Analysis S455

Key Facts:

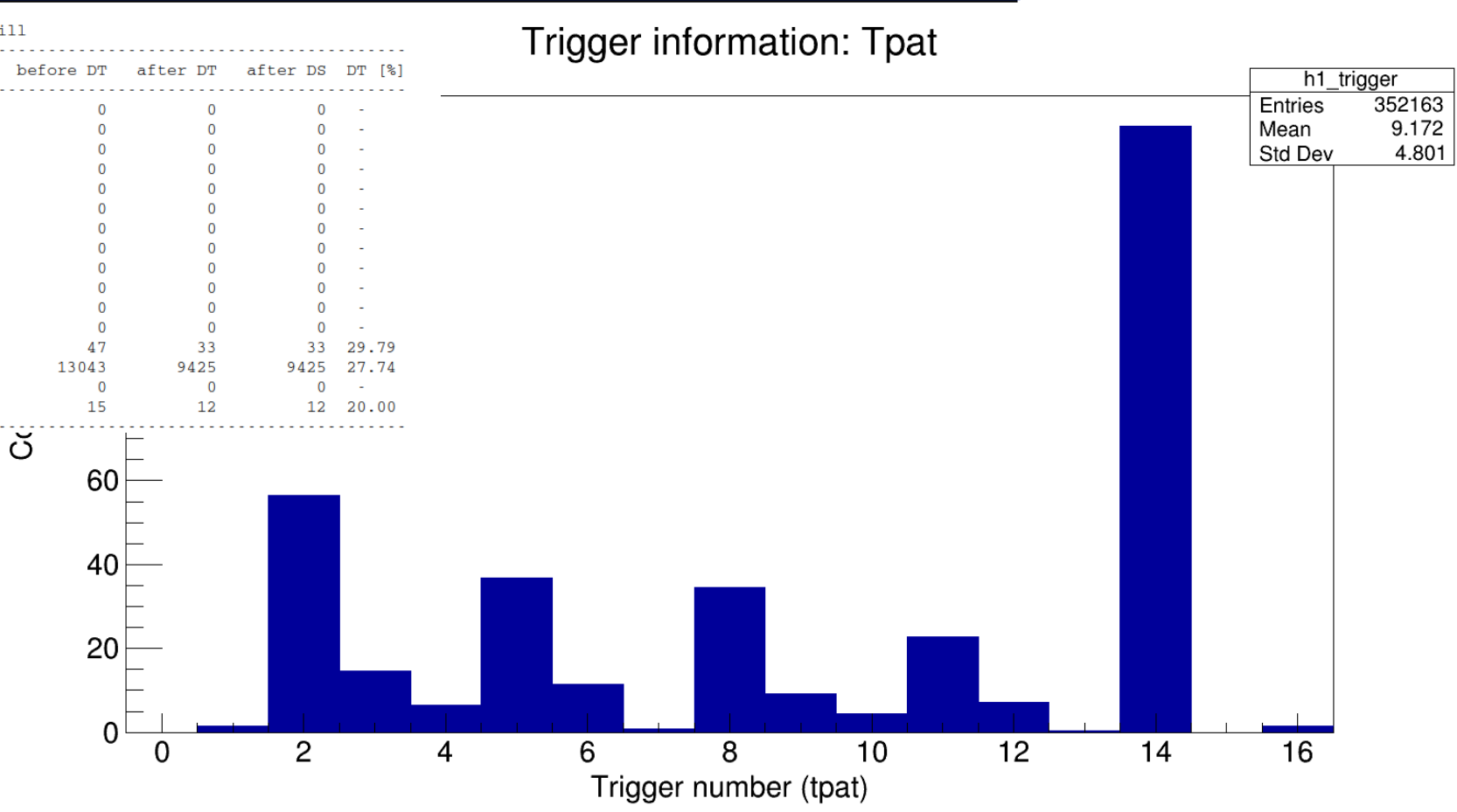
- Run 273, subrun 10 (~180 s), 10e7 events
- Expected p2p-Events ~ 5/s → 180*5 → 900 events for file
- TWIM calibration file used:

  /u/land/r3broot/202106_testing/R3BRoot_20210726/sofia/macros/s455Up2p/parameters/CalibParam.par

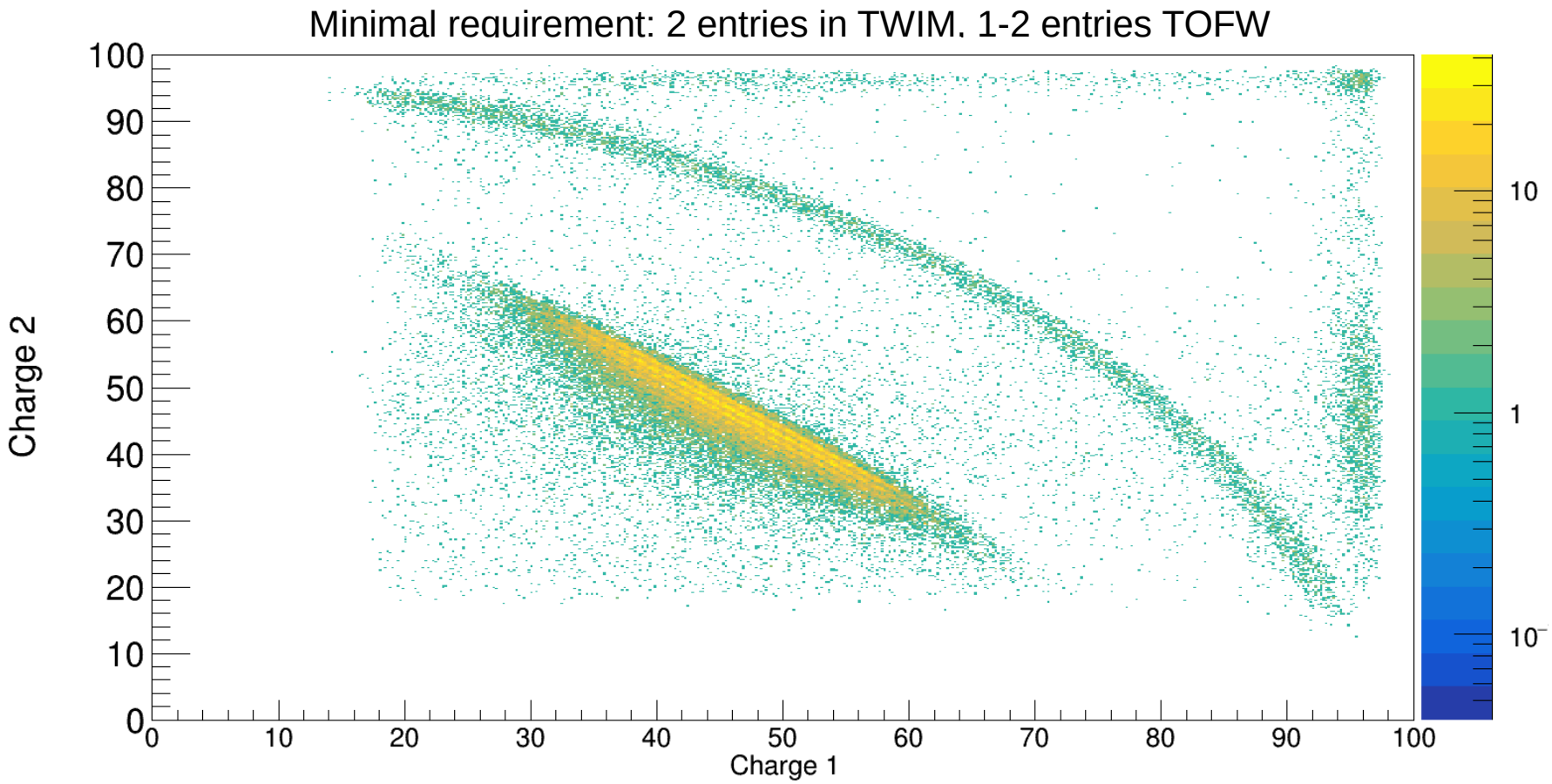
TPats

TrloII Scalers (r3b_trloii) begin-of-spill

Input		#	before DT	after DT	after DS	DT [%]
0:	0 SofStart	# S	0	0	0	-
1:	0 Fission	# S+F	0	0	0	-
2:	47 CalifOR	# S+ C&&	0	0	0	-
3:	0 CalifAND	# S+F+C&&	0	0	0	-
4:	13043 NeuLAND	# S+ C||	0	0	0	-
5:	0	# S+F+C||	0	0	0	-
6:	0	# !S	0	0	0	-
7:	0	# !S+F	0	0	0	-
8:	0	# !S+ C&&	0	0	0	-
9:	0	# !S+F+C&&	0	0	0	-
10:	0	# !S+ C||	0	0	0	-
11:	0	# !S+F+C||	0	0	0	-
12:	0	# CalifOR	47	33	33	29.79
13:	0	# NeuLAND	13043	9425	9425	27.74
14:	0	#	0	0	0	-
15:	0	# sync	15	12	12	20.00



TWIM Charge Distribution



CALIFA p2p-Reconstruction

Minimal Cuts:

- E_1 and E_2 > 30 MeV
- Δφ = 180+-30°
- (2 entries in TWIM; Z_sum < 100, 1-2 entries TOFW)

Hit Selection Algorithm

- Sort CALIFA hits according to energy
- Calculate Δφ for the **first two highest** energy hits
- if Δφ = 180+-30° → **p2p hits**

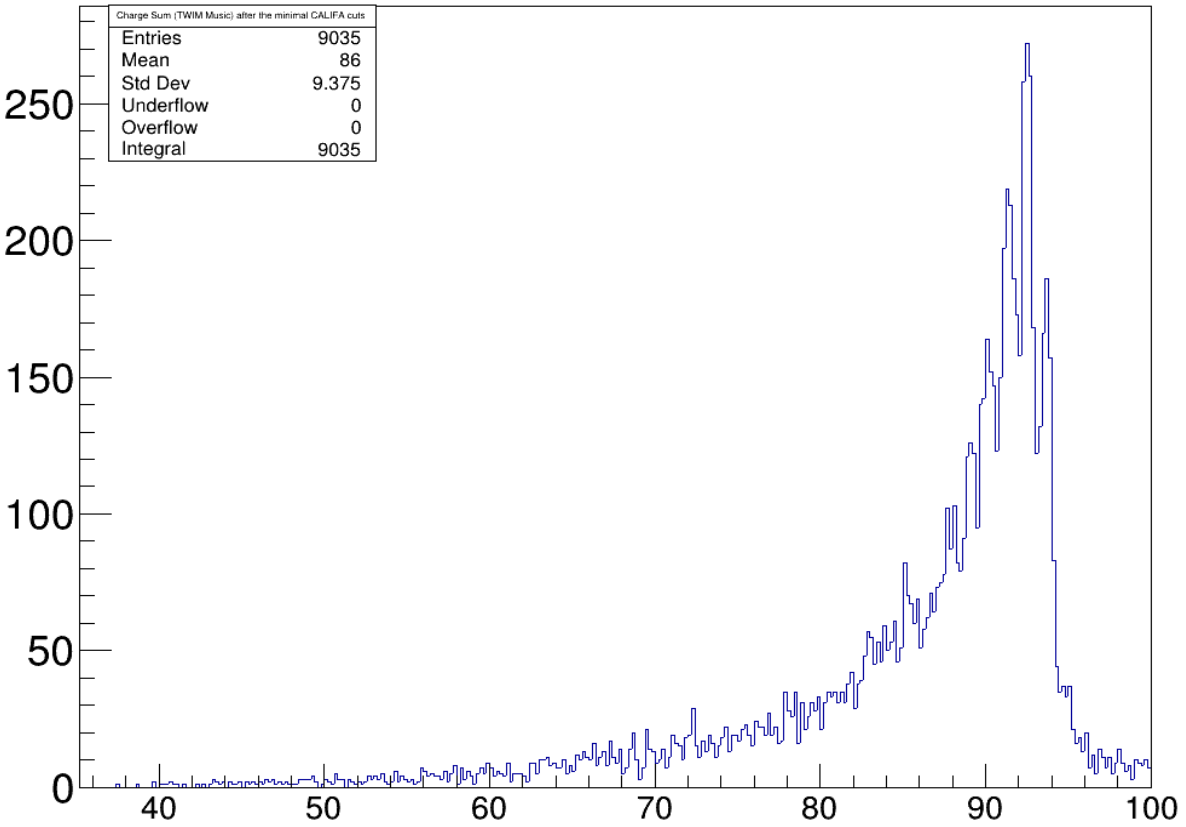
- Else:

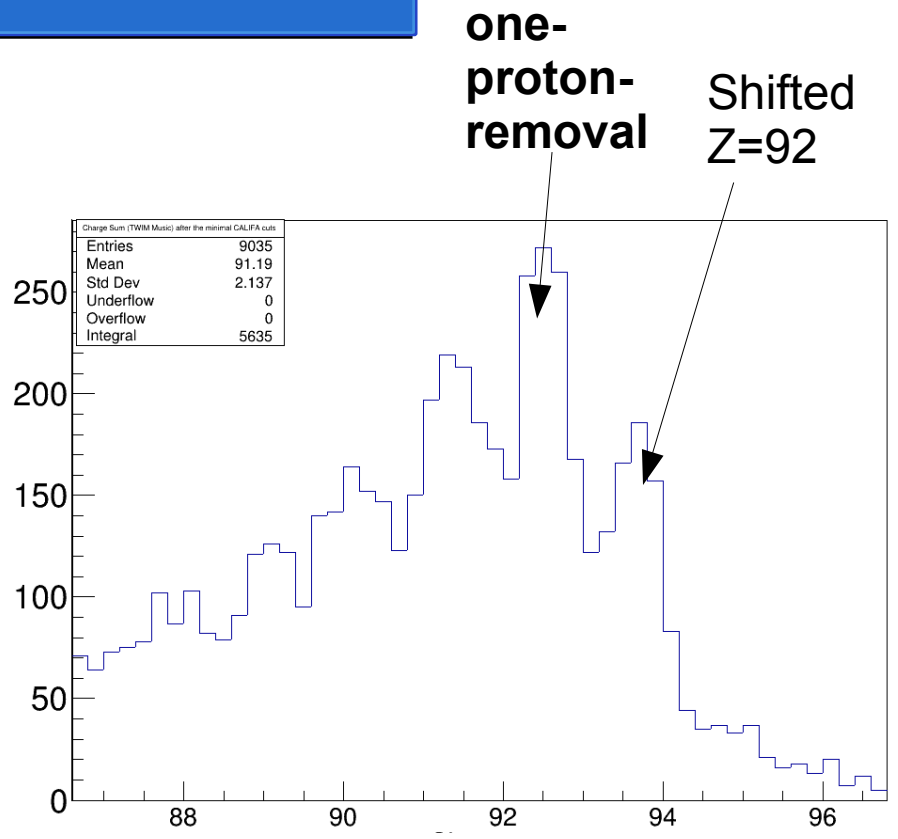
  calculate Δφ for hit with **highest** energy and other hits &

  Δφ for hit with **second highest** energy and other hits

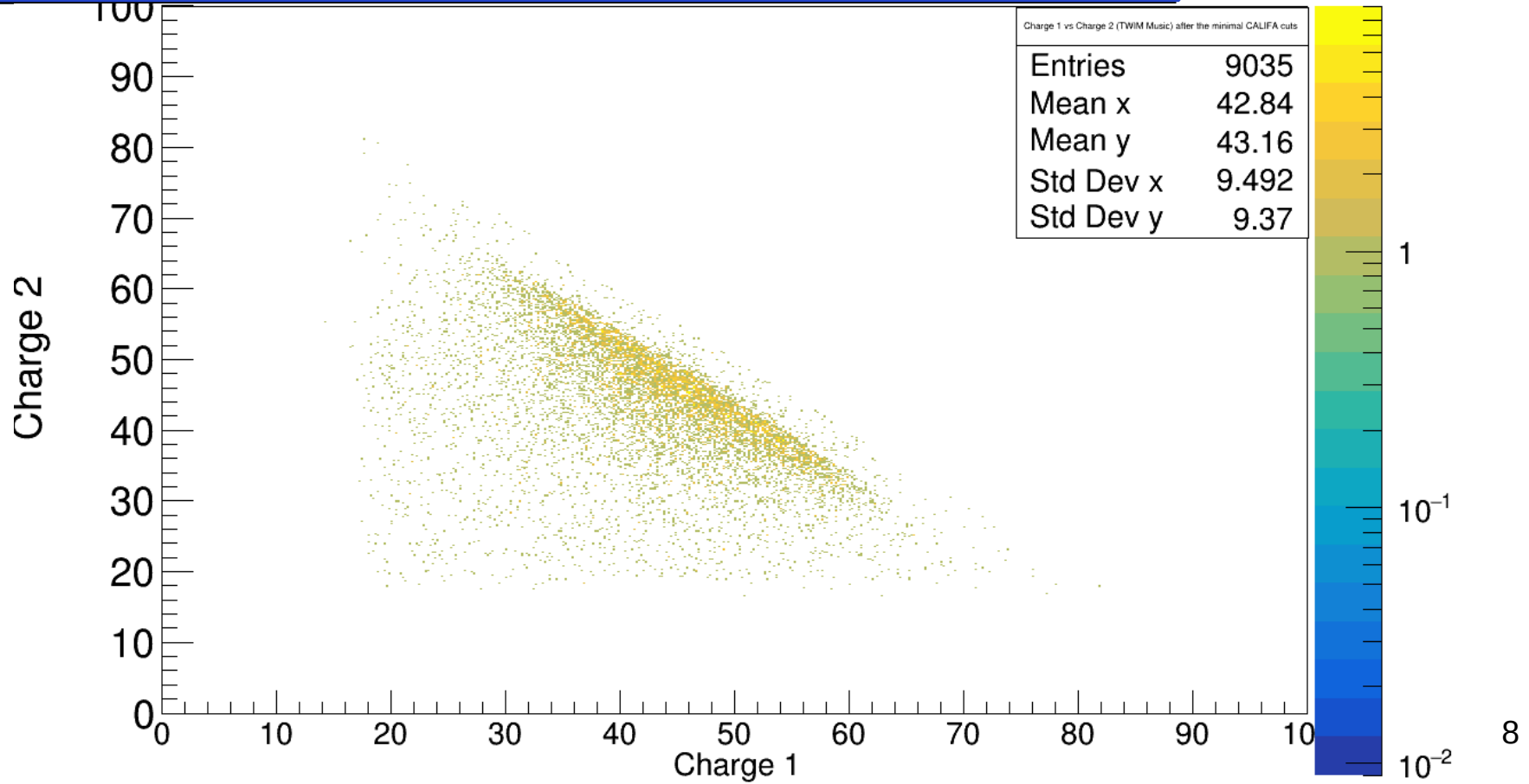
  Select combination with best Δφ (at least 180+-30°)→ **p2p hits**

Z_sum (with minimal CALIFA cuts)

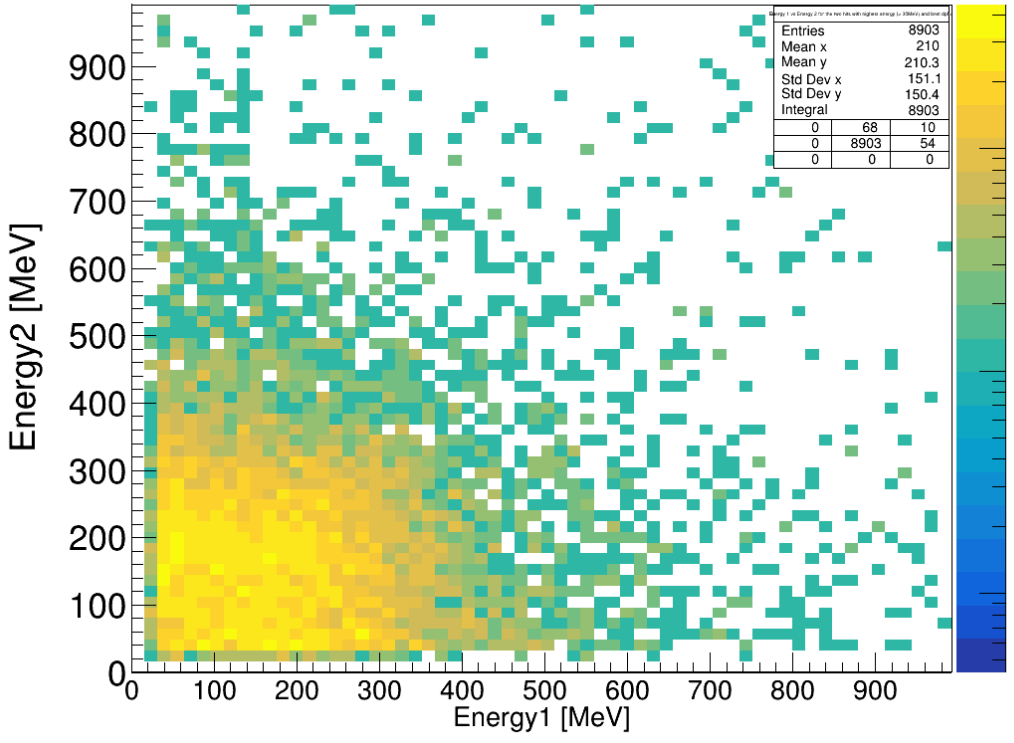


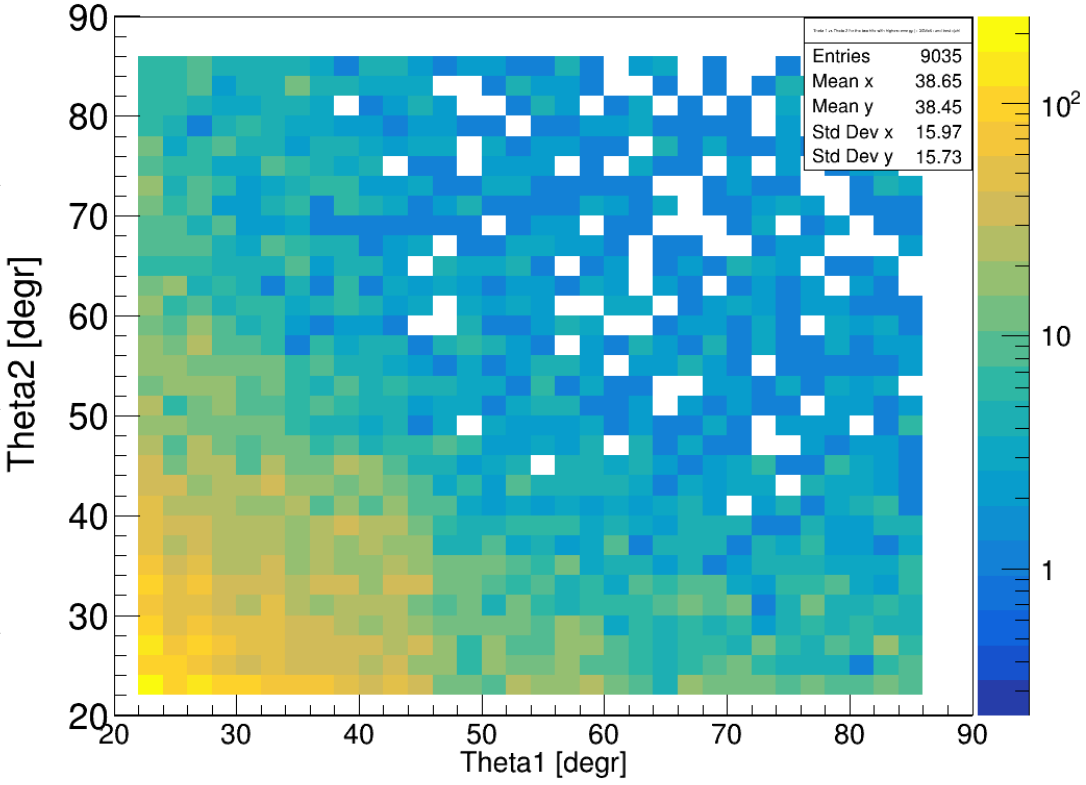


Z_1_vs_Z_2 (with minimal CALIFA cuts)

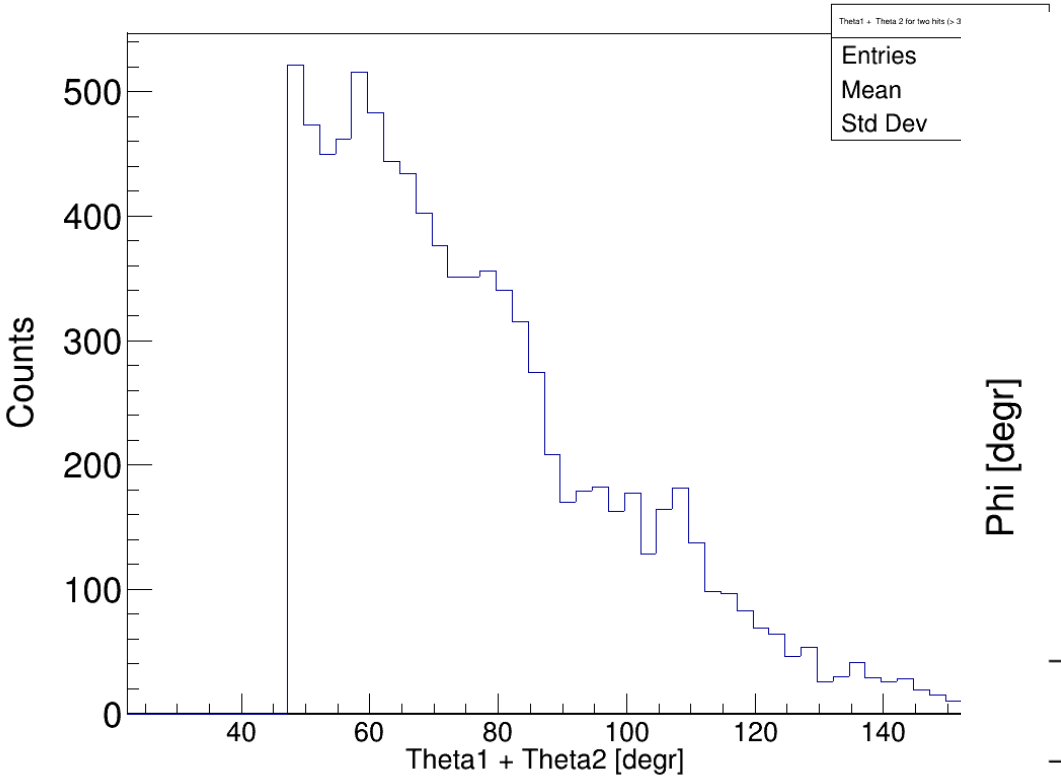


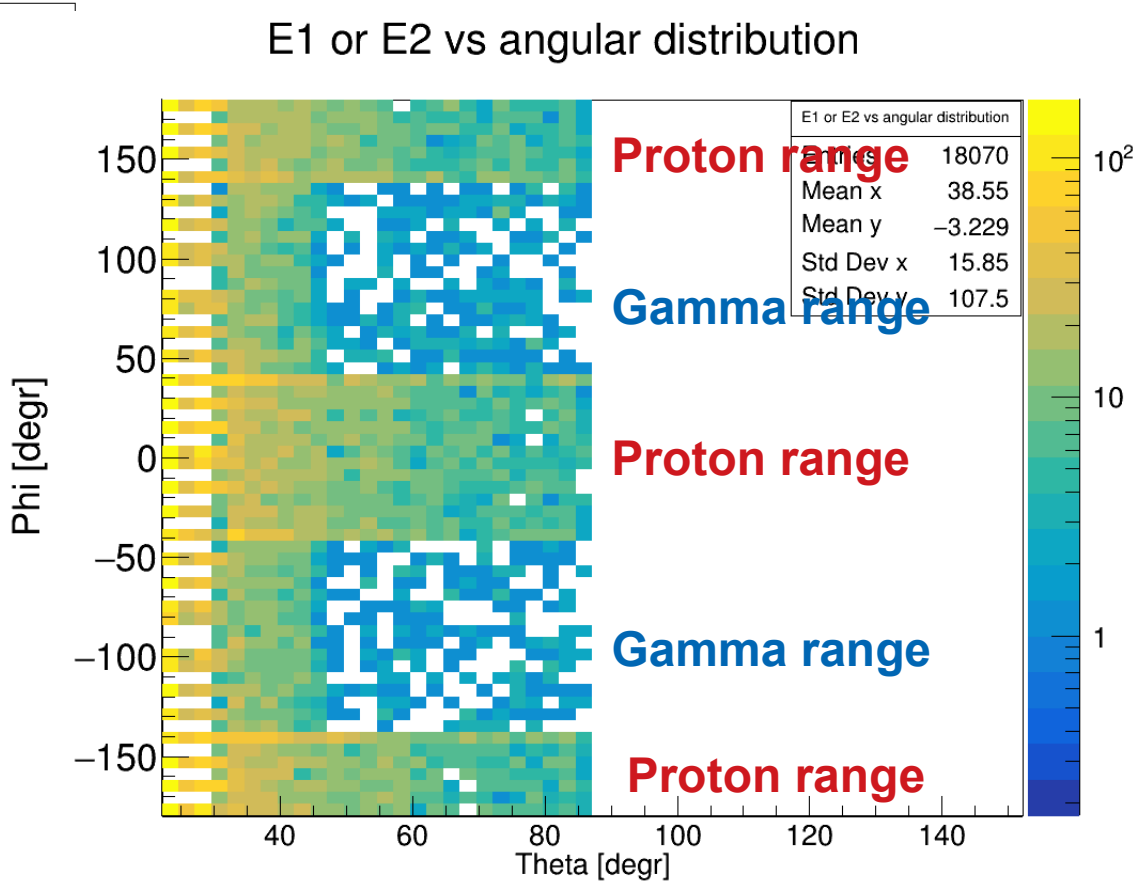
More plots with minimal CALIFA cuts...





And more...


Theta1 + Theta 2 for two hits (> 3
Entries
Mean
Std Dev
Counts
Theta1 + Theta2 [degr]

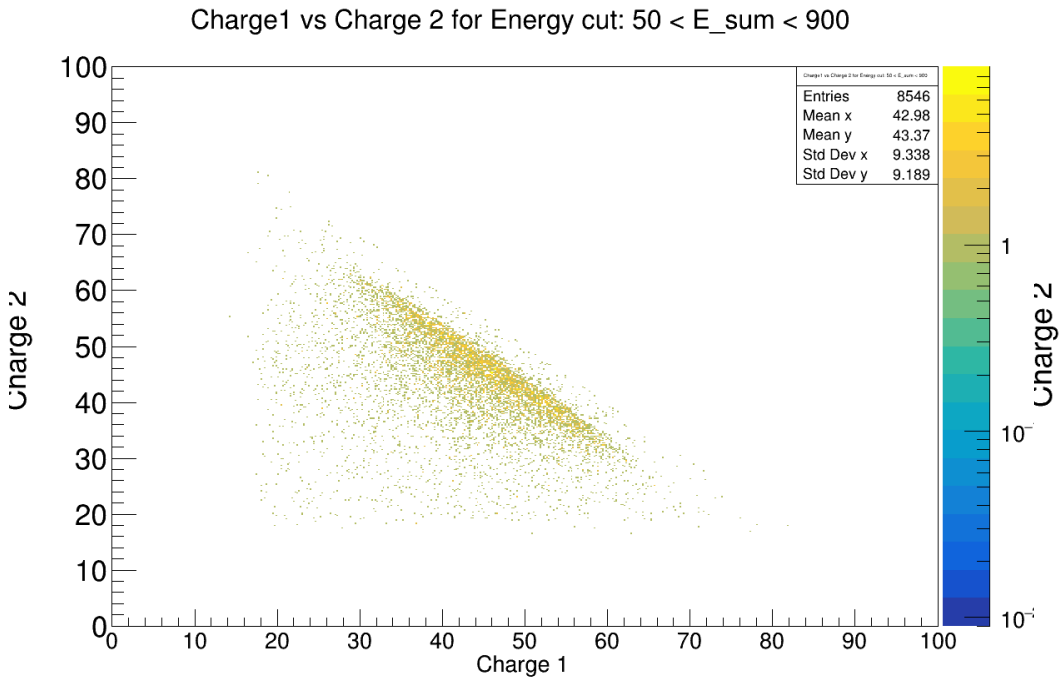

E1 or E2 vs angular distribution
E1 or E2 vs angular distribution
Entries 18070
Mean x 38.55
Mean y −3.229
Std Dev x 15.85
Std Dev y 107.5
Proton range
Gamma range
Proton range
Gamma range
Proton range
Phi [degr]
Theta [degr]

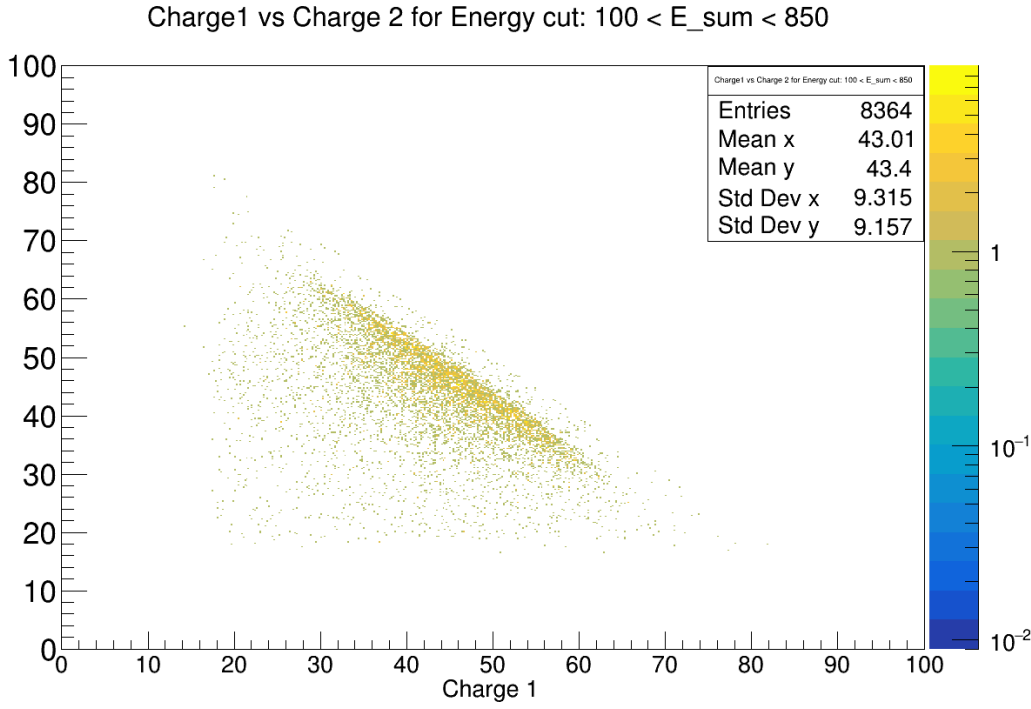
CALIFA cut parameters analysis

Stepwise and independent restriction of parameters Δφ, Δθ (= θ_1+ θ_2), E_sum (= E_1+E_2)

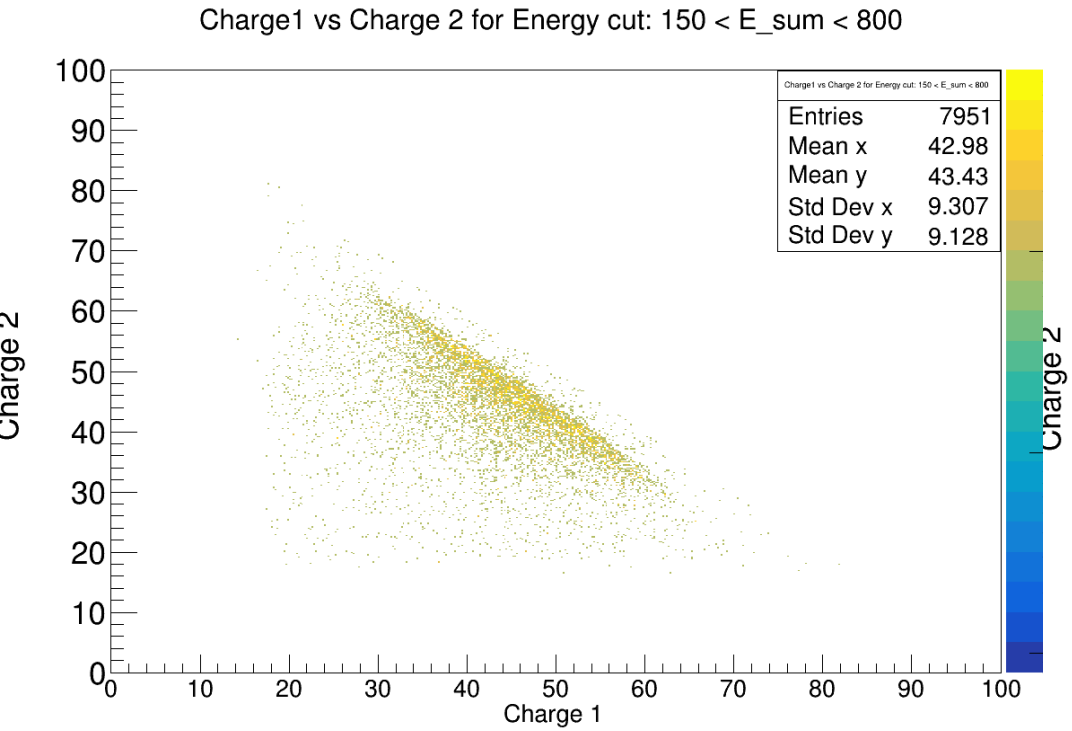
- Δφ: from 180+-30° to 180+-5°
- Δθ: from 80+-10° to 80+-5°
- E_sum: from 50 < E_sum < 900 to 300 < E_sum < 650 MeV

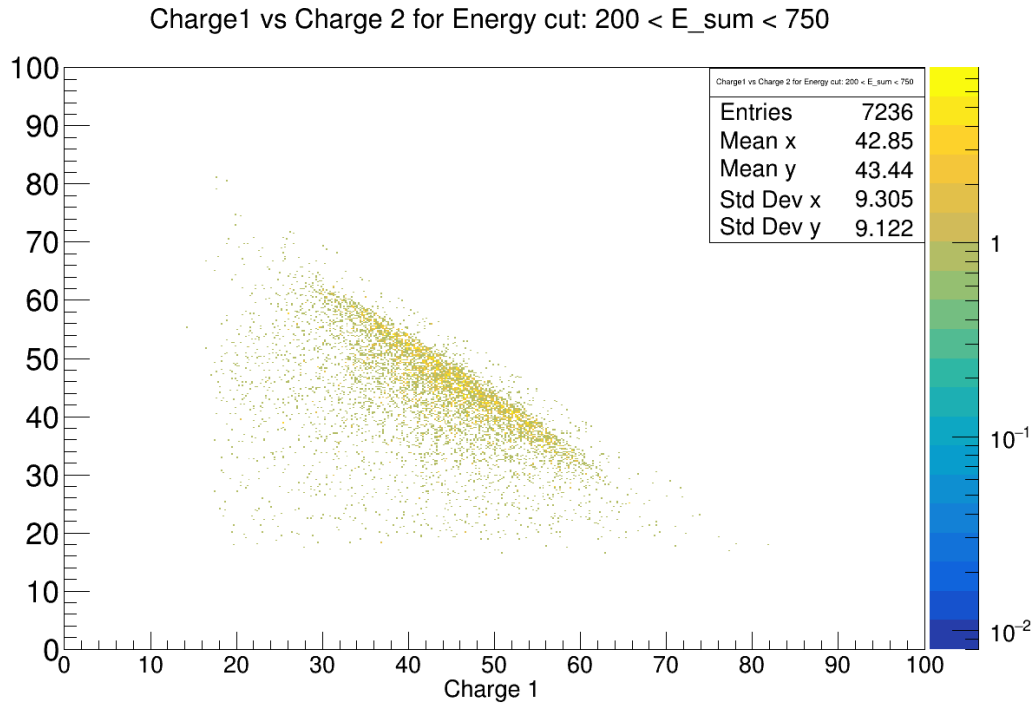
CALIFA E_sum Cuts 1-3



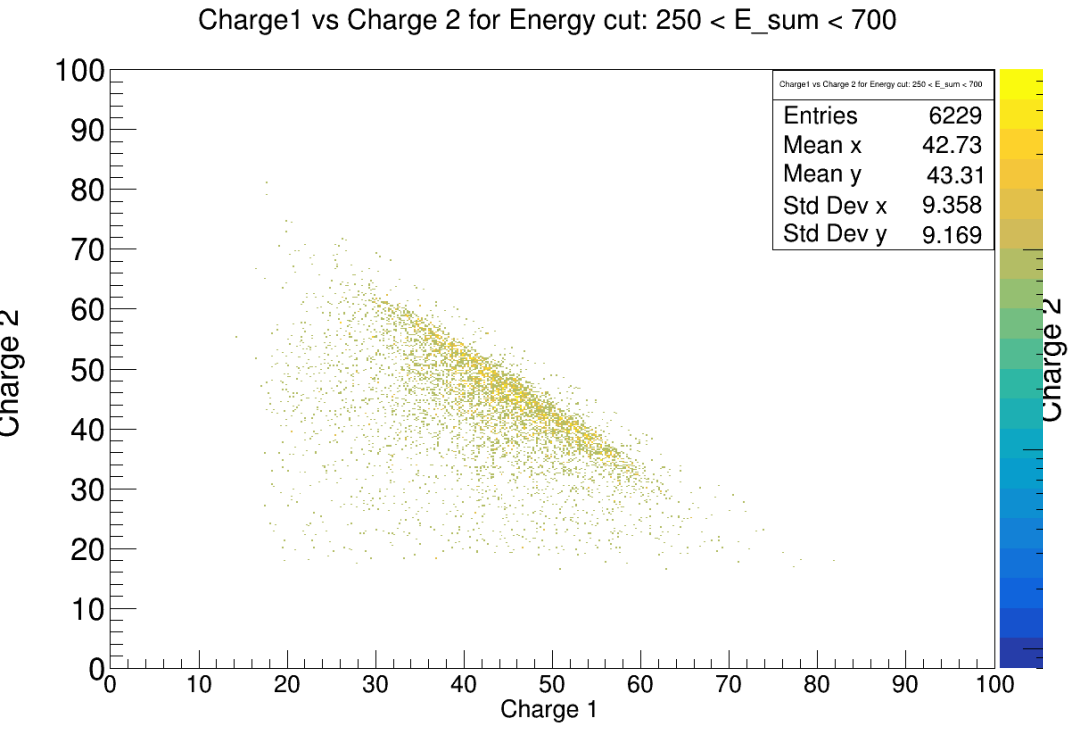


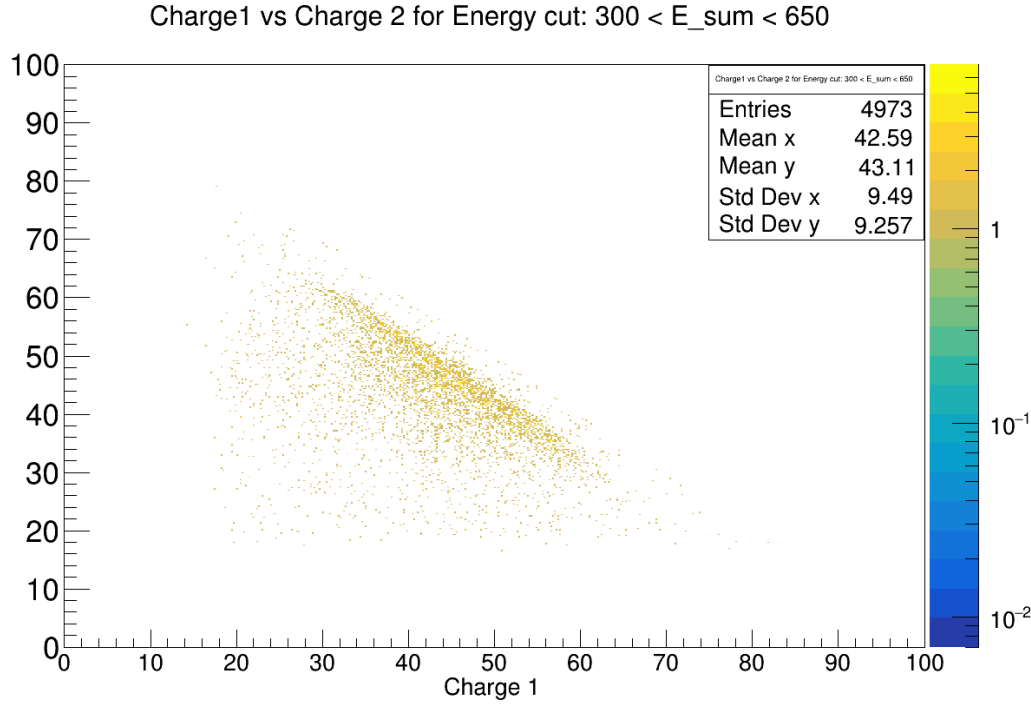
CALIFA E_sum Cuts 2-3



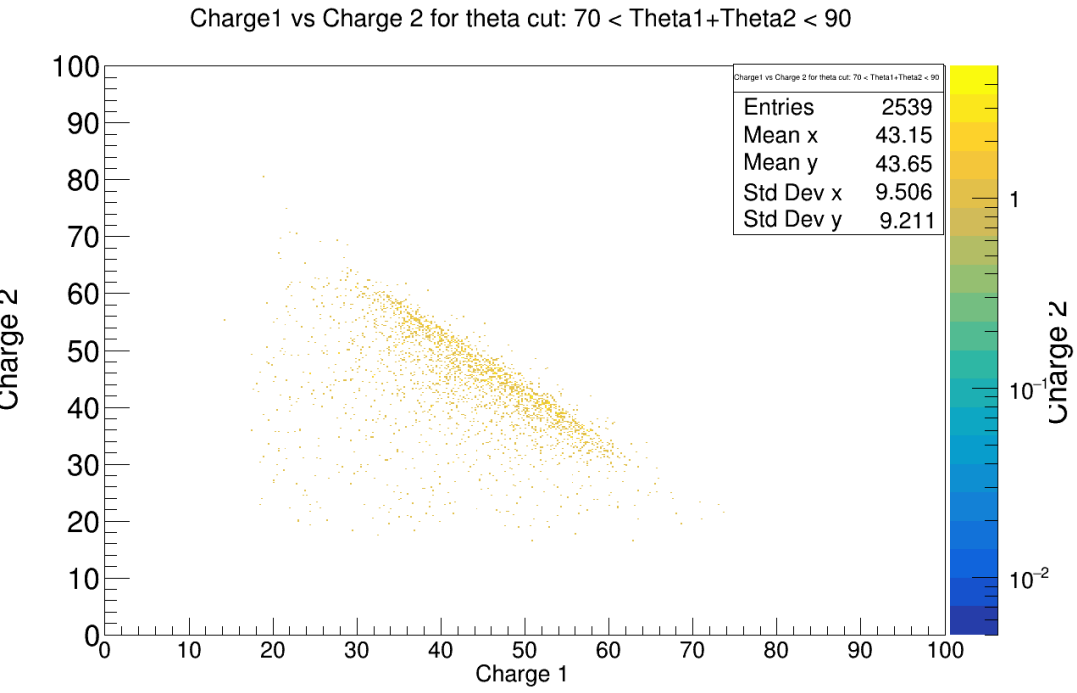


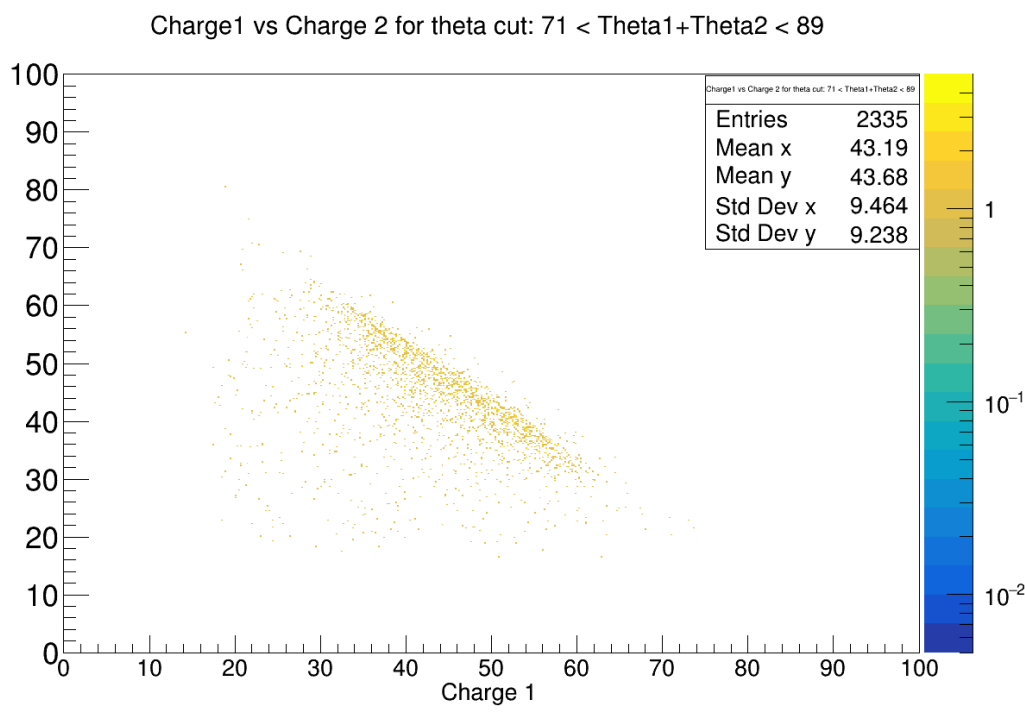
CALIFA E_sum Cuts 3-3



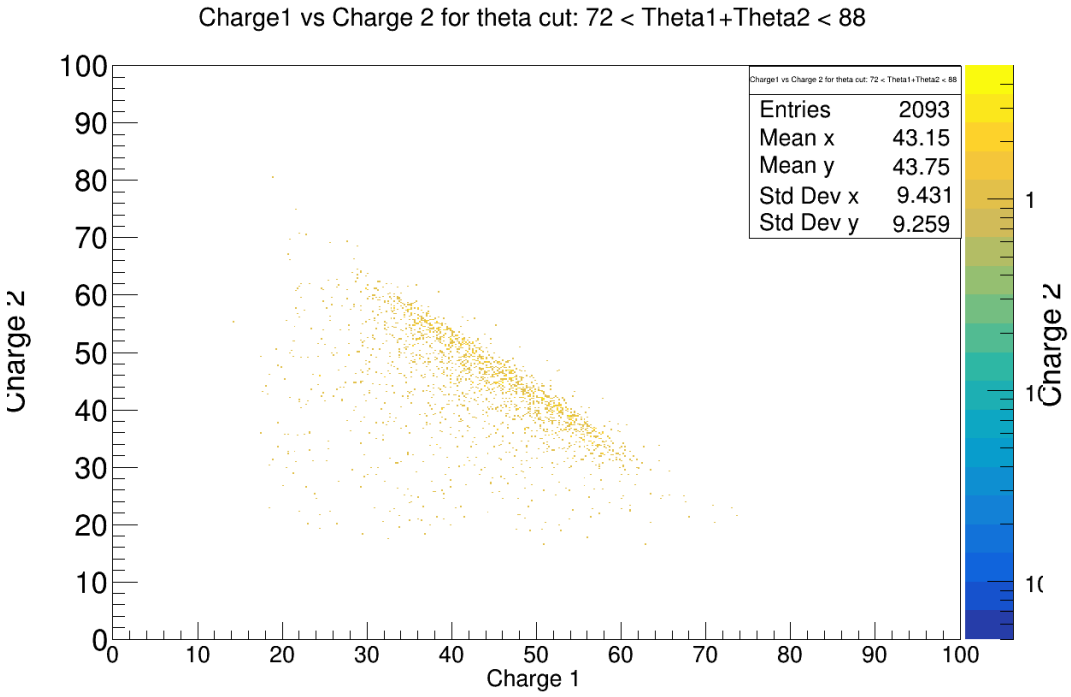


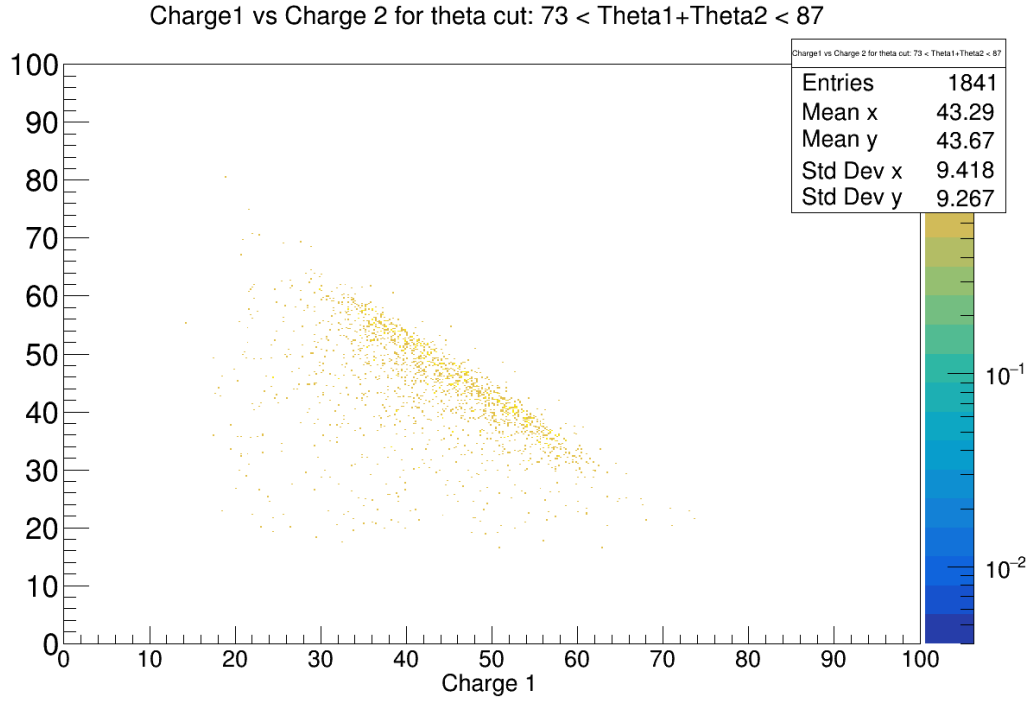
CALIFA Δθ Cuts 1-3



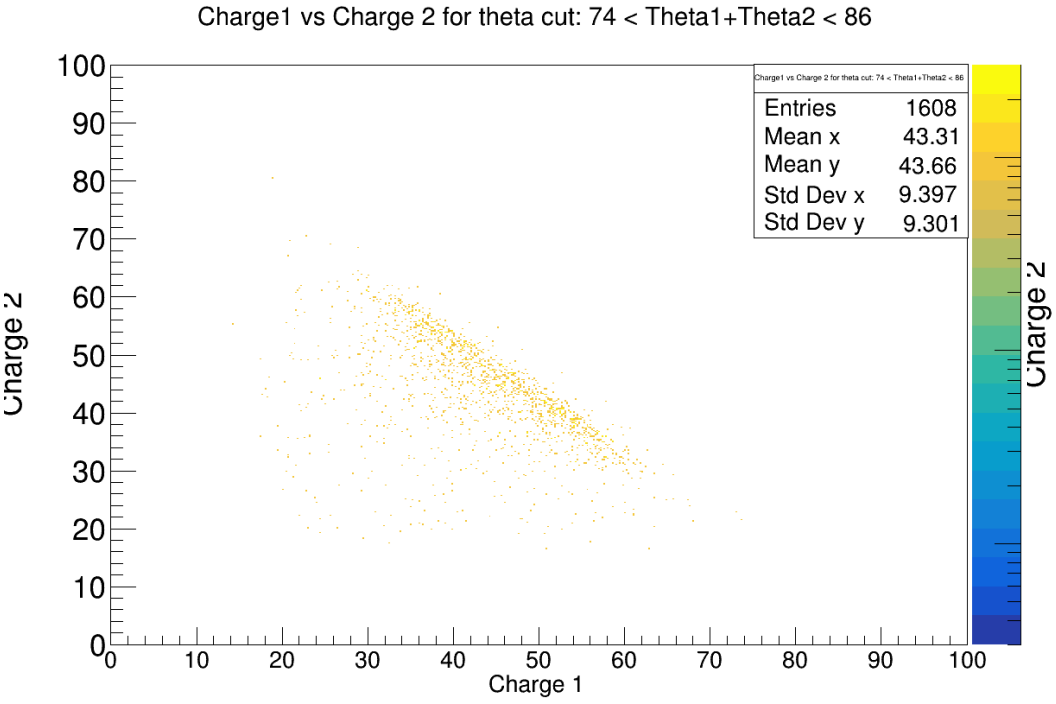


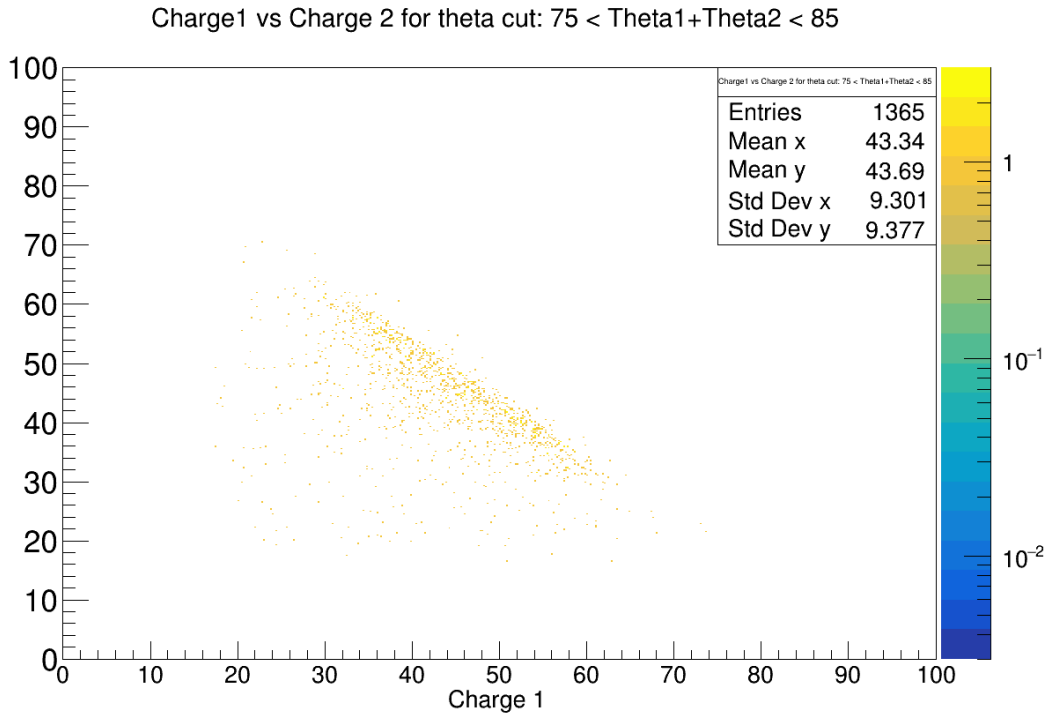
CALIFA Δθ Cuts 2-3



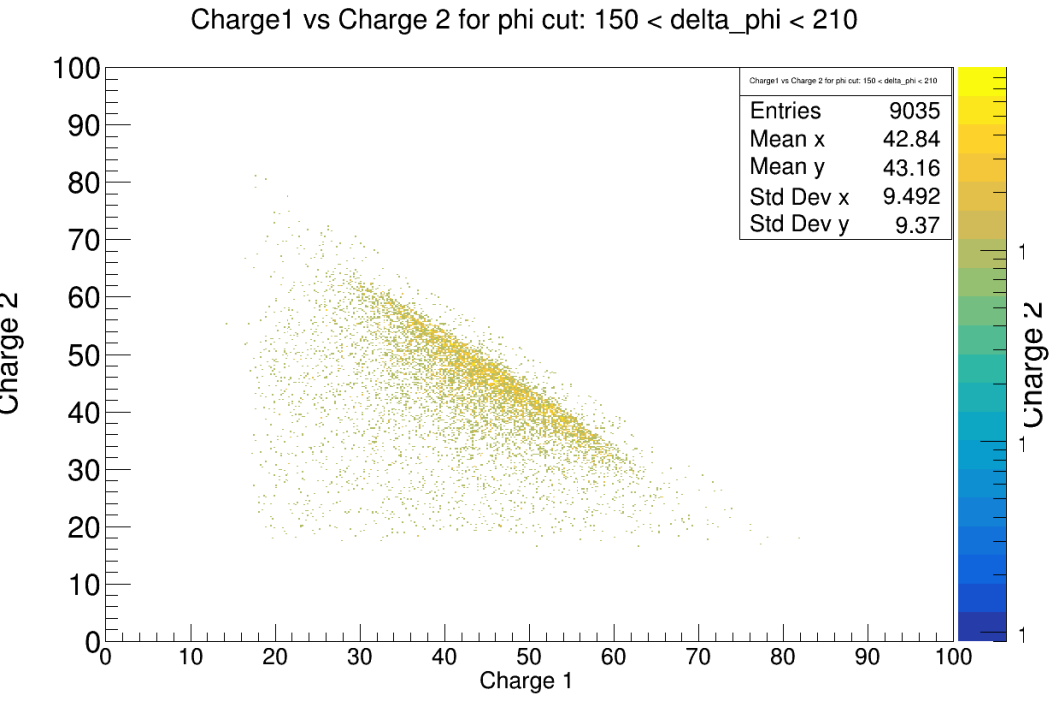


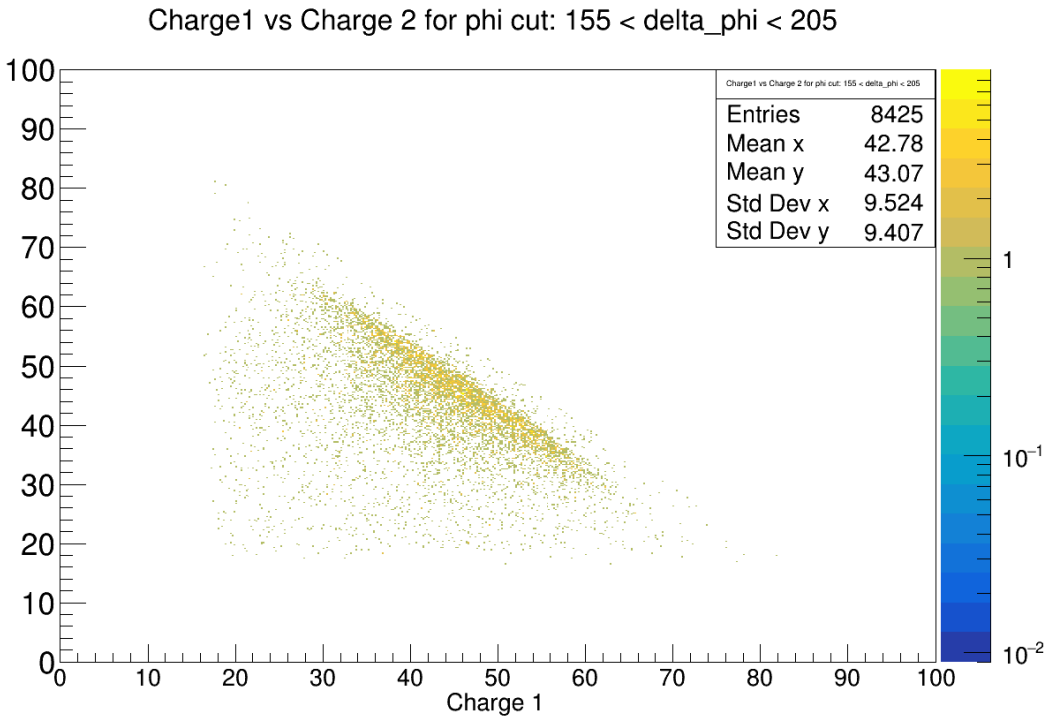
CALIFA Δθ Cuts 3-3



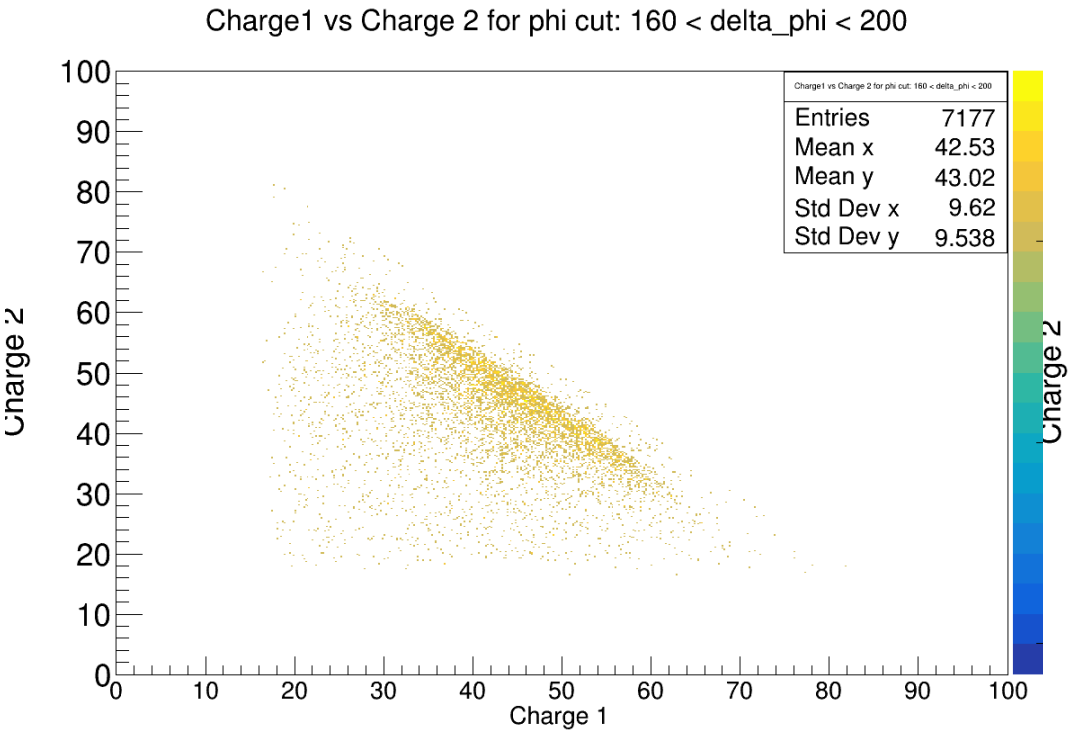


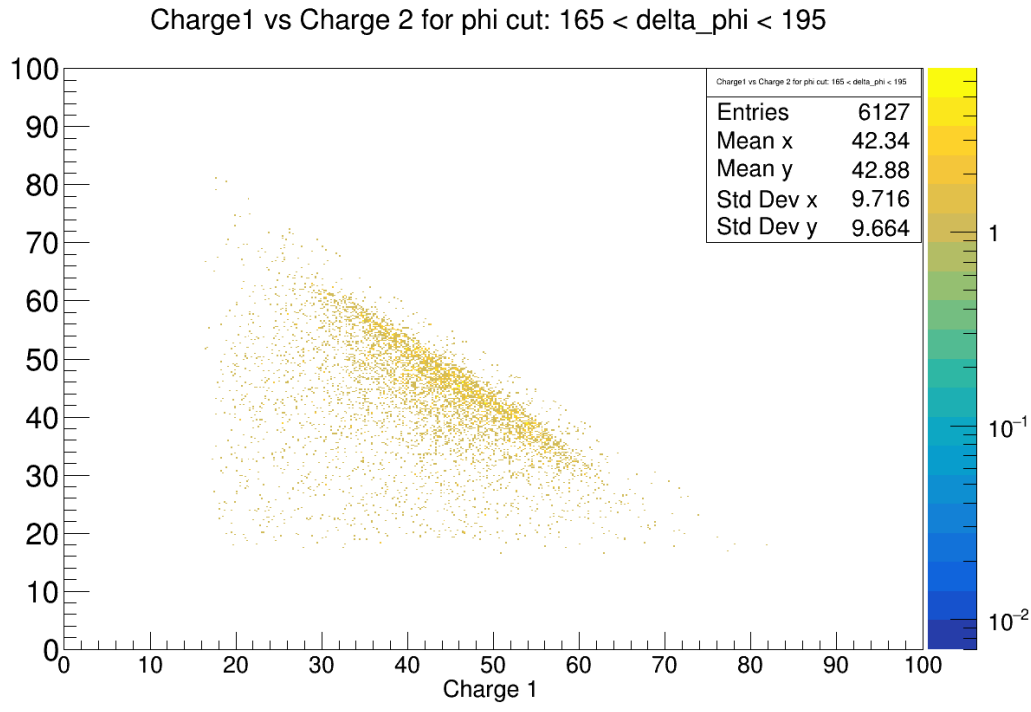
CALIFA Δφ Cuts 1-3



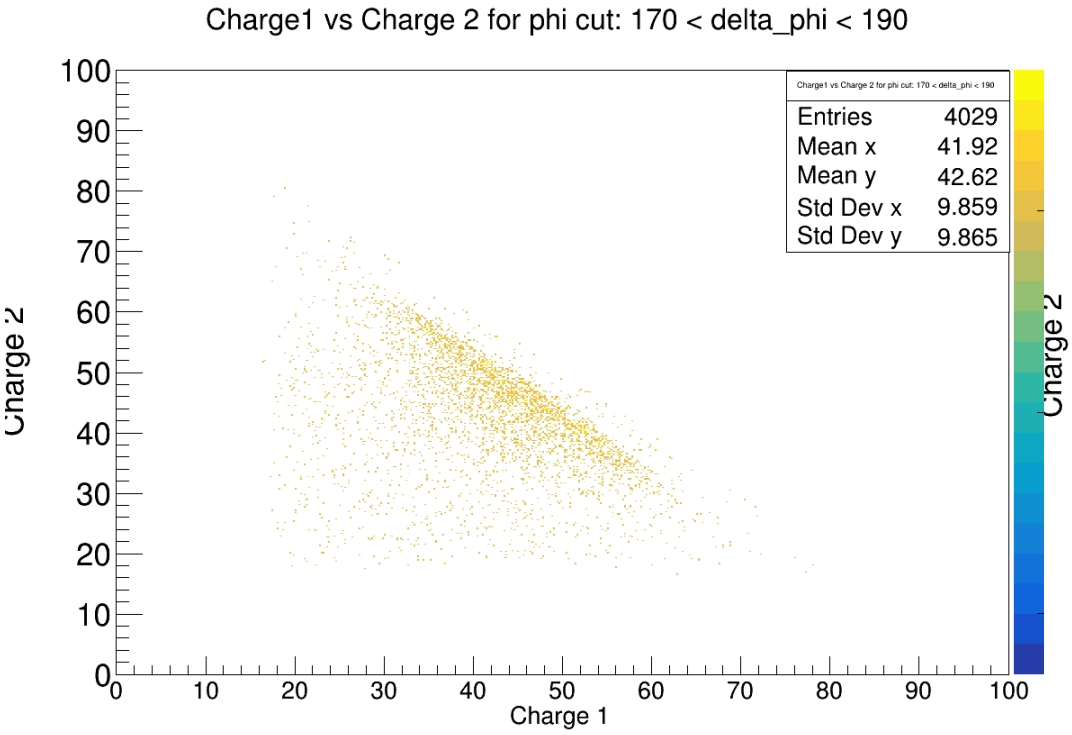


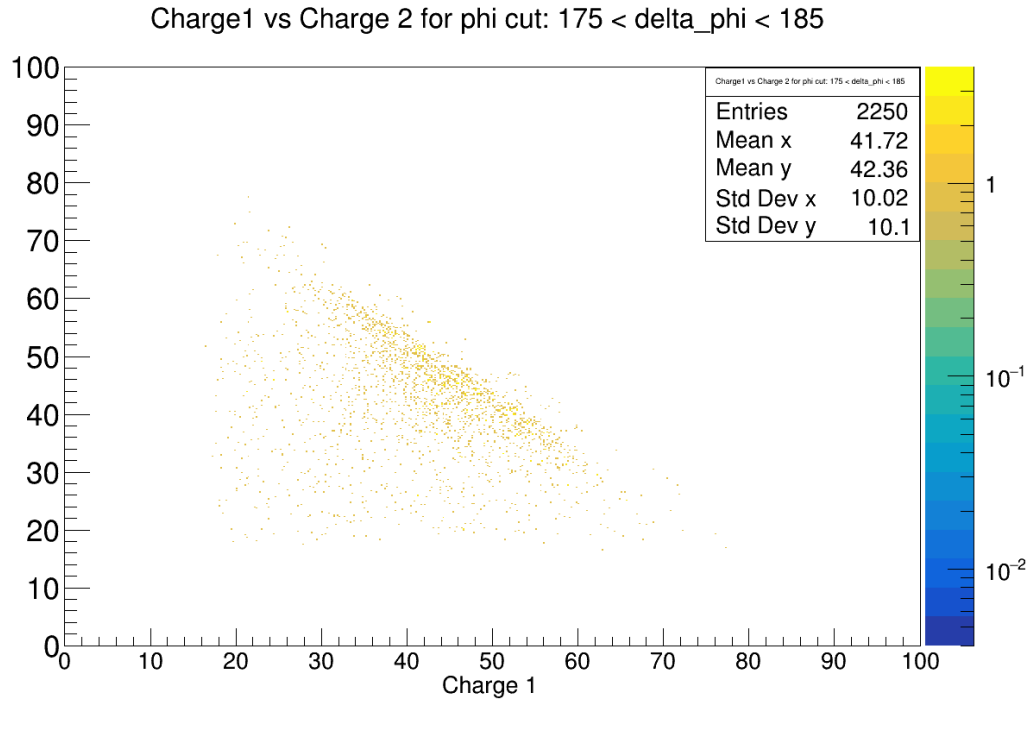
CALIFA Δφ Cuts 2-3



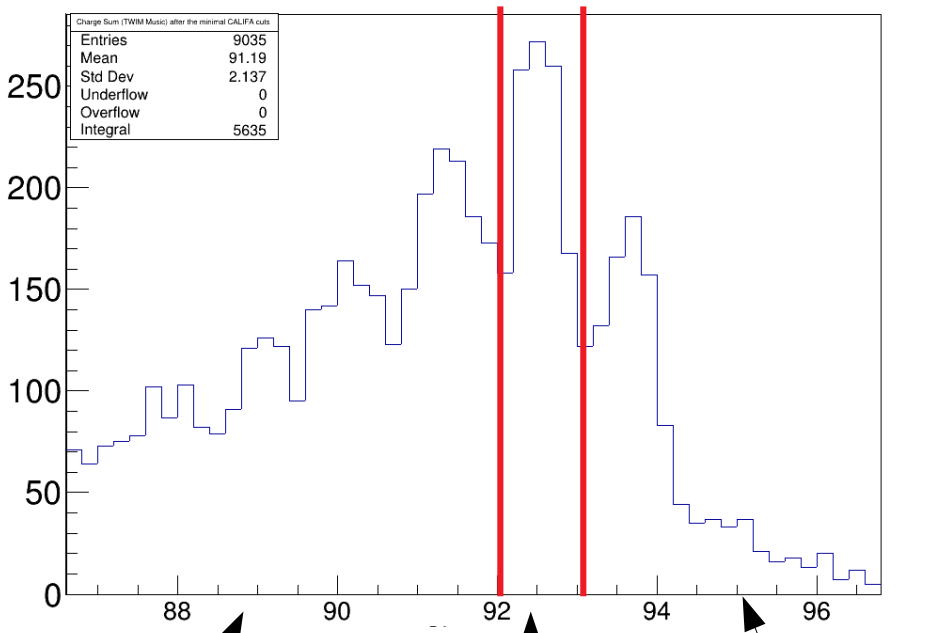


CALIFA Δφ Cuts 3-3





How to quantify



For each cut parameter setting (Δφ, Δθ, E_sum) count events in lower-, correlation and higher region.

Some numbers….

Values for Energy parameter change: ----------

	low	correlation	high
50-900:	6250	1203	1093
100-850:	6113	11831	1070
150-800	5832	11234	995
200-750	5355	10130	871
250-700	4675	8533	701
300-650	3797	6603	516

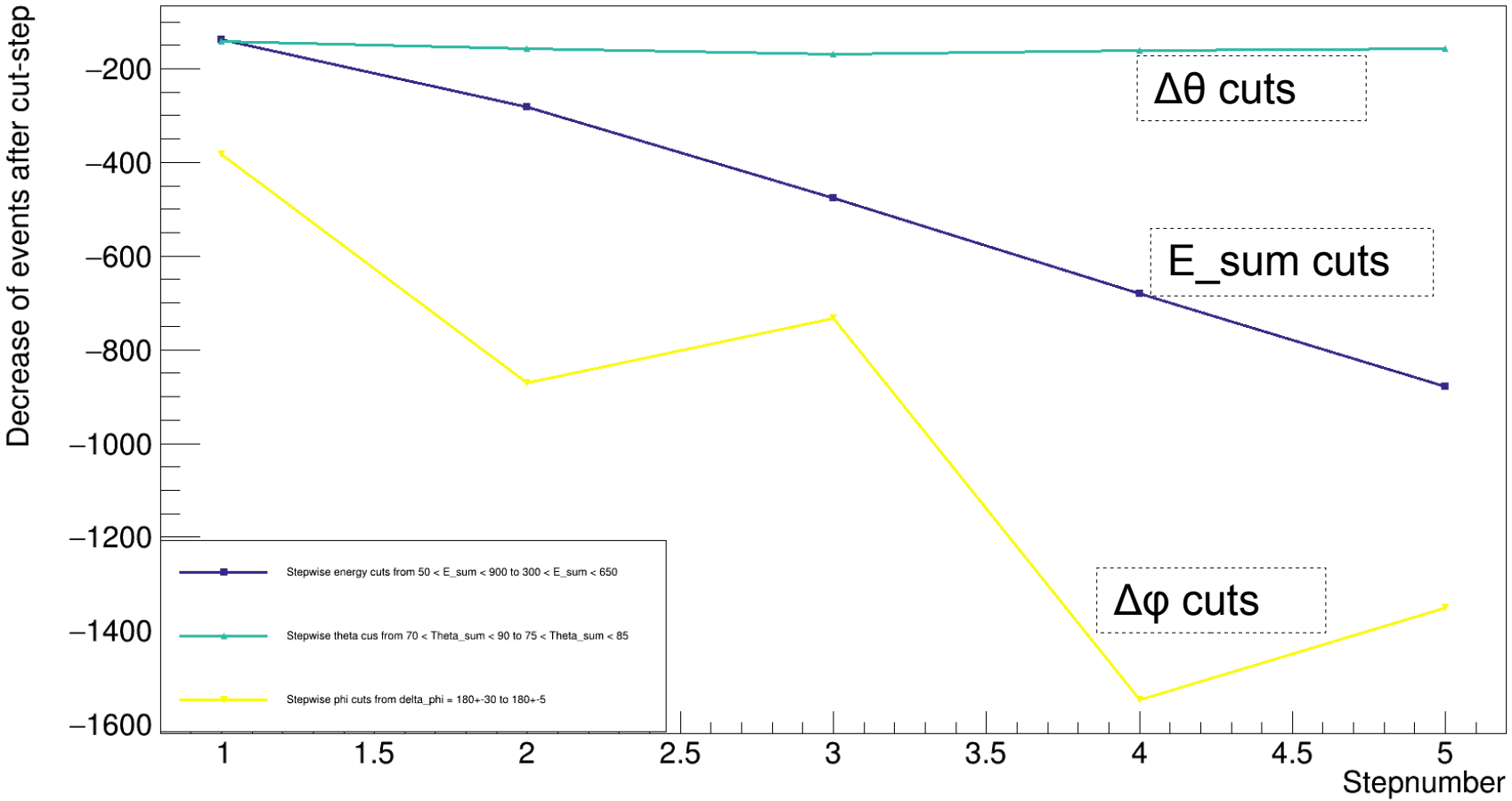
Values for phi parameter change: ----------

	low	correlation	high
150-210:	6634	1238	1163
155-205:	6251	1119	1055
160-200:	5380	906	891
165-195:	4648	742	737
170-190:	3100	451	478
175-185:	1749	248	253

Values for theta parameter change: ----------

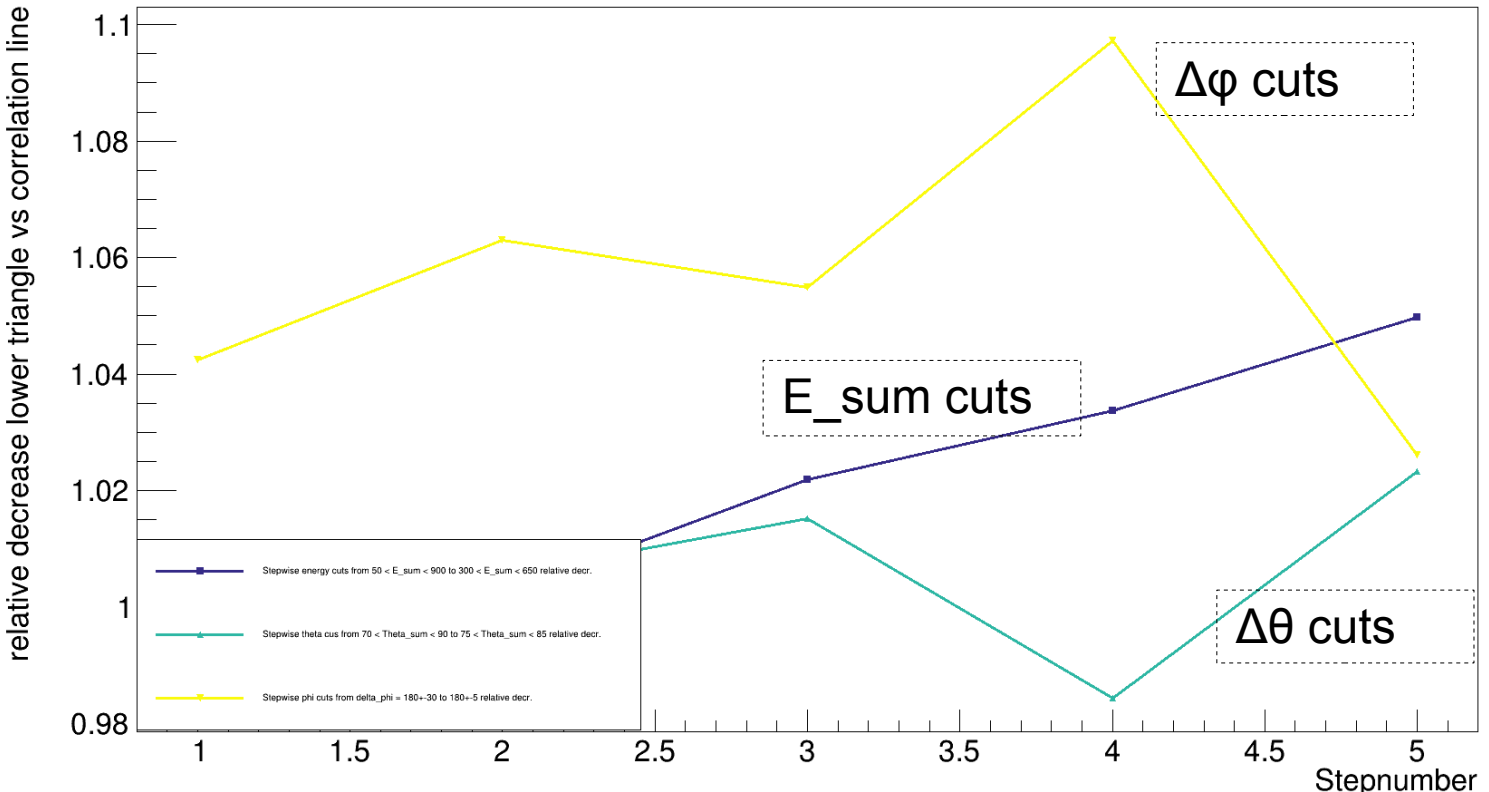
	low	correlation	high
70-90:	1708	415	416
71-89:	1566	378	391
72-88:	1408	338	347
73-87:	1239	293	309
74-86:	1078	259	271
75-85:	920	216	229

Plotting the decrease of evens from one cut step to next in low region



Relative decrease between lower- and correlation line

On y-axis:
(#events_low[step+1]/#events_low[step]) / (#events_corr[step+1]/#events_corr[step])



I loose more events in the correlation region than in the low region for all cuts!

2Dos

- Use TWIM calibration file from 202103 (I used the one from:

  /u/land/r3broot/202106_testing/R3BRoot_20210726/sofia/macros/s455Up2p/parameters/CalibParam.par)