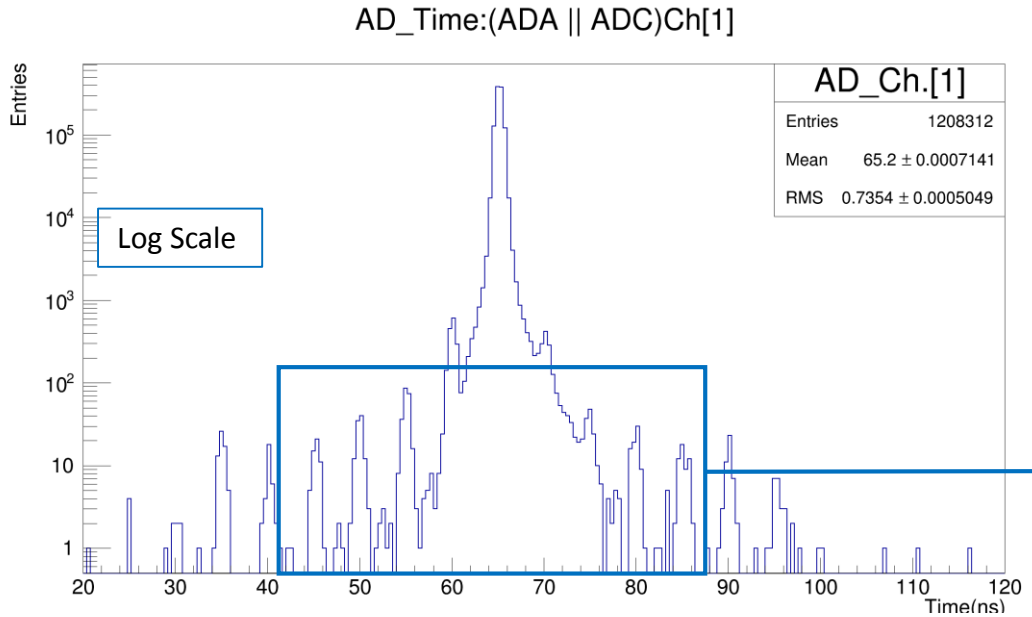


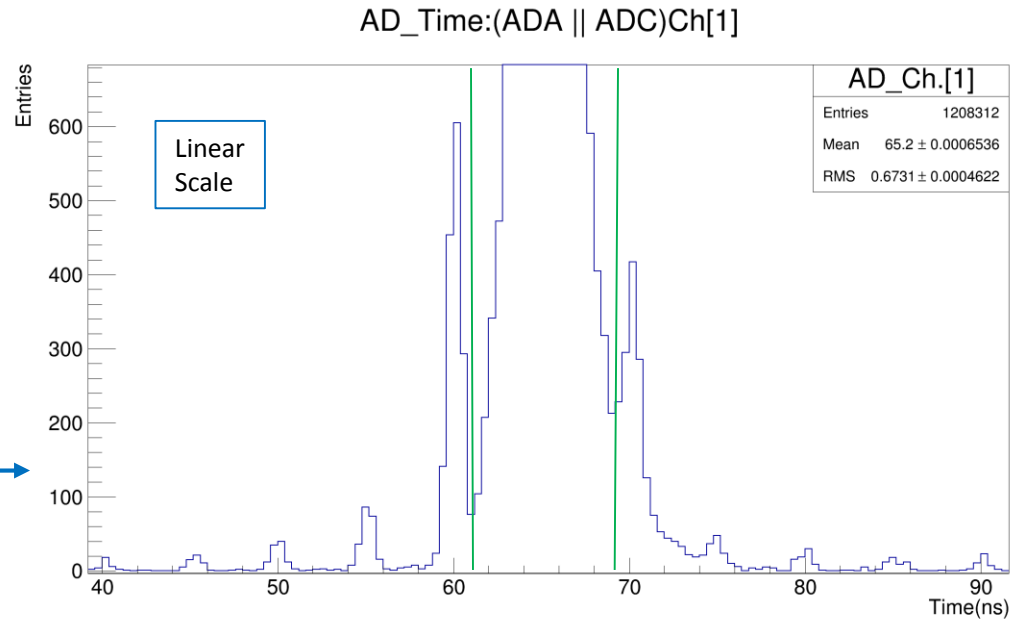


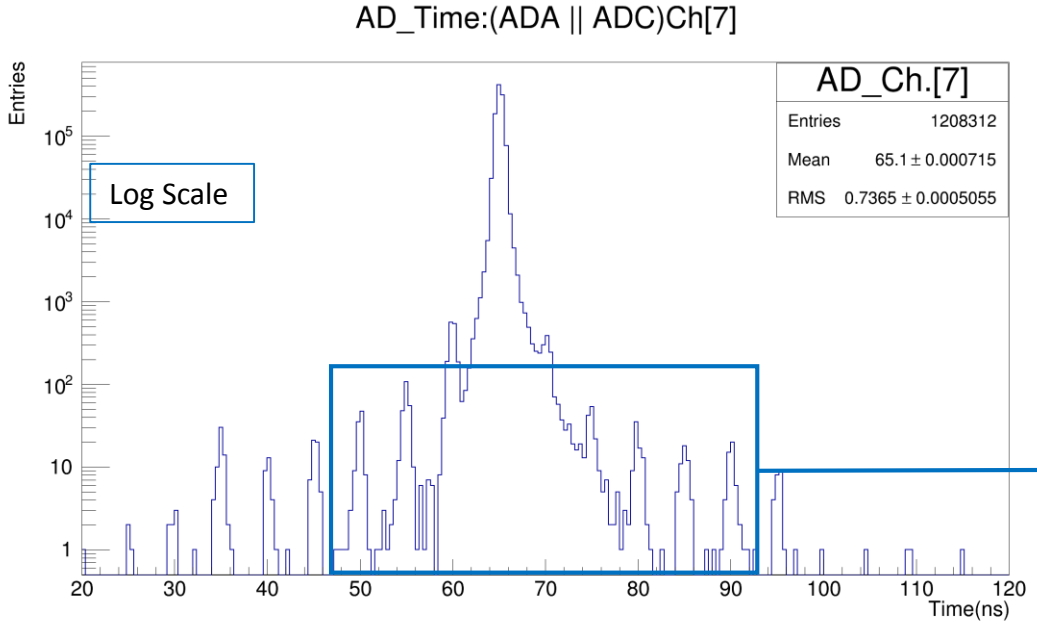


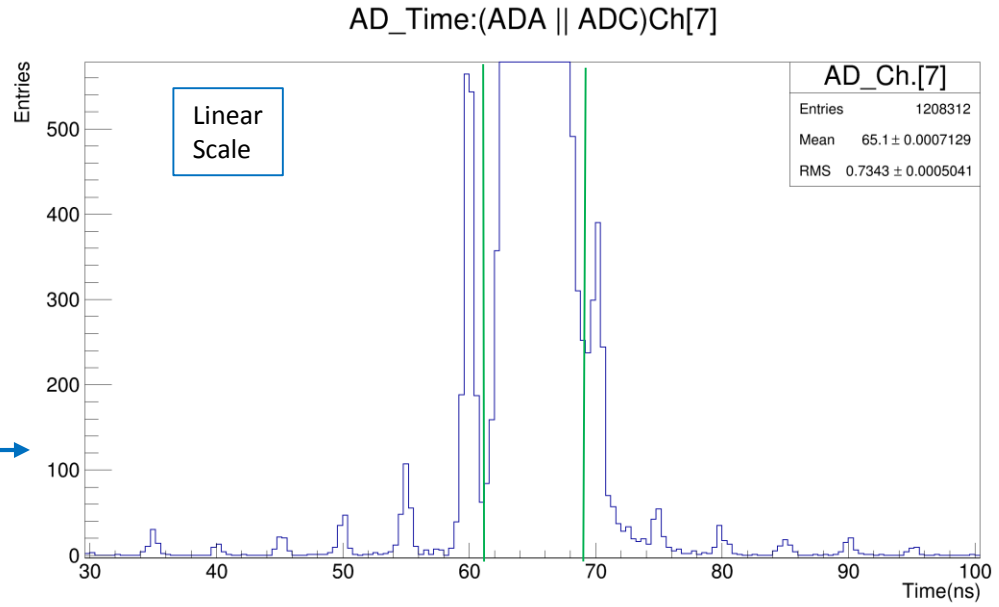
Run: 226062

Cut defined for AD-C-Side



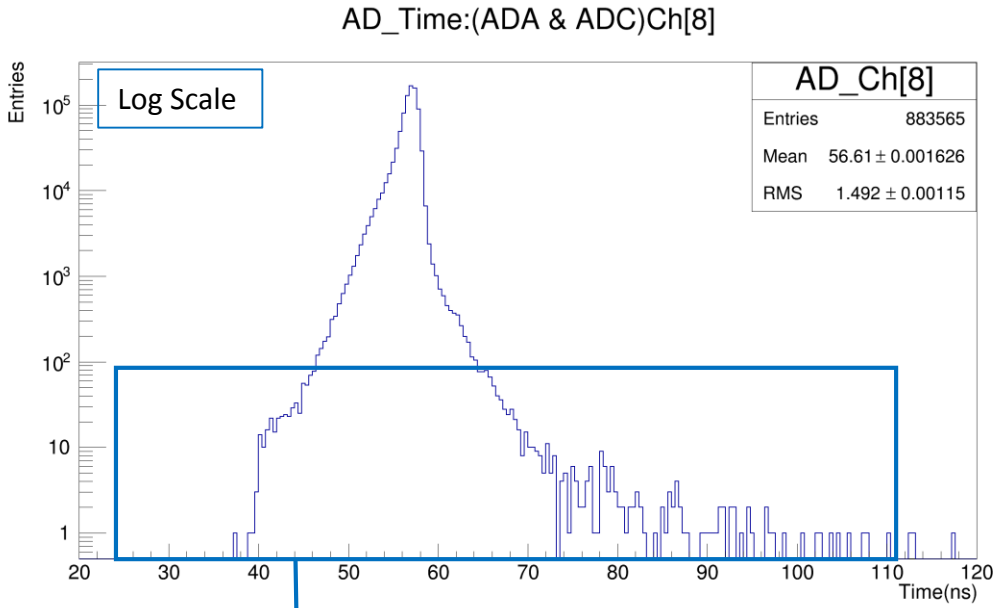


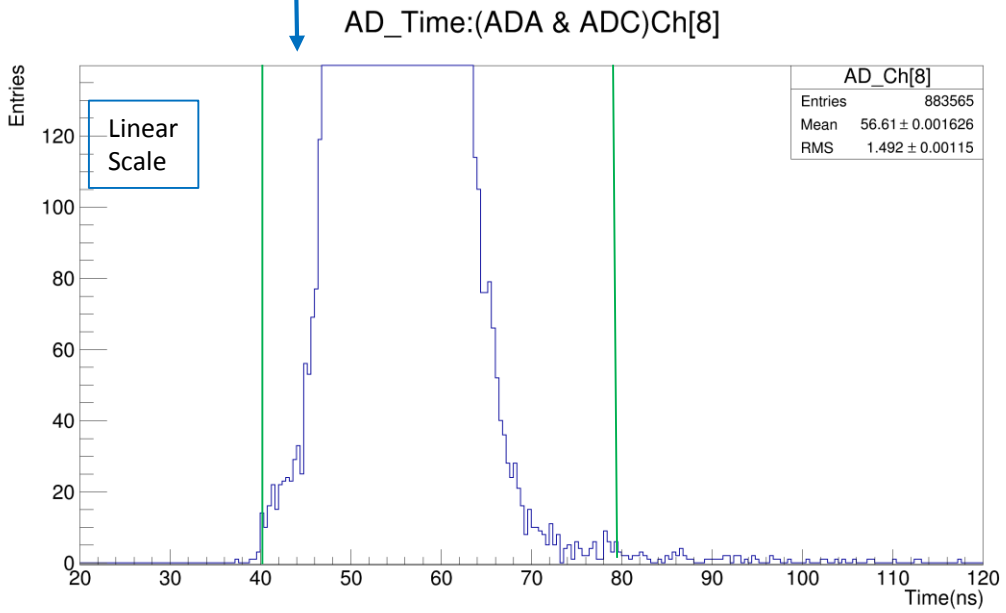


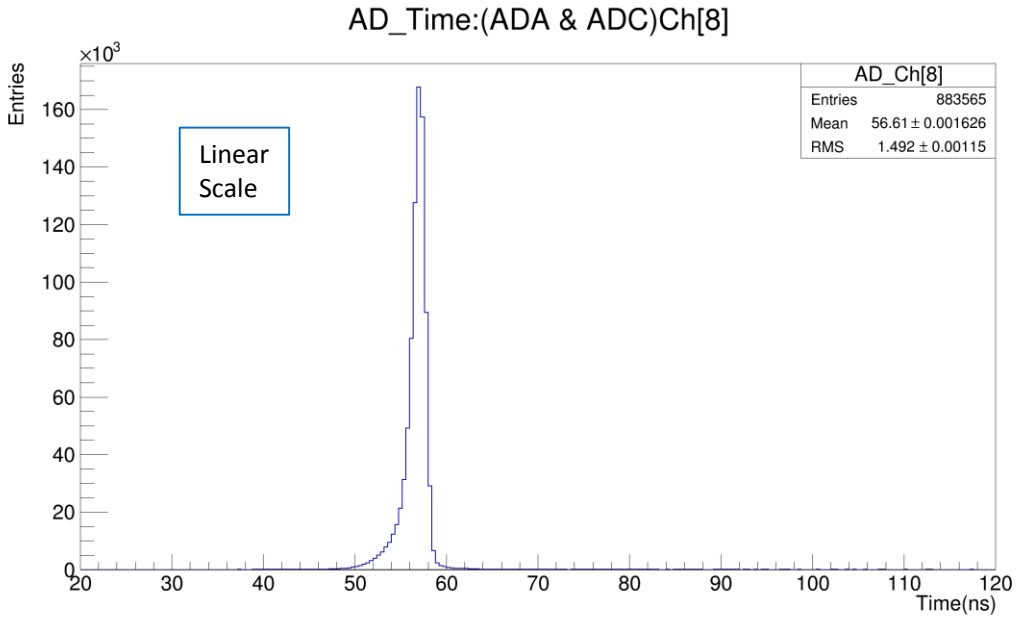


Run: 226062

Cut defined for AD-A-Side

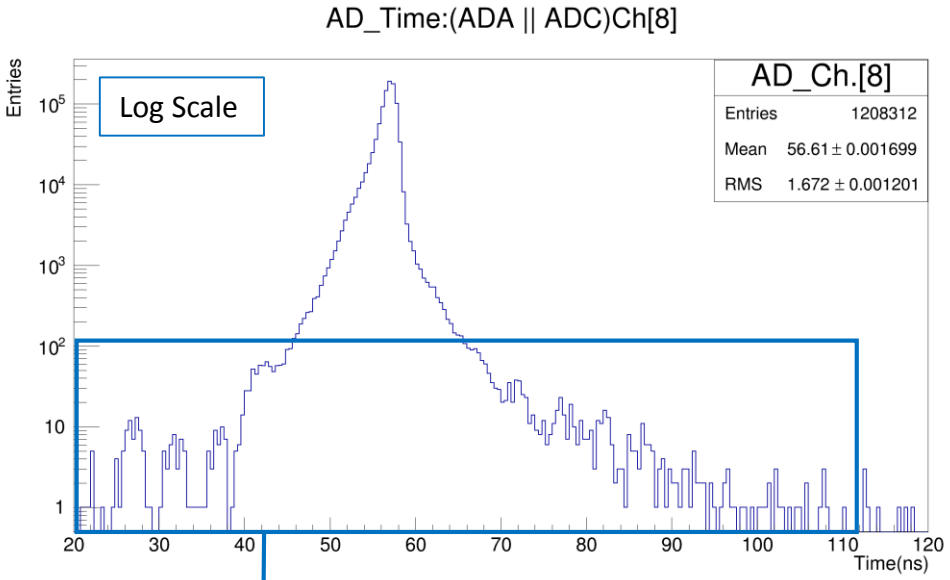


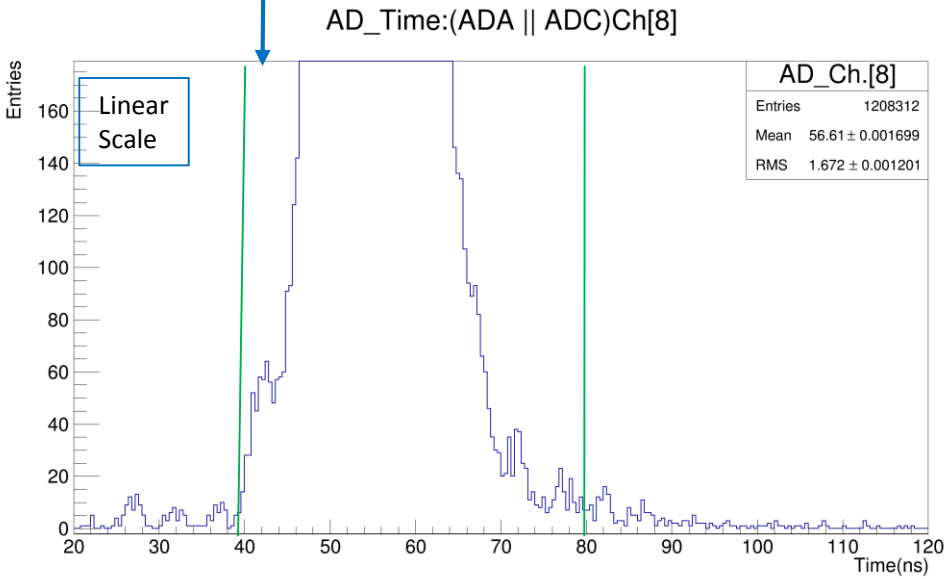


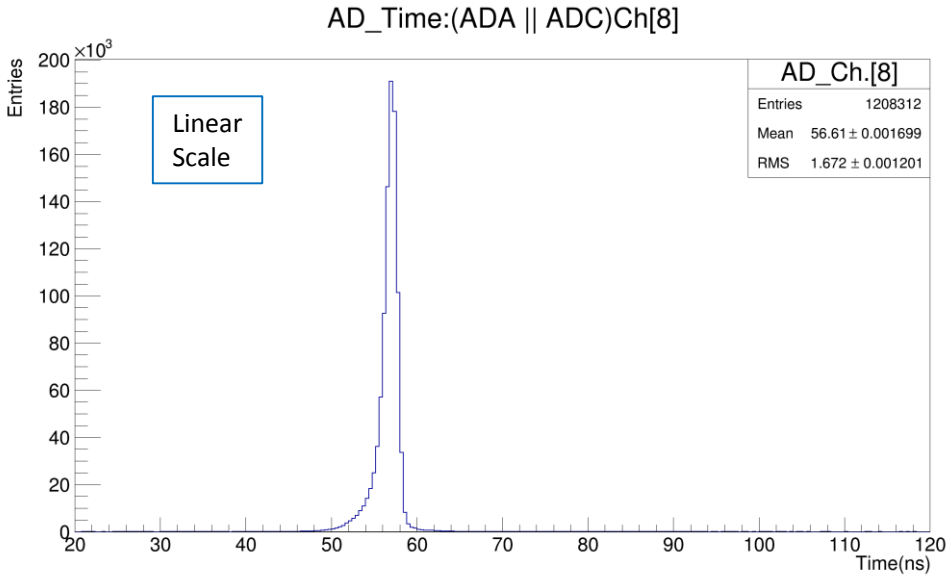


Run: 226062

Cut defined for AD-A-Side

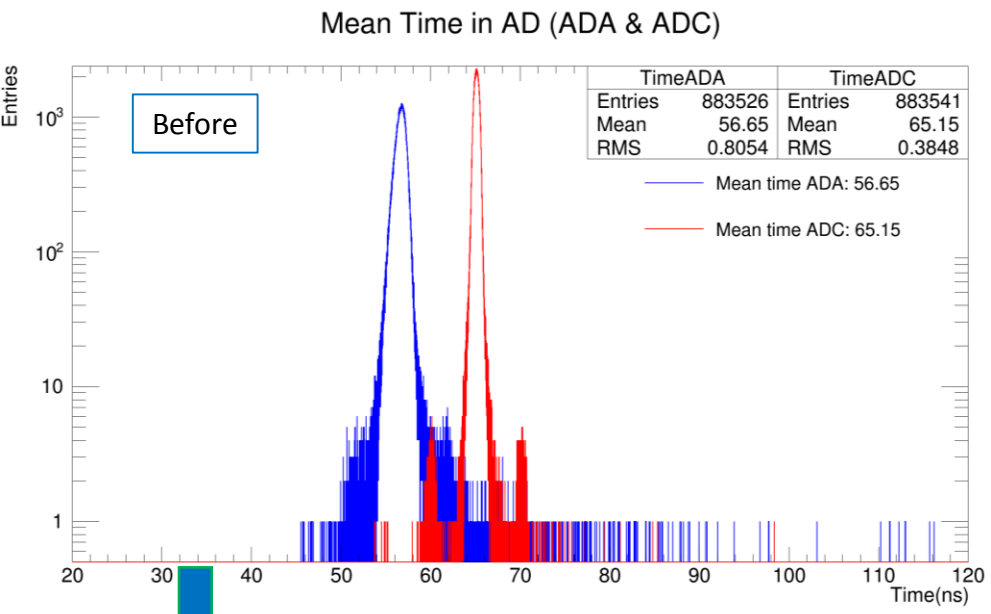


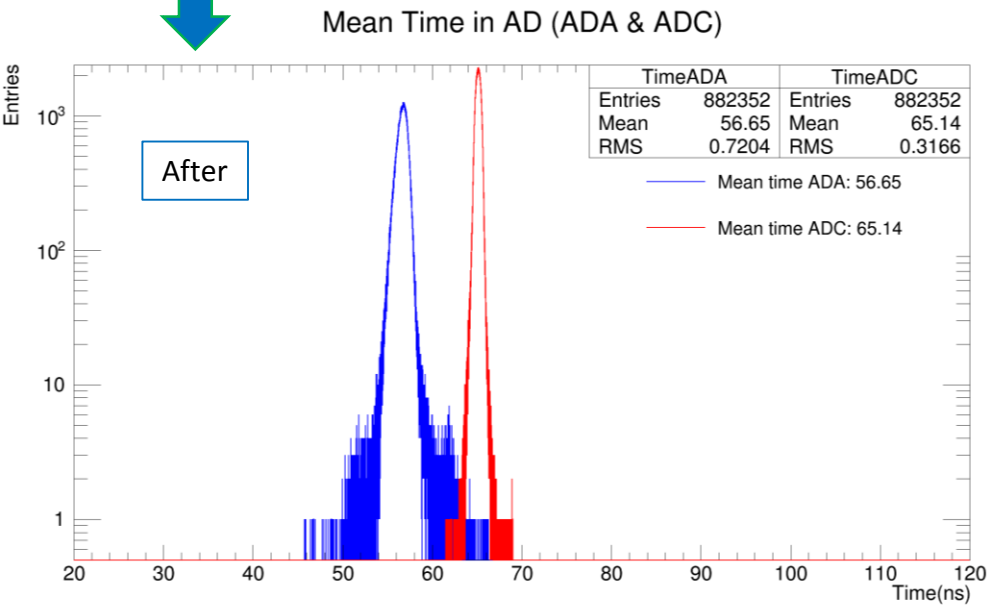


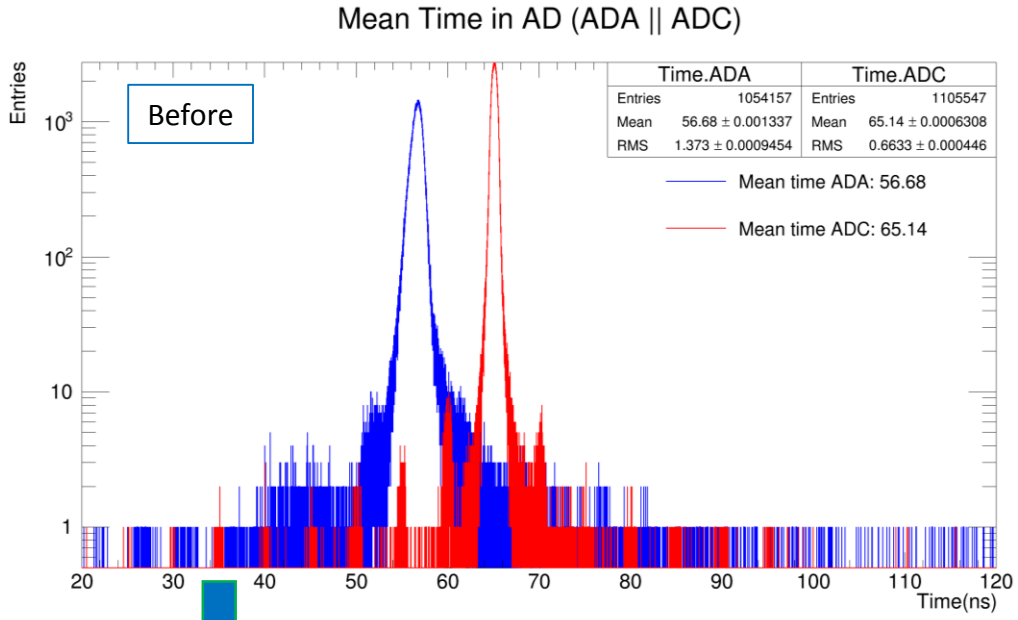


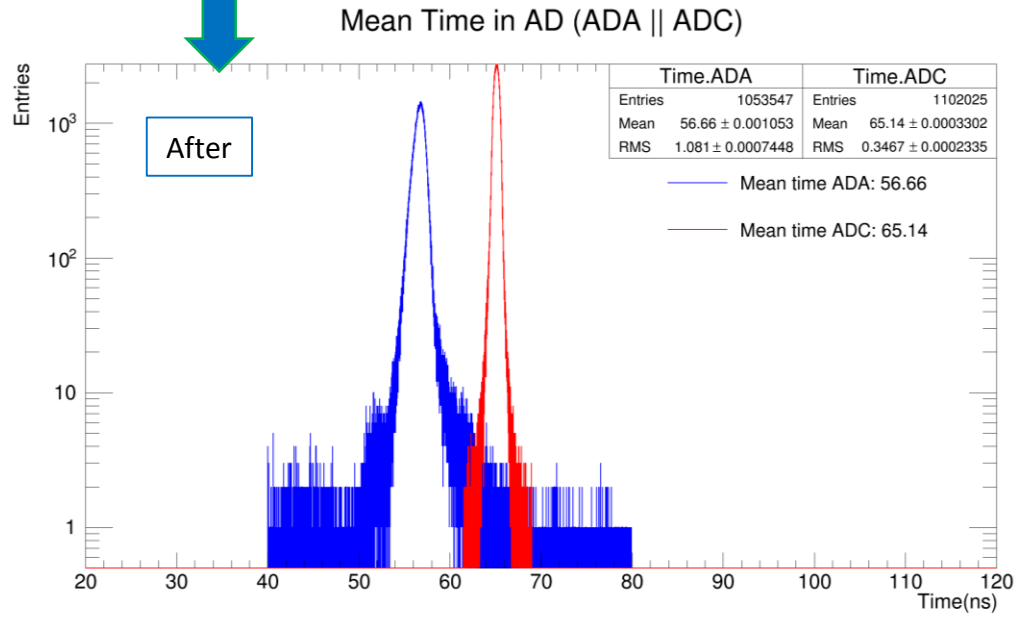
Run: 226062

Mean Time after applying the Cuts (ADs)



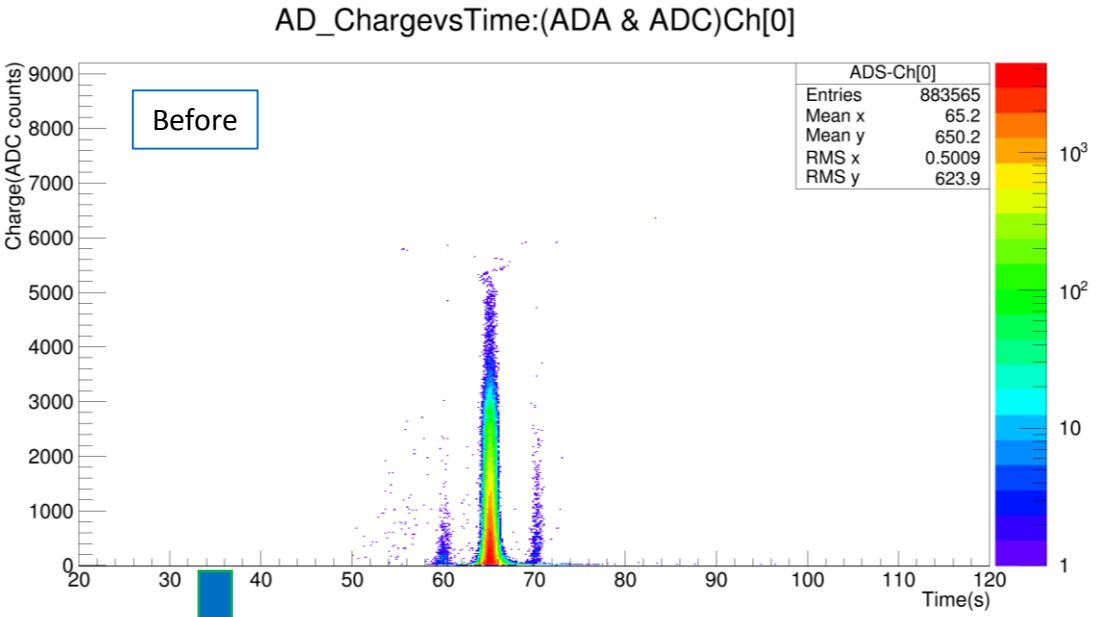


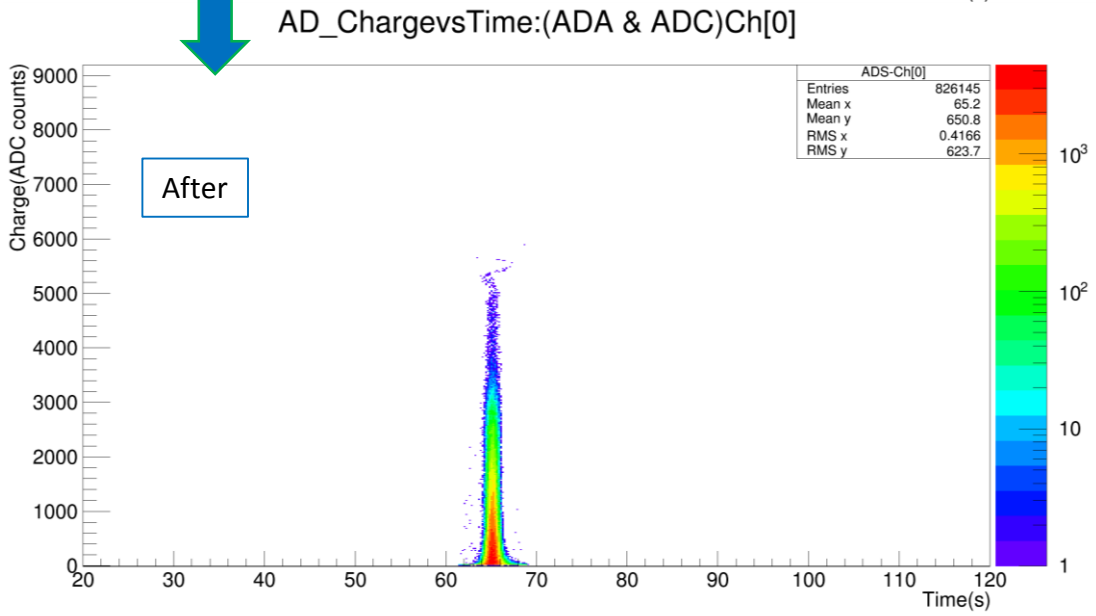


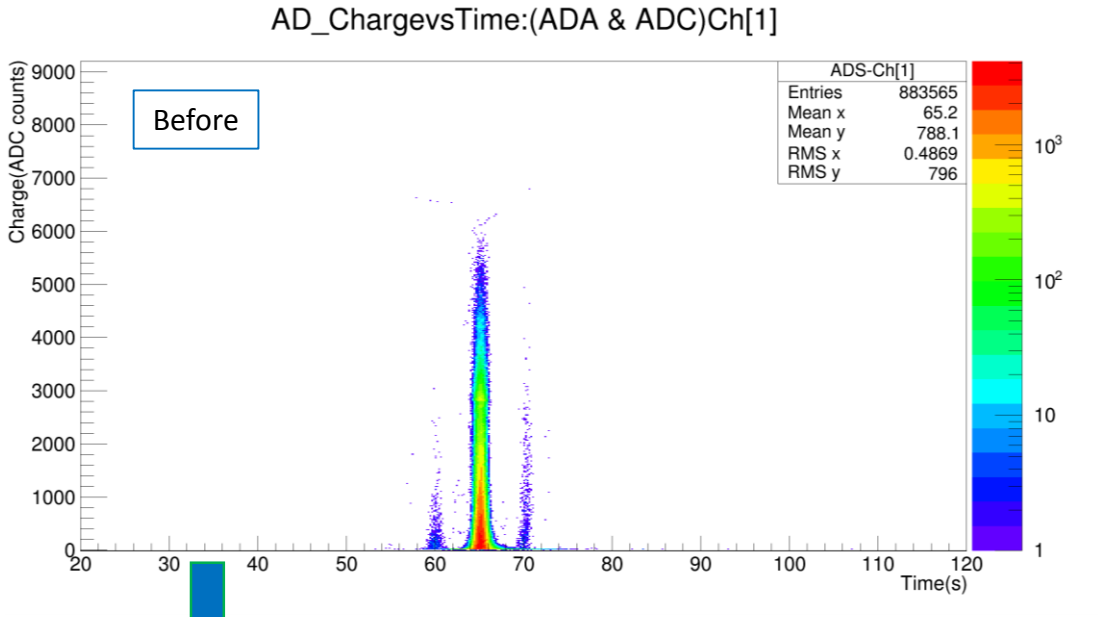


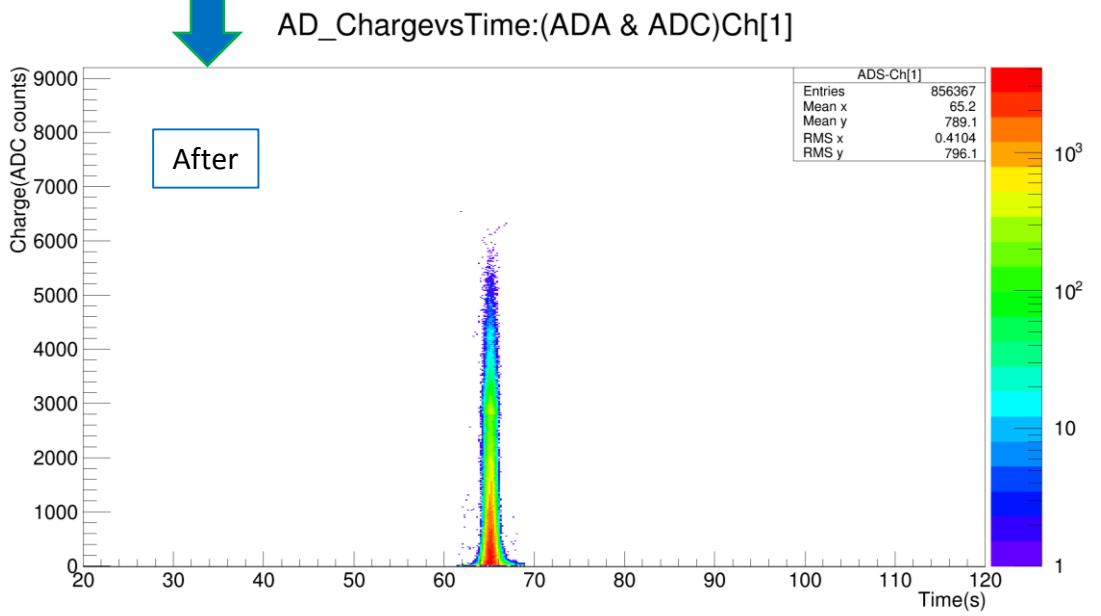
Run: 226062

Charge vs Time after applying the Cuts (AD-C-Side)



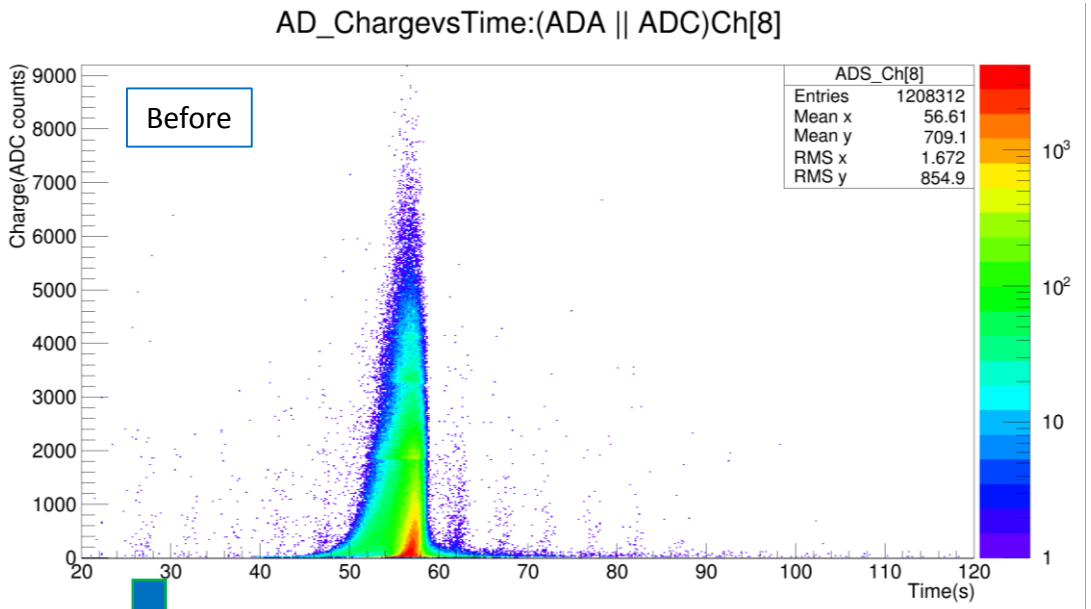


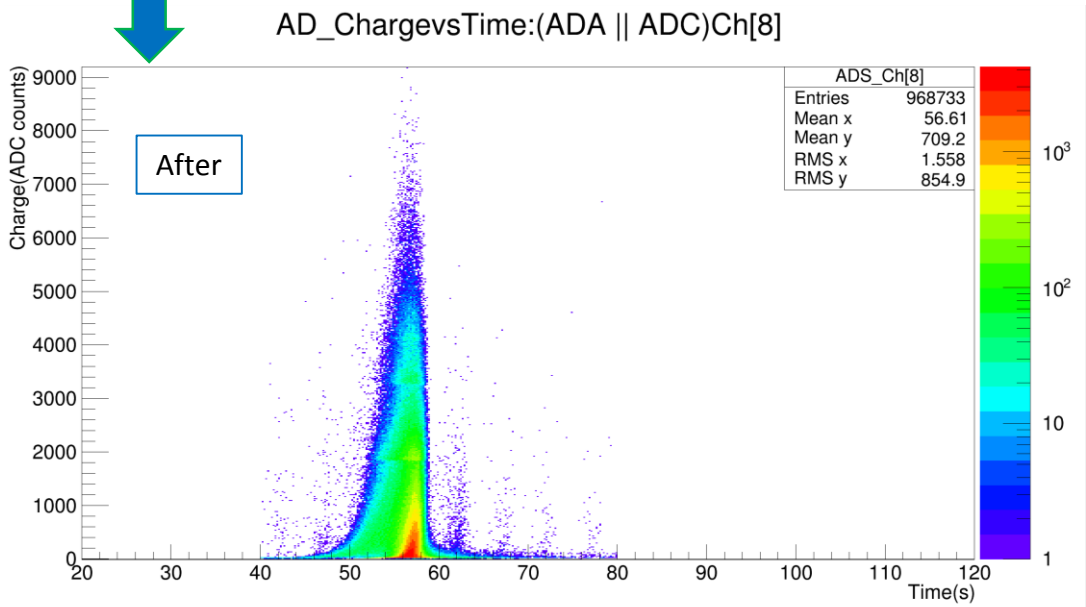


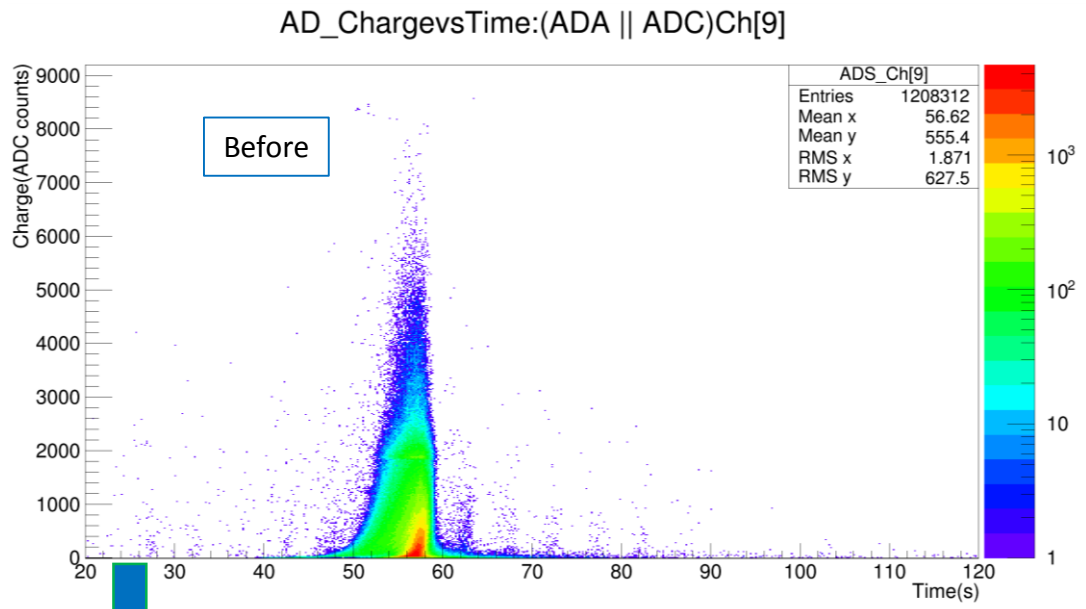


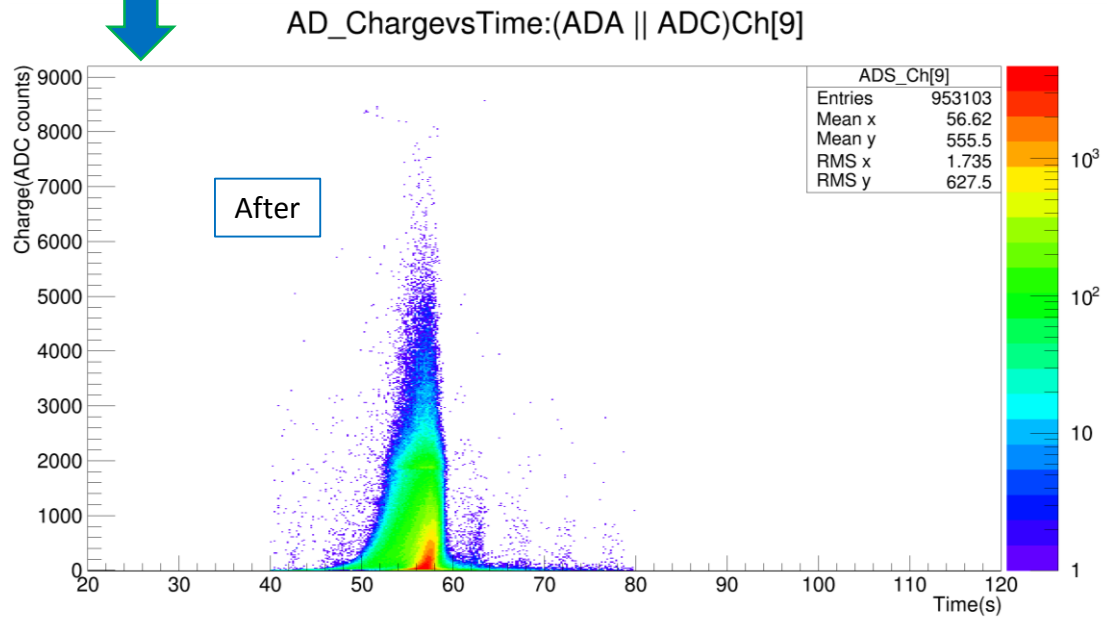
Run: 226062

Charge vs Time after applying the Cuts (AD-A-Side)



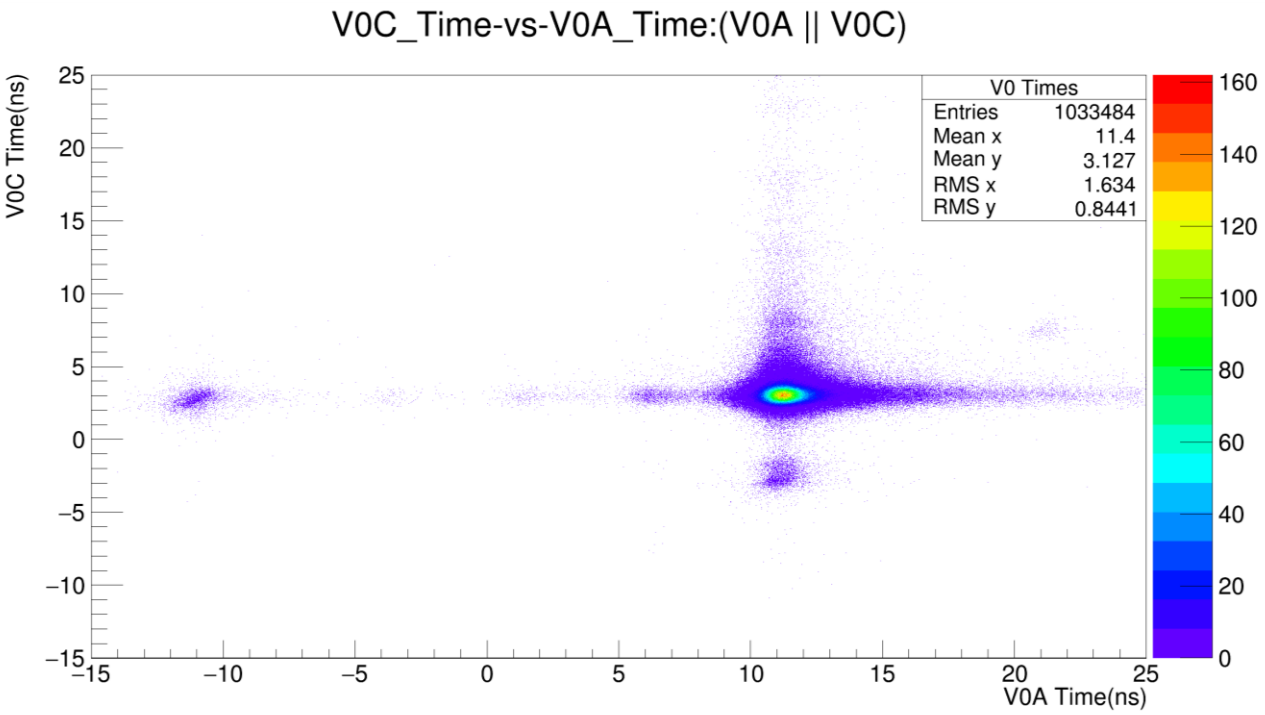




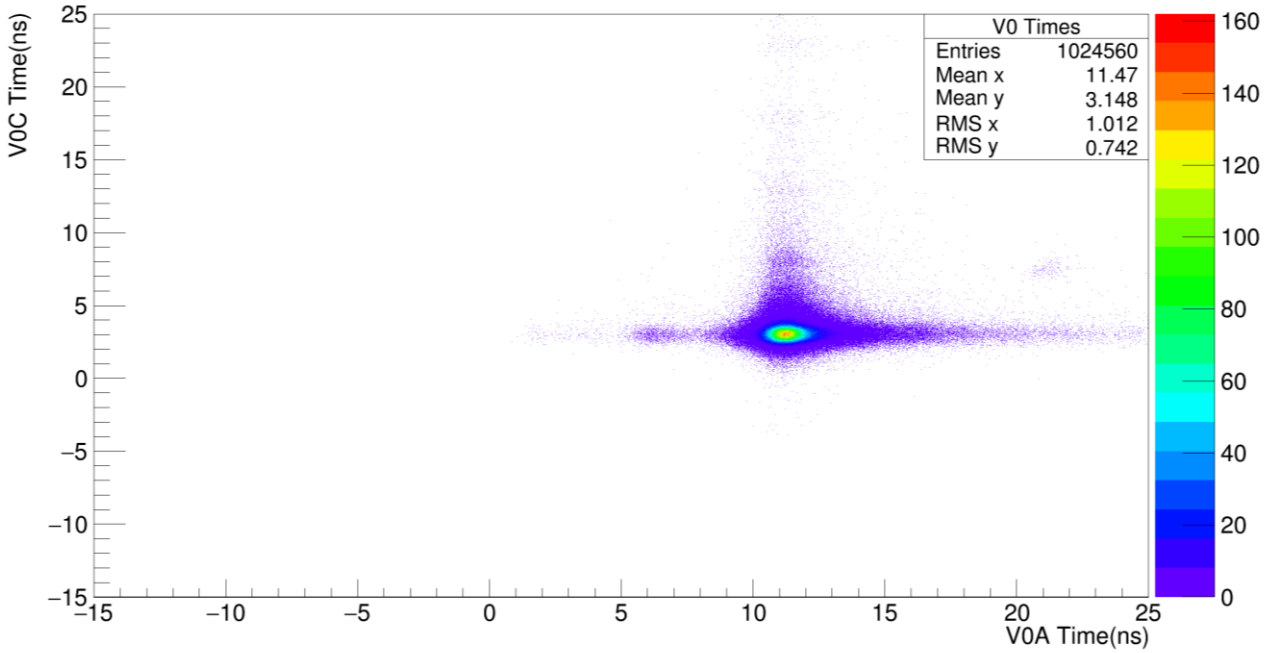


Run: 226062

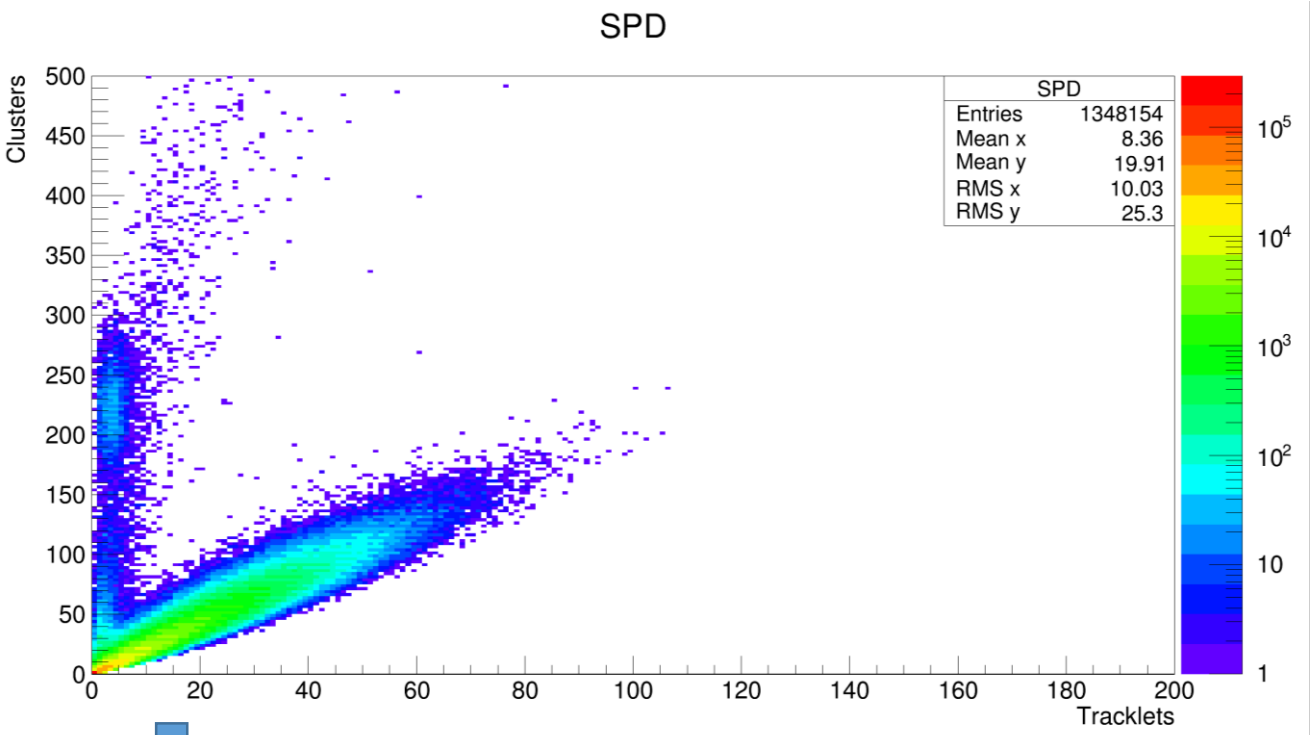
Mean Time in V0s



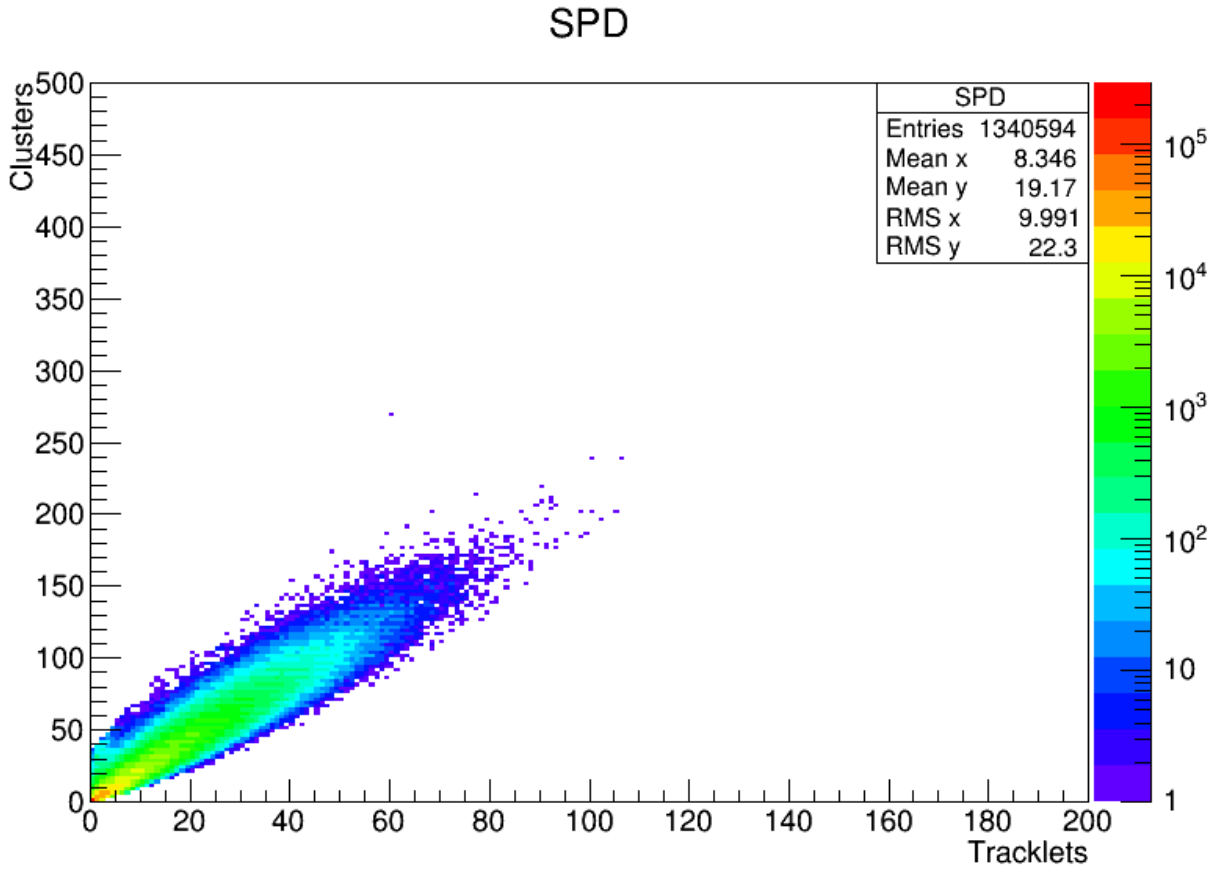
After using BG-Rejection
With the “V0 decision”.



Run: 226062



After Pile-Up Rejection in SPD
With “IsSPDClusterVsTrackletBG”



Run: 226062

The Numbers Obtained

		This numbers are with Trigger information only		This numbers are with the cut applied in Time info for ADs		Cut applied in Time info for ADs, and Beam-Gas rejection for V0		Cut in Time for ADs, Beam-Gas rejection for V0, PileUp rejection for SPD	
ID	Trigger combination	# of Events	Ratio wrt MB	# of Events	Ratio wrt MB	# of Events	Ratio wrt MB	# of Events	Ratio wrt MB
00000	!ADC/!V0C/!SPD/!V0A/!ADA	0	0.0000	0	0.0000	0	0.0000	0	0.0000
00001	!ADC/!V0C/!SPD/!V0A/ADA	24893	0.0165	24892	0.0165	24892	0.0165	24892	0.0165
00010	!ADC/!V0C/!SPD/V0A/!ADA	10625	0.0070	10625	0.0070	10590	0.0070	10590	0.0070
00011	!ADC/!V0C/!SPD/V0A/ADA	21836	0.0145	21835	0.0145	21812	0.0145	21812	0.0145
00100	!ADC/!V0C/SPD/!V0A/!ADA	261759	0.1735	261759	0.1735	261759	0.1735	259151	0.1718
00101	!ADC/!V0C/SPD/!V0A/ADA	710	0.0005	710	0.0005	710	0.0005	697	0.0005
00110	!ADC/!V0C/SPD/V0A/!ADA	5520	0.0037	5520	0.0037	5514	0.0037	5453	0.0036
00111	!ADC/!V0C/SPD/V0A/ADA	15992	0.0106	15992	0.0106	15991	0.0106	15871	0.0105
01000	!ADC/V0C/!SPD/!V0A/!ADA	5688	0.0038	5688	0.0038	5346	0.0035	5346	0.0035
01001	!ADC/V0C/!SPD/!V0A/ADA	588	0.0004	588	0.0004	582	0.0004	582	0.0004
01010	!ADC/V0C/!SPD/V0A/!ADA	588	0.0004	588	0.0004	463	0.0003	463	0.0003
01011	!ADC/V0C/!SPD/V0A/ADA	1473	0.0010	1473	0.0010	1427	0.0009	1427	0.0009
01100	!ADC/V0C/SPD/!V0A/!ADA	5166	0.0034	5166	0.0034	5114	0.0034	4913	0.0033
01101	!ADC/V0C/SPD/!V0A/ADA	1154	0.0008	1154	0.0008	1148	0.0008	1148	0.0008
01110	!ADC/V0C/SPD/V0A/!ADA	11161	0.0074	11161	0.0074	9883	0.0066	9880	0.0065
01111	!ADC/V0C/SPD/V0A/ADA	48237	0.0320	48235	0.0320	46580	0.0309	46565	0.0309

Run: 226062

The Numbers Obtained

		This numbers are with Trigger information only		This numbers are with the cut applied in Time info for ADs		Cut applied in Time info for ADs, and Beam-Gas rejection for V0		Cut in Time for ADs, Beam-Gas rejection for V0, PileUp rejection for SPD	
ID	Trigger combination	# of Events	Ratio wrt MB	# of Events	Ratio wrt MB	# of Events	Ratio wrt MB	# of Events	Ratio wrt MB
10000	ADC/!V0C/!SPD/!V0A/!ADA	45144	0.0299	45014	0.0298	45014	0.0298	45014	0.0298
10001	ADC/!V0C/!SPD/!V0A/ADA	5611	0.0037	5592	0.0037	5592	0.0037	5592	0.0037
10010	ADC/!V0C/!SPD/V0A/!ADA	2449	0.0016	2429	0.0016	2423	0.0016	2423	0.0016
10011	ADC/!V0C/!SPD/V0A/ADA	7608	0.0050	7559	0.0050	7551	0.0050	7551	0.0050
10100	ADC/!V0C/SPD/!V0A/!ADA	1494	0.0010	1487	0.0010	1487	0.0010	1290	0.0009
10101	ADC/!V0C/SPD/!V0A/ADA	491	0.0003	489	0.0003	489	0.0003	489	0.0003
10110	ADC/!V0C/SPD/V0A/!ADA	3302	0.0022	3261	0.0022	3261	0.0022	3261	0.0022
10111	ADC/!V0C/SPD/V0A/ADA	12751	0.0085	12595	0.0083	12593	0.0083	12592	0.0083
11000	ADC/V0C/!SPD/!V0A/!ADA	18441	0.0122	18419	0.0122	18396	0.0122	18396	0.0122
11001	ADC/V0C/!SPD/!V0A/ADA	3609	0.0024	3605	0.0024	3602	0.0024	3602	0.0024
11010	ADC/V0C/!SPD/V0A/!ADA	2848	0.0019	2834	0.0019	2820	0.0019	2820	0.0019
11011	ADC/V0C/!SPD/V0A/ADA	9264	0.0061	9218	0.0061	9188	0.0061	9188	0.0061
11100	ADC/V0C/SPD/!V0A/!ADA	24265	0.0161	24250	0.0161	24238	0.0161	23757	0.0157
11101	ADC/V0C/SPD/!V0A/ADA	9653	0.0064	9649	0.0064	9643	0.0064	9630	0.0064
11110	ADC/V0C/SPD/V0A/!ADA	111921	0.0742	111794	0.0741	111437	0.0739	111292	0.0738
11111	ADC/V0C/SPD/V0A/ADA	834578	0.5531	833645	0.5525	833379	0.5523	831407	0.5510
	Total:	**1508819**	**1.0000**	**1507226**	**0.9989**	**1502924**	**0.9961**	**1497094**	**0.9922**

For more details take a look at Excel file.

Run: 226062

Number of –C, -A, -E triggered events for each combination.

First I changed the trigger mask for –A, -C, -E in the minimum Bias:

CINT10-B-NOPF-ALLNOTRD || COSMB-B-NOPF-ALLNOTRD

to

CINT10-A-NOPF-ALLNOTRD || COSMB-A-NOPF-ALLNOTRD

And count the number of triggered events for each of the 32 combinations defined.
In order to be able to substract the noise.

Total contribution(counts) = **B – A*fA – C*fC – E*fE**
Where:

- B -> Events from Beam-Beam interaction.
- A -> Events from Beam-Empty.
- C -> Events from Empty-Beam.
- E -> Events from Empty-Empty.
- fA, fC -> Scaling factors to the intensity of (A, C)
- fE -> Number of Bunches “E” we have in B acording to the filling scheme.

Run: 226062

Number of –C, -A, -E triggered events for each combination.

		Numer of Events for MBor (-A) "CINT10-A || COSMB-A"		Numer of Events for MBor (-C) "CINT10-C || COSMB-C"		Number of Events for MBor (-E) "CINT10-E || COSMB-E"	
ID	Trigger combination	# of Events	Correction Factor	# of Events	Correction Factor	# of Events	Correction Factor
00000	!ADC/!V0C/!SPD/!V0A/!ADA	4	0.651	0	0.614	0	7.5
00001	!ADC/!V0C/!SPD/!V0A/ADA	0	0.651	0	0.614	0	7.5
00010	!ADC/!V0C/!SPD/V0A/!ADA	2	0.651	0	0.614	0	7.5
00011	!ADC/!V0C/!SPD/V0A/ADA	22	0.651	0	0.614	0	7.5
00100	!ADC/!V0C/SPD/!V0A/!ADA	28	0.651	3	0.614	0	7.5
00101	!ADC/!V0C/SPD/!V0A/ADA	4	0.651	0	0.614	0	7.5
00110	!ADC/!V0C/SPD/V0A/!ADA	10	0.651	0	0.614	0	7.5
00111	!ADC/!V0C/SPD/V0A/ADA	92	0.651	0	0.614	0	7.5
01000	!ADC/V0C/!SPD/!V0A/!ADA	0	0.651	0	0.614	0	7.5
01001	!ADC/V0C/!SPD/!V0A/ADA	0	0.651	0	0.614	0	7.5
01010	!ADC/V0C/!SPD/V0A/!ADA	0	0.651	0	0.614	0	7.5
01011	!ADC/V0C/!SPD/V0A/ADA	1	0.651	0	0.614	0	7.5
01100	!ADC/V0C/SPD/!V0A/!ADA	1	0.651	0	0.614	0	7.5
01101	!ADC/V0C/SPD/!V0A/ADA	0	0.651	0	0.614	0	7.5
01110	!ADC/V0C/SPD/V0A/!ADA	0	0.651	0	0.614	0	7.5
01111	!ADC/V0C/SPD/V0A/ADA	47	0.651	0	0.614	0	7.5
10000	ADC/!V0C/!SPD/!V0A/!ADA	0	0.651	0	0.614	0	7.5
10001	ADC/!V0C/!SPD/!V0A/ADA	0	0.651	0	0.614	0	7.5
10010	ADC/!V0C/!SPD/V0A/!ADA	0	0.651	0	0.614	0	7.5
10011	ADC/!V0C/!SPD/V0A/ADA	7	0.651	0	0.614	0	7.5
10100	ADC/!V0C/SPD/!V0A/!ADA	0	0.651	6	0.614	0	7.5
10101	ADC/!V0C/SPD/!V0A/ADA	2	0.651	1	0.614	0	7.5
10110	ADC/!V0C/SPD/V0A/!ADA	2	0.651	0	0.614	0	7.5
10111	ADC/!V0C/SPD/V0A/ADA	150	0.651	7	0.614	2	7.5
11000	ADC/V0C/!SPD/!V0A/!ADA	0	0.651	34	0.614	0	7.5
11001	ADC/V0C/!SPD/!V0A/ADA	0	0.651	38	0.614	0	7.5
11010	ADC/V0C/!SPD/V0A/!ADA	0	0.651	0	0.614	0	7.5
11011	ADC/V0C/!SPD/V0A/ADA	0	0.651	0	0.614	0	7.5
11100	ADC/V0C/SPD/!V0A/!ADA	0	0.651	47	0.614	0	7.5
11101	ADC/V0C/SPD/!V0A/ADA	40	0.651	211	0.614	7	7.5
11110	ADC/V0C/SPD/V0A/!ADA	0	0.651	35	0.614	0	7.5
11111	ADC/V0C/SPD/V0A/ADA	14	0.651	45	0.614	0	7.5
	Total:	426		427		9	

	SOR	EOR	Avg
Interacting Bunches Beam 1	1.16E+11	1.16E+11	1.16E+11
Non Interacting Bunches Beam 1	1.78E+11	1.78E+11	1.78E+11
Interacting Bunches Beam 2	1.21E+11	1.20E+11	1.20E+11
Non Interacting Bunches Beam 2	1.97E+11	1.97E+11	1.97E+11

- The “**Beam 1**” is the clockwise LHC Beam (For us, Beam from A-side)
- The “**Beam 2**” is anticlockwise LHC Beam (For us, Beam from C-side)

The correction factors can be calculated dividing the number of *Interacting Bunches* by the number of *Non Interacting Bunches*.

As for the Empty-Empty events we can take a look at the “Trigger Info” Tab in ALICE-logbook and find the number of E events in the filling scheme.

https://alice-logbook.cern.ch/logbook/date_online.php?p_cont=rund&p_run=226062&p_tab=trg&p_subtab=ttconf

Run: 226062

The Final Numbers after correction.

		Number of Events after correction factors	
ID	Trigger combination	# of Events	Ratio wrt MB
00000	!ADC/!V0C/!SPD/!V0A/!ADA	0	0.00000
00001	!ADC/!V0C/!SPD/!V0A/ADA	24892	0.01650
00010	!ADC/!V0C/!SPD/V0A/!ADA	10588.698	0.00702
00011	!ADC/!V0C/!SPD/V0A/ADA	21797.678	0.01445
00100	!ADC/!V0C/SPD/!V0A/!ADA	259130.93	0.17174
00101	!ADC/!V0C/SPD/!V0A/ADA	694.396	0.00046
00110	!ADC/!V0C/SPD/V0A/!ADA	5446.49	0.00361
00111	!ADC/!V0C/SPD/V0A/ADA	15811.108	0.01048
01000	!ADC/V0C/!SPD/!V0A/!ADA	5346	0.00354
01001	!ADC/V0C/!SPD/!V0A/ADA	582	0.00039
01010	!ADC/V0C/!SPD/V0A/!ADA	463	0.00031
01011	!ADC/V0C/!SPD/V0A/ADA	1426.349	0.00095
01100	!ADC/V0C/SPD/!V0A/!ADA	4912.349	0.00326
01101	!ADC/V0C/SPD/!V0A/ADA	1148	0.00076
01110	!ADC/V0C/SPD/V0A/!ADA	9880	0.00655
01111	!ADC/V0C/SPD/V0A/ADA	46534.403	0.03084
10000	ADC/!V0C/!SPD/!V0A/!ADA	45014	0.02983
10001	ADC/!V0C/!SPD/!V0A/ADA	5592	0.00371
10010	ADC/!V0C/!SPD/V0A/!ADA	2423	0.00161
10011	ADC/!V0C/!SPD/V0A/ADA	7546.443	0.00500
10100	ADC/!V0C/SPD/!V0A/!ADA	1286.316	0.00085
10101	ADC/!V0C/SPD/!V0A/ADA	487.084	0.00032
10110	ADC/!V0C/SPD/V0A/!ADA	3259.698	0.00216
10111	ADC/!V0C/SPD/V0A/ADA	12505.052	0.00829
11000	ADC/V0C/!SPD/!V0A/!ADA	18375.124	0.01218
11001	ADC/V0C/!SPD/!V0A/ADA	3578.668	0.00237
11010	ADC/V0C/!SPD/V0A/!ADA	2820	0.00187
11011	ADC/V0C/!SPD/V0A/ADA	9188	0.00609
11100	ADC/V0C/SPD/!V0A/!ADA	23728.142	0.01573
11101	ADC/V0C/SPD/!V0A/ADA	9526.906	0.00631
11110	ADC/V0C/SPD/V0A/!ADA	111270.51	0.07375
11111	ADC/V0C/SPD/V0A/ADA	831370.256	0.55101
	Total:	**1496624.6**	**0.99192**

Lets not forget…

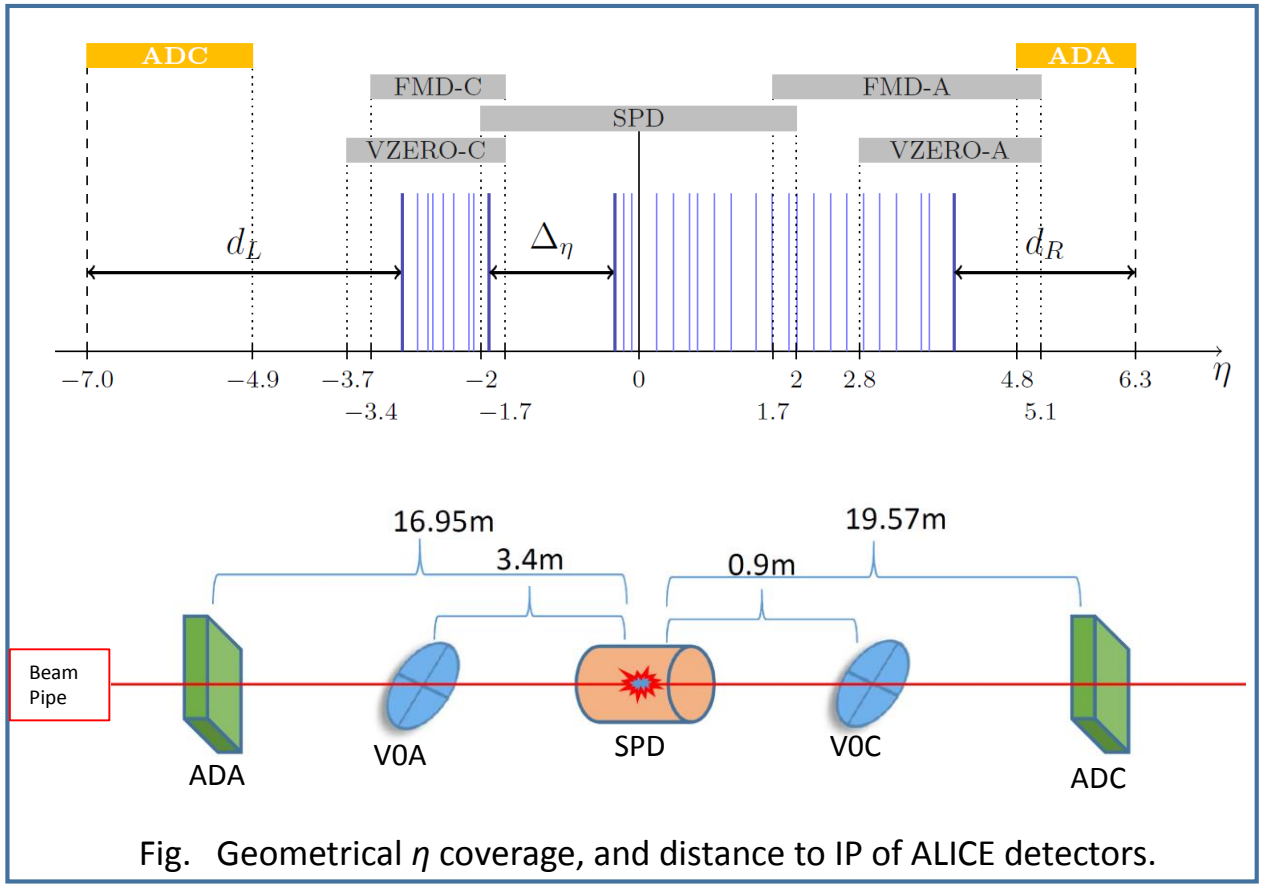


Fig. Geometrical η coverage, and distance to IP of ALICE detectors.

Summary

The sample was cleaned in 3 different ways.

- For AD -> Using time information
- For V0 -> Using V0 decision for Beam-Gas rejection
- For SPD -> Using Pile-Up Rejection

The contribution for -A, -C, -E events was obtained and used for the correction of the –B events.

Some numbers for diffractive events

ID	Trigger Combination	# of Events	Ratio wrt MBor
10101	**ADC/!V0C/SPD/!V0A/ADA**	487.084	0.00032
00100	**!ADC/!V0C/SPD/!V0A/!ADA**	259130.93	0.17174
00101	**!ADC/!V0C/SPD/!V0A/ADA**	694.396	0.00046
10100	**ADC/!V0C/SPD/!V0A/!ADA**	1286.316	0.00085

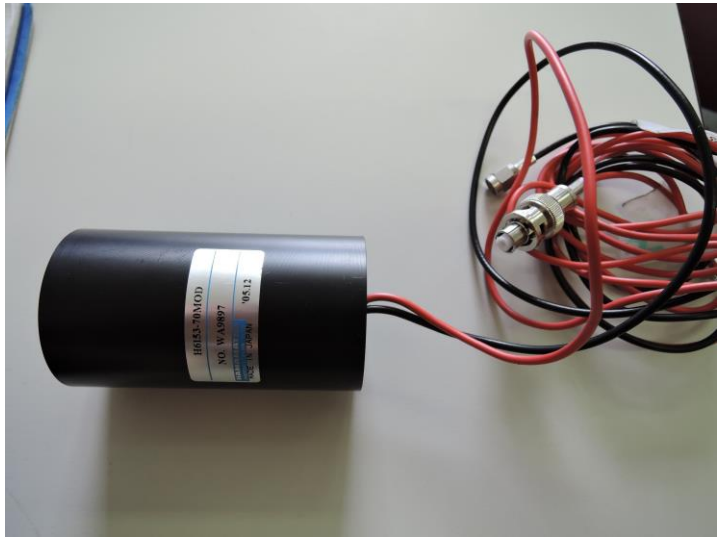
To do:

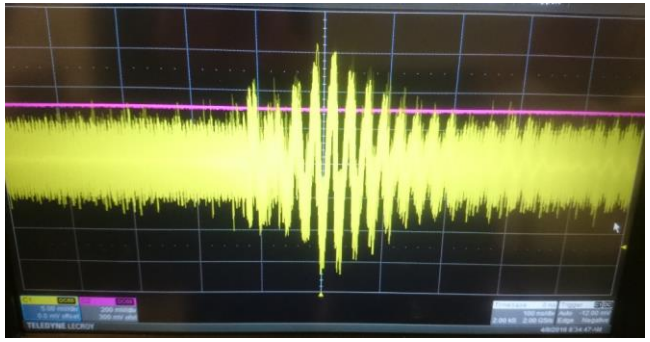
- Include T0 in the trigger combinations.
- Compare ADA charge distributions with physics selection.
- Compute the rates for Beam-Gas interactions.
- Obtain delivered, recorded, collected.. etc etc Lumi. ☺
- Write down all that has been done. (Comparison with Totem method)
- Estimate events fraction for double diffractive events.

AD Tasks

In Summary

- The system is working fine.
- Now I have two PMTs in the 2 AD modules. (Second HVPS needed)
- There is a strange noise source that can reach 20 mV
- I raised the threshold level up to 240 mV (remember that we amplify by a factor 10)
- Runs are ongoing. I have to see the data to find out if it possible to plateau like this.





PMT selection-> some results

	Small Top	Small Bottom	Black Palette	AD Module (test)	Efficiency	AD Module (test)	Efficiency
HV	1650	1600	1780	**1400**	**7.6%**	1400	9.67%
	1650	1600	1780	**1500**	**18.18%**	1500	27.27%
	1650	1600	1780	**1600**	**66.99%**	1600	58.49%
	1650	1600	1780	**1700**	**97.4%**	1700	83.76%
	1650	1600	1780	**1750**	**98.1%**	1750	89.72%
	1650	1600	1780	**1800**	**98.6%**	1800	94.4%

PMT selection-> some results