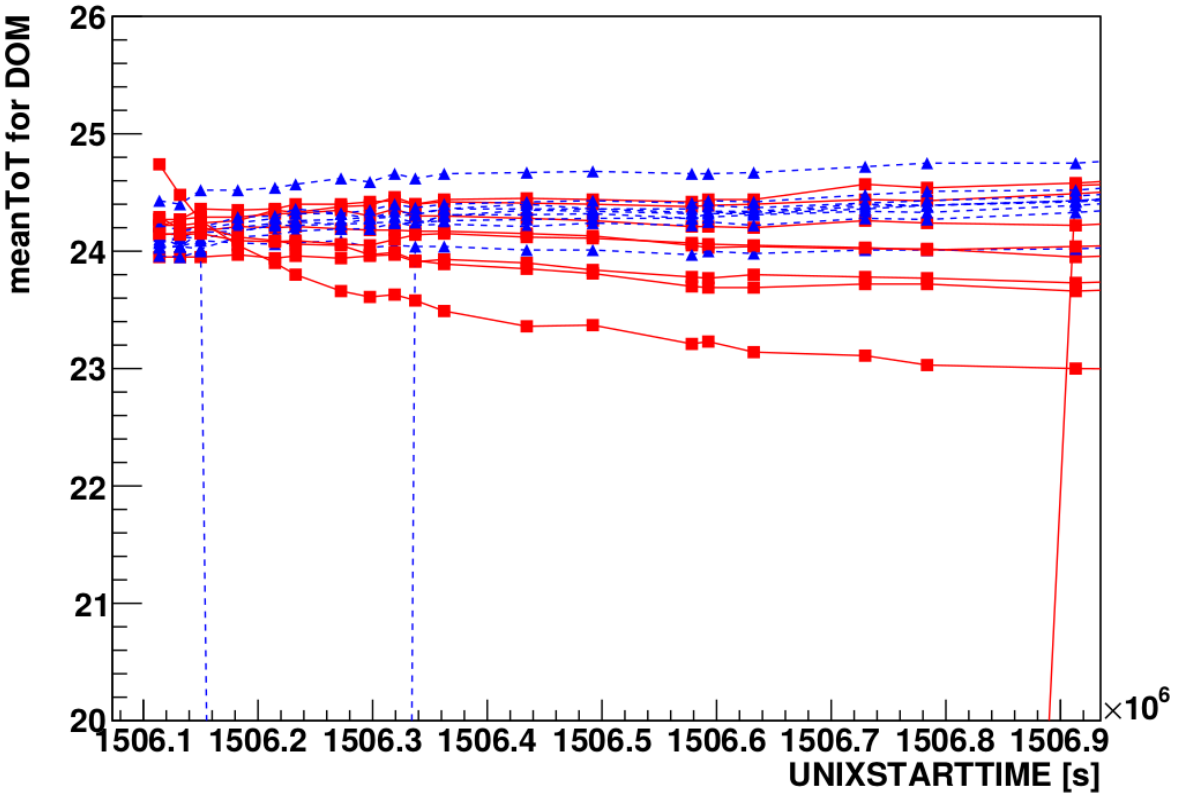
Strange ToT decreasing investigation

R.Mele
Università degli Studi di Napoli Federico II, INFN Napoli

Workshop on PMT handling, storage, calibration and analysis,Napoli, 16th January 2017

Introduction

- Strange behavior of the ToT. It seems to decrease over time.
- Decrease rate differences between the DOMs of Catania and those of Napoli.
- Decrease rate differences between “old” and “new” DOMs.

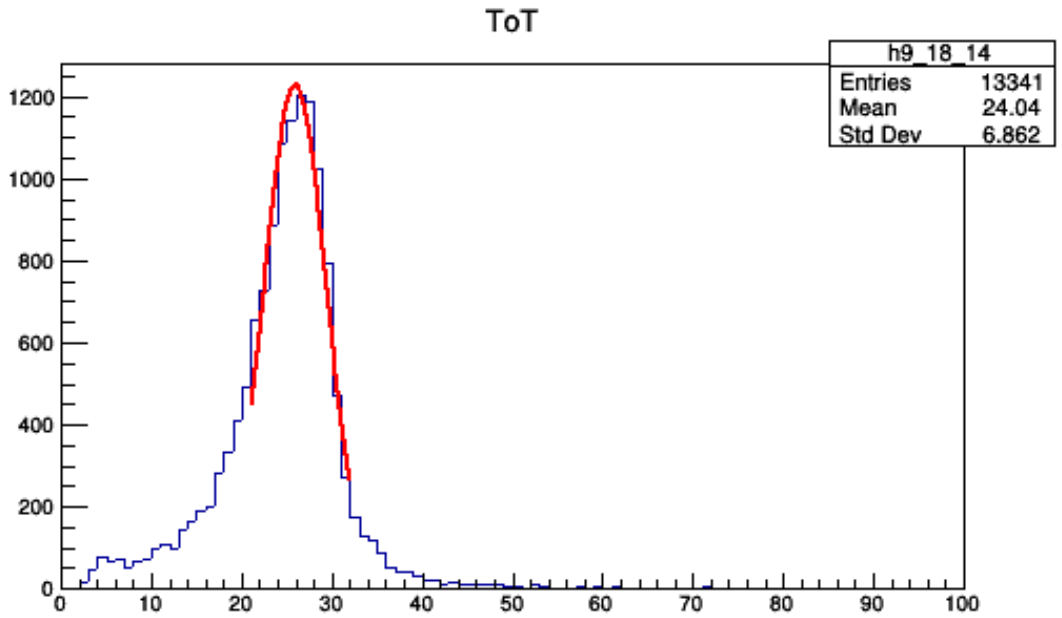


Method

Run analyzed:

2318,2323,2339,2351,2357,2365,2370,2382,2400,2423,2427,2440,2445,2460,2493,2525,2558 .
From data 2318 to data 2558

ToT distribution for each PMT of each DOM and RUN



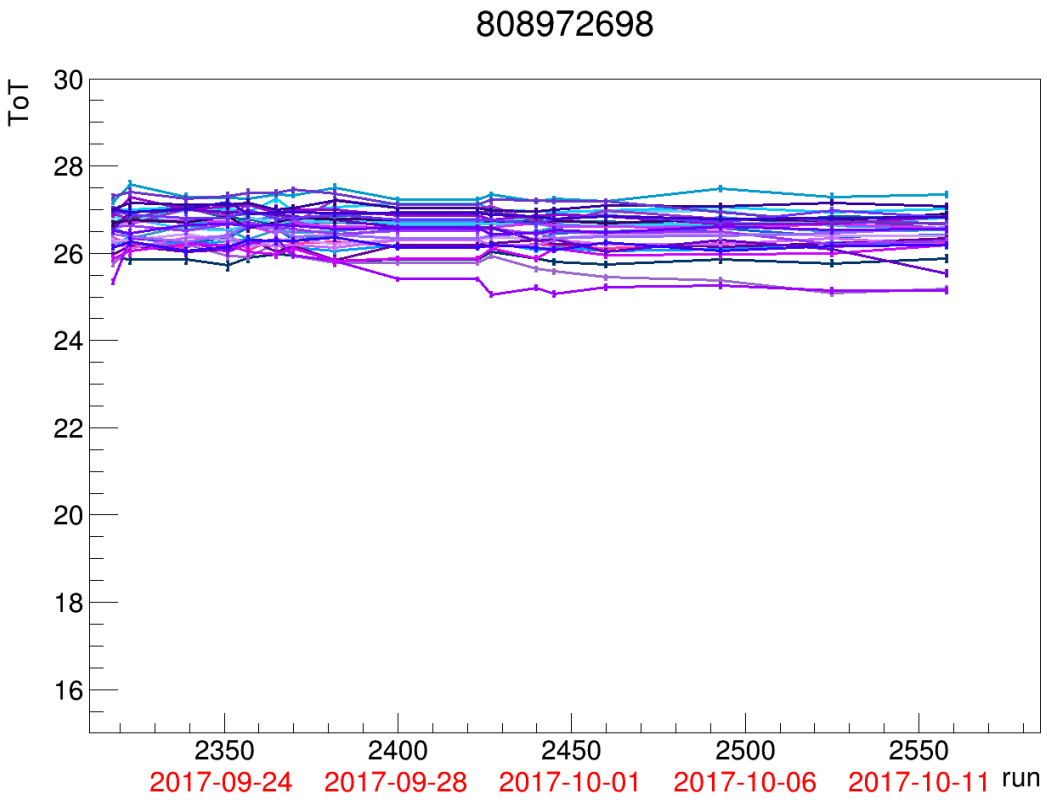
Research of the max position

Gaussian fit around the peak (maxbin-3, maxbin+3)

→ Estimation of ToT mean for each PMT of each DOM and RUN

→ Analysis for each DOM and PMT

DOM 1

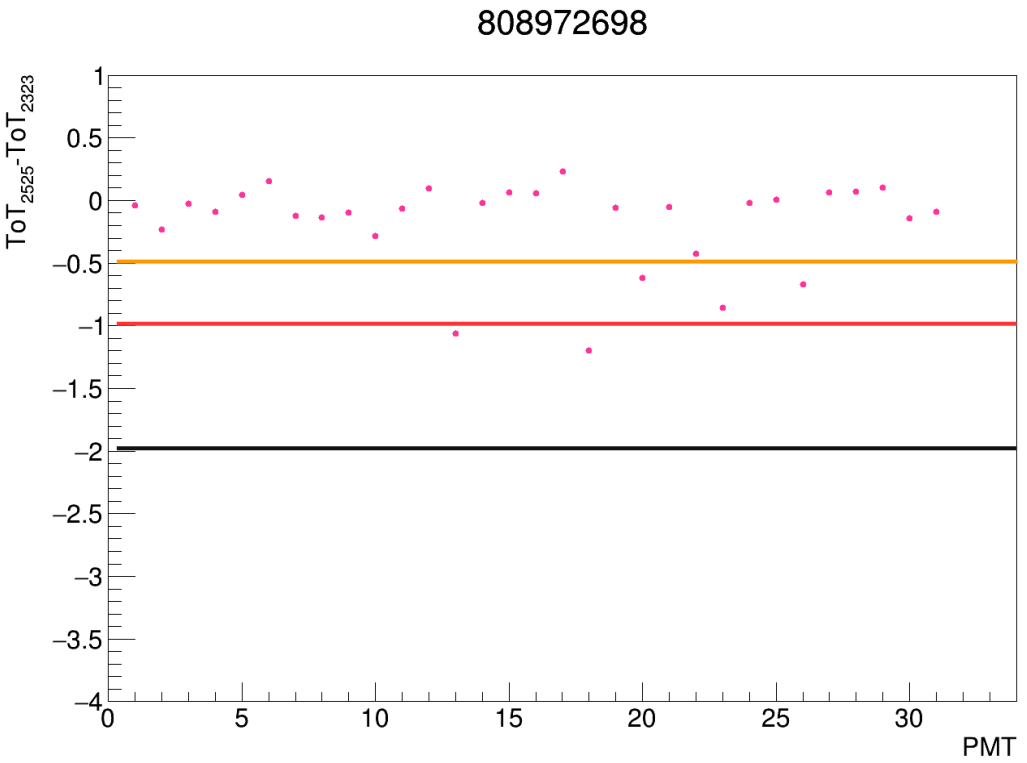


Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

Red PMT: -2<ΔToT<=-1

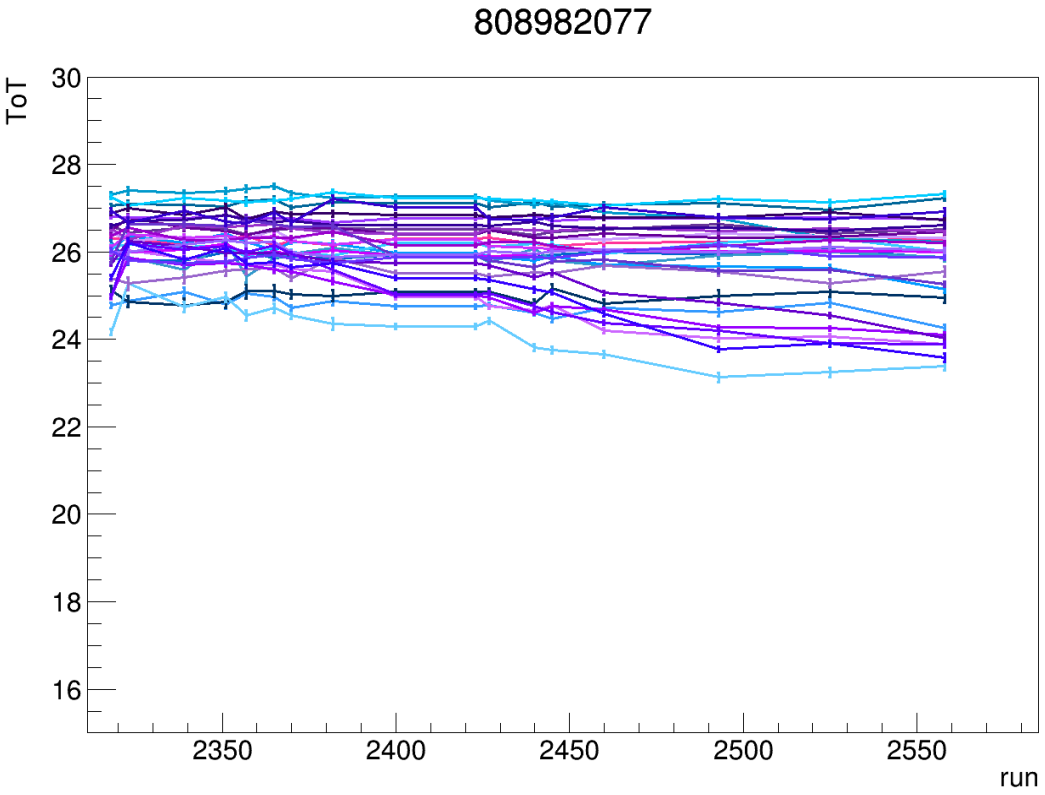
Black PMT: ΔToT<=-2



3 Orange PMT:
PMT20,PMT23,PMT26

2 Red PMT:
PMT13 and PMT18

DOM 2



Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

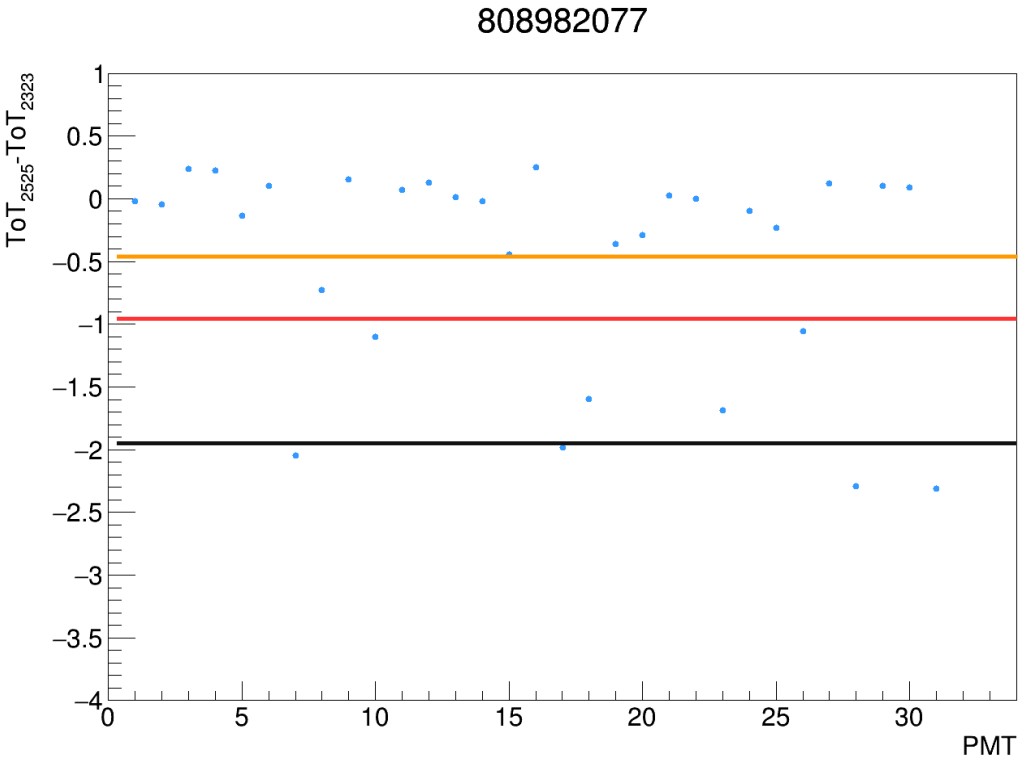
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

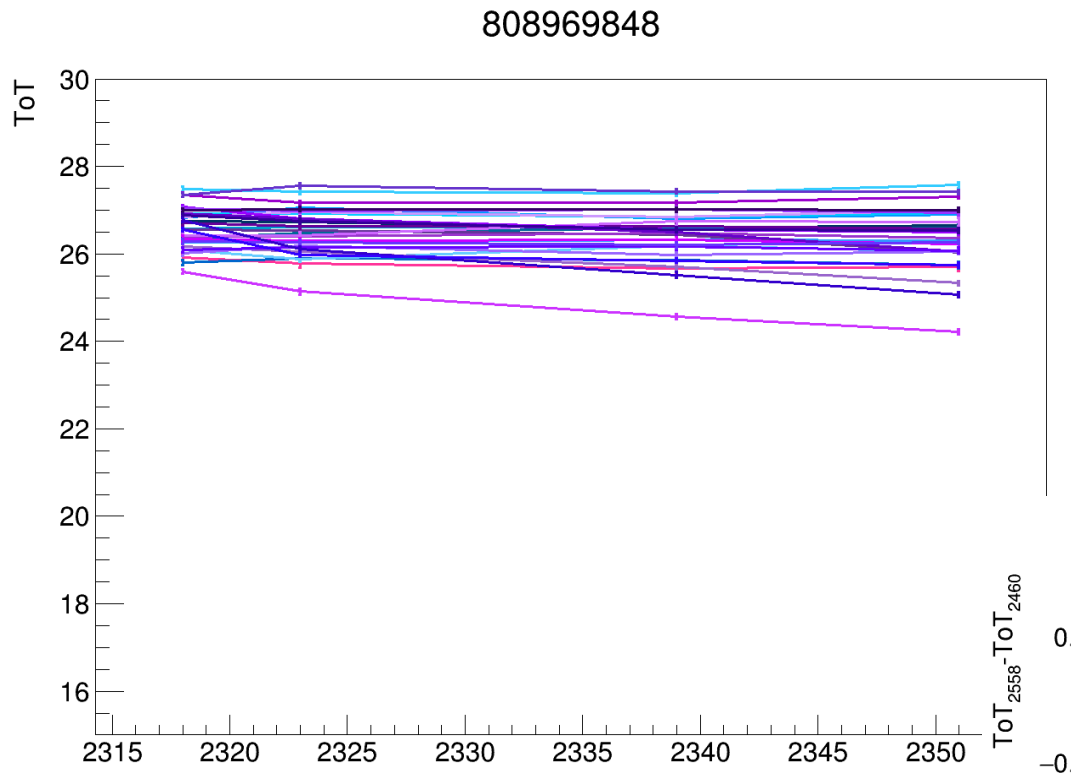
1 Orange PMT:
PMT8,

5 Red PMT:
PMT10 , PMT17,PMT18,
PMT23,PMT26

3 Black PMT:
PMT7 , PMT28,PMT31,



DOM 3



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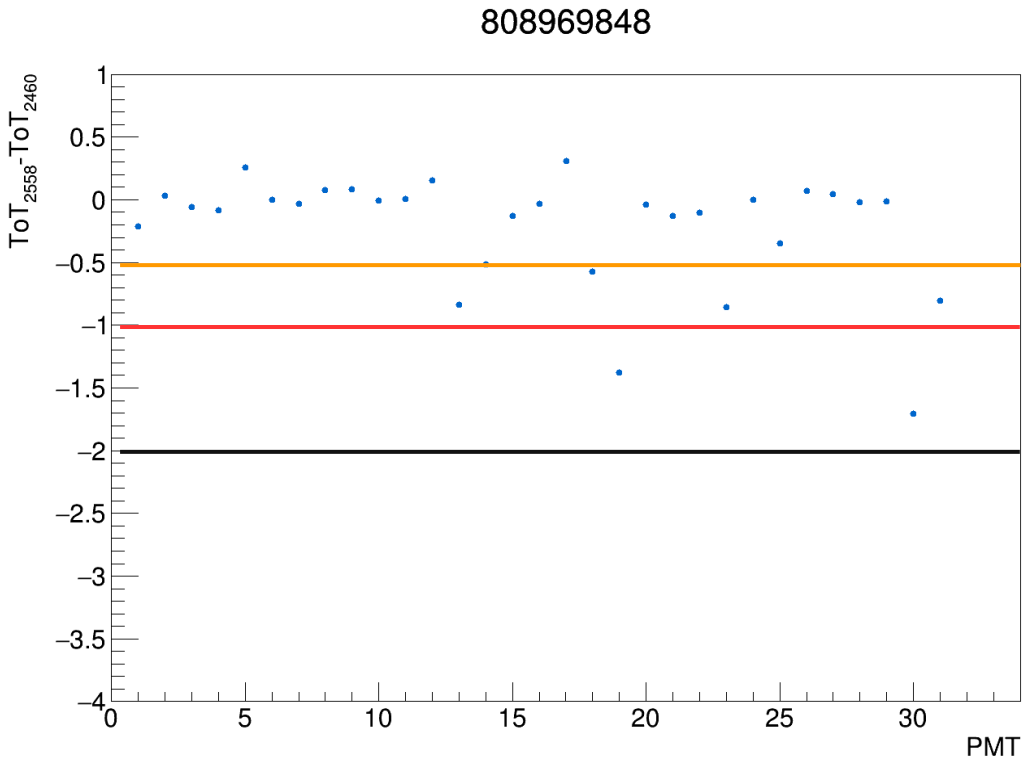
Orange PMT: -1<ΔtoT<=-0.5

Red PMT: -2<ΔToT<=-1

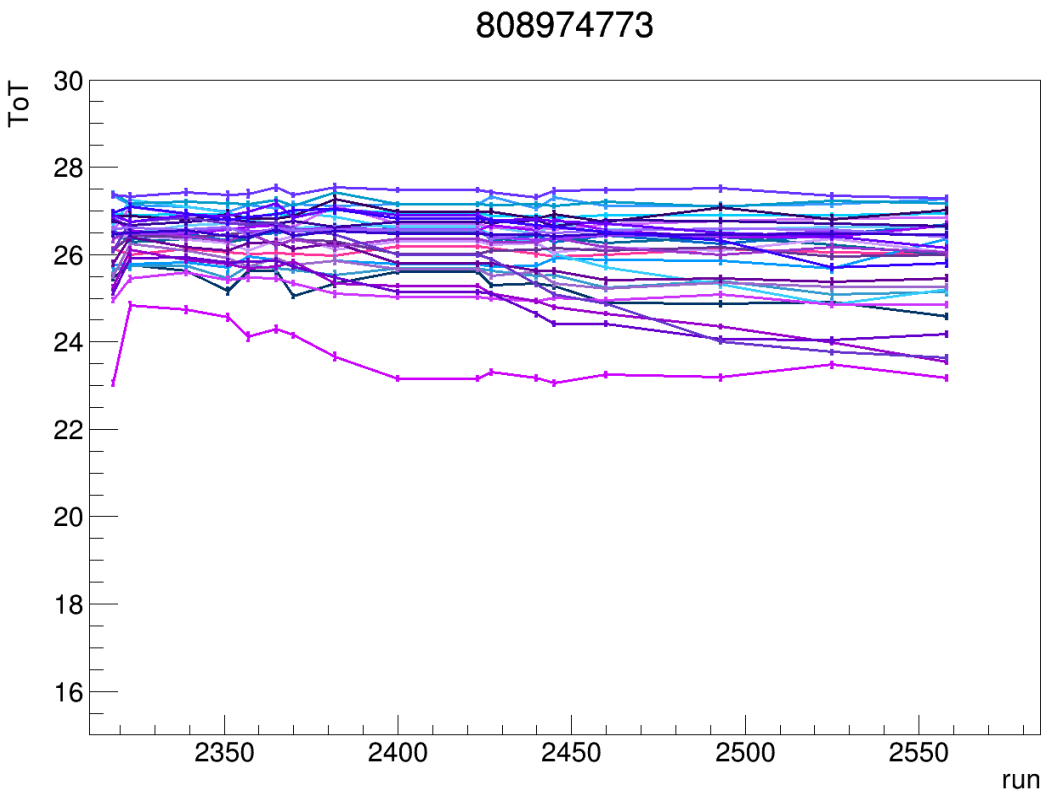
Black PMT: ΔToT<=-2



5 Orange PMT:
PMT13,PMT14,PMT18,
PMT23,PMT31

2 Red PMT:
PMT19 , PMT30

DOM 4



Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

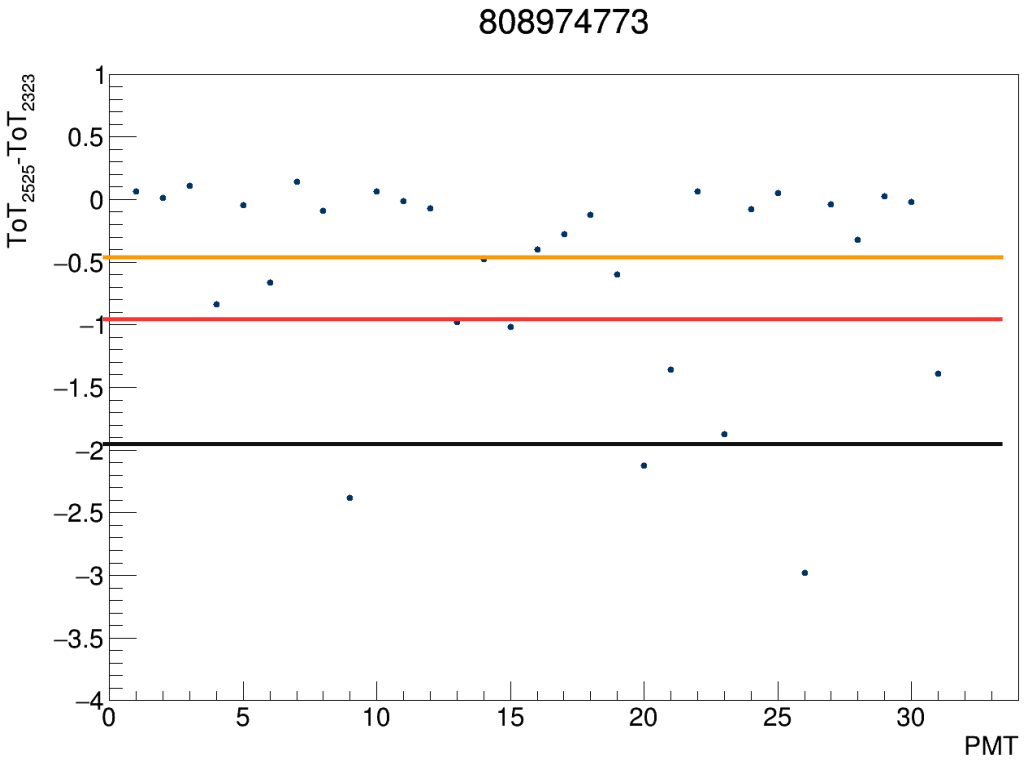
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

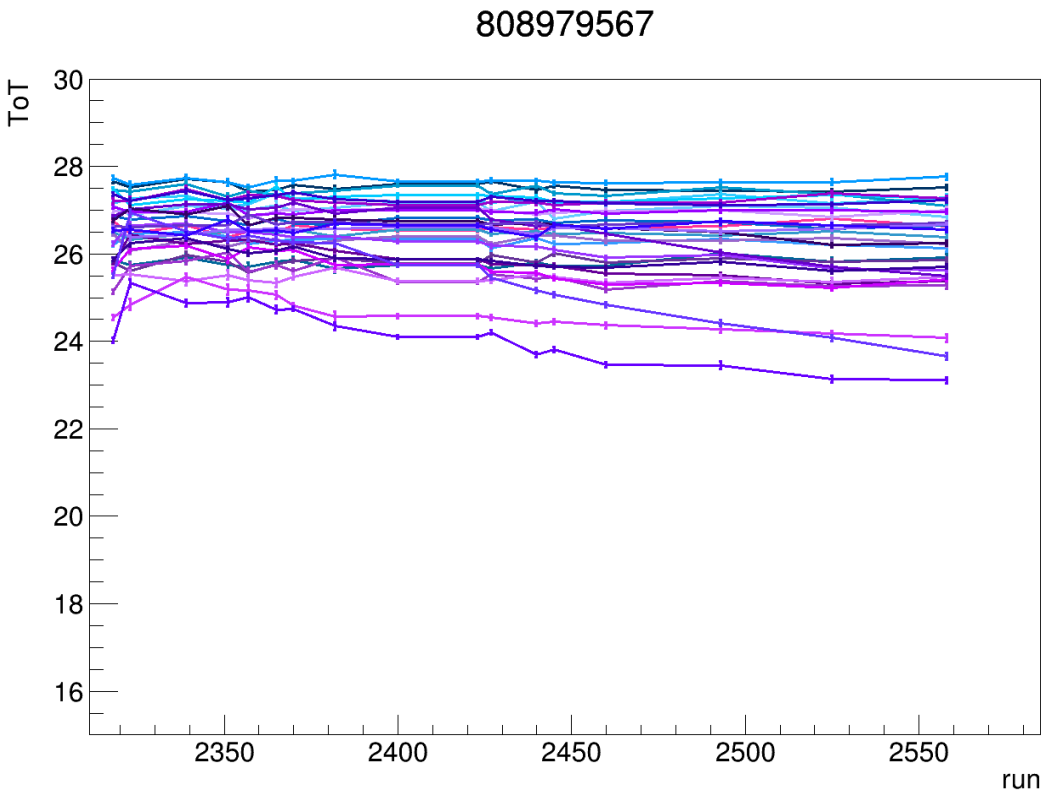
4 Orange PMT:
PMT4,PMT6,PMT13,
PMT19

4 Red PMT:
PMT15,PMT21,PMT23,
PMT31

3 Black PMT:
PMT9,PMT20,PMT26



DOM 5



Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

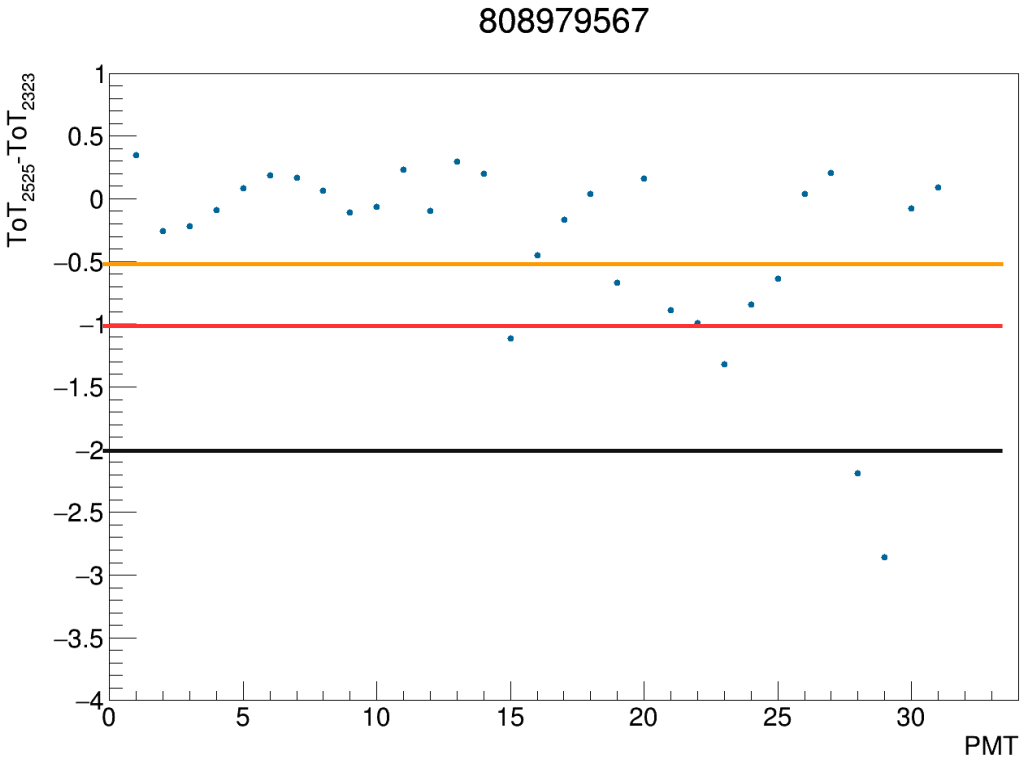
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

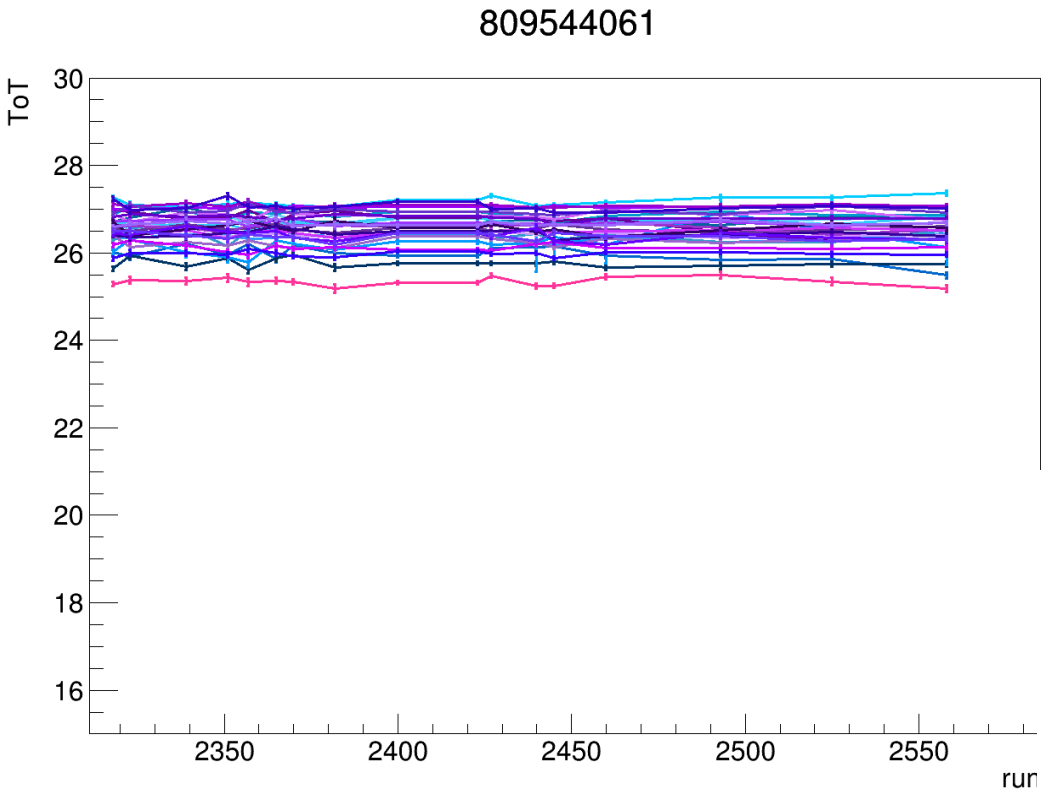
5 Orange PMT:
PMT19,PMT21,PMT22,
PMT24,PMT24,

2 Red PMT:
PMT15,PMT23,

2 Black PMT:
PMT28,PMT29



DOM 6



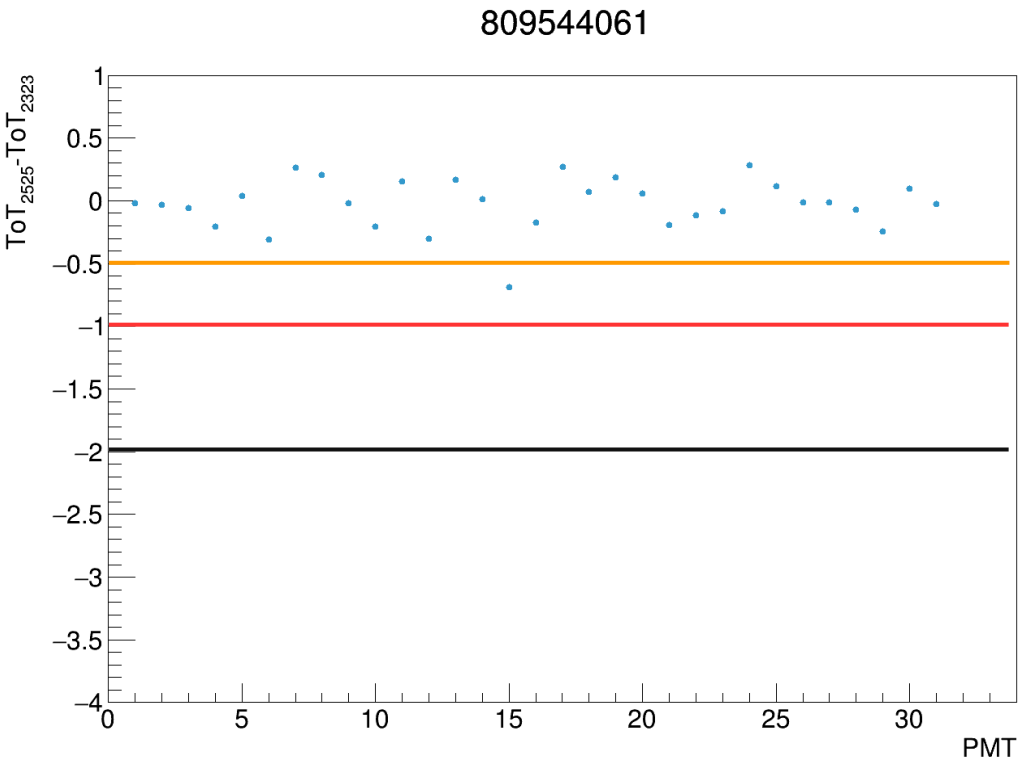
Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

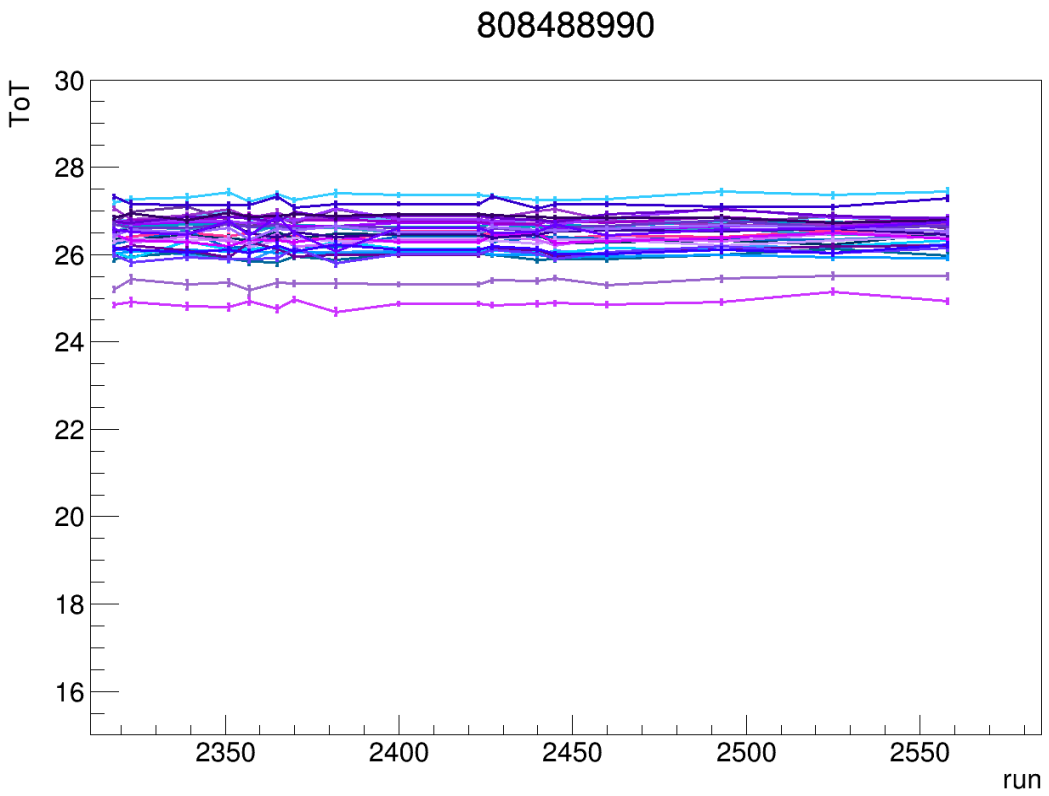
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

1 Orange PMT:
PMT15



DOM 7



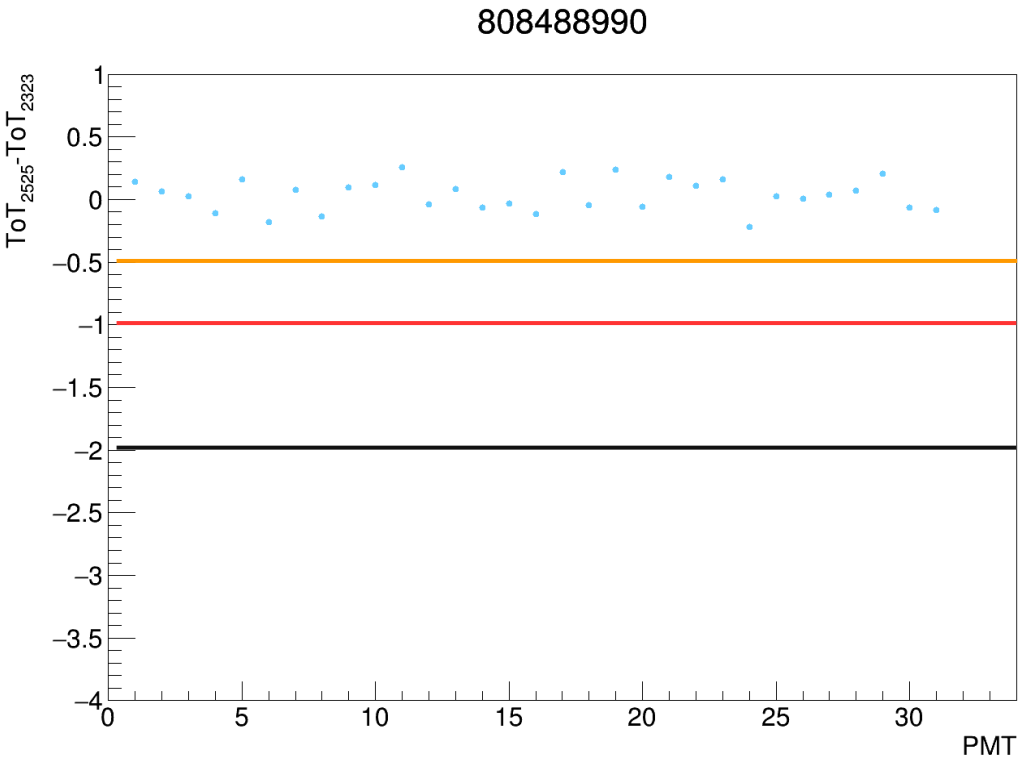
Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

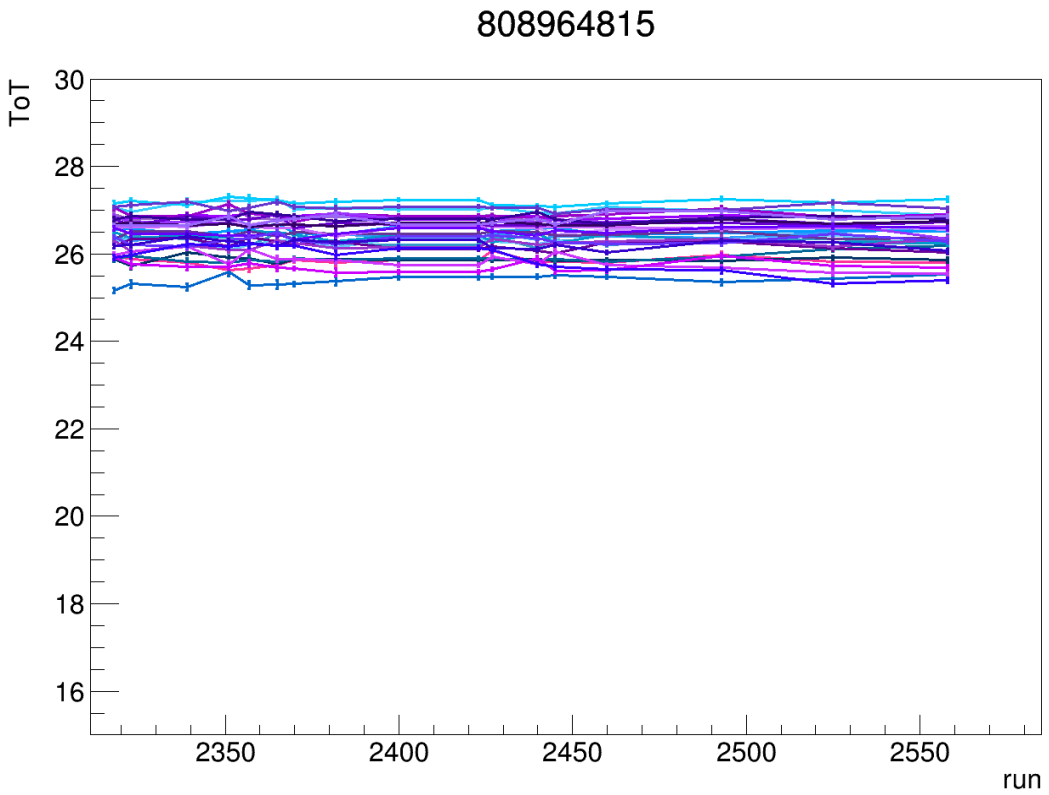
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

ALL GREEN



DOM 8



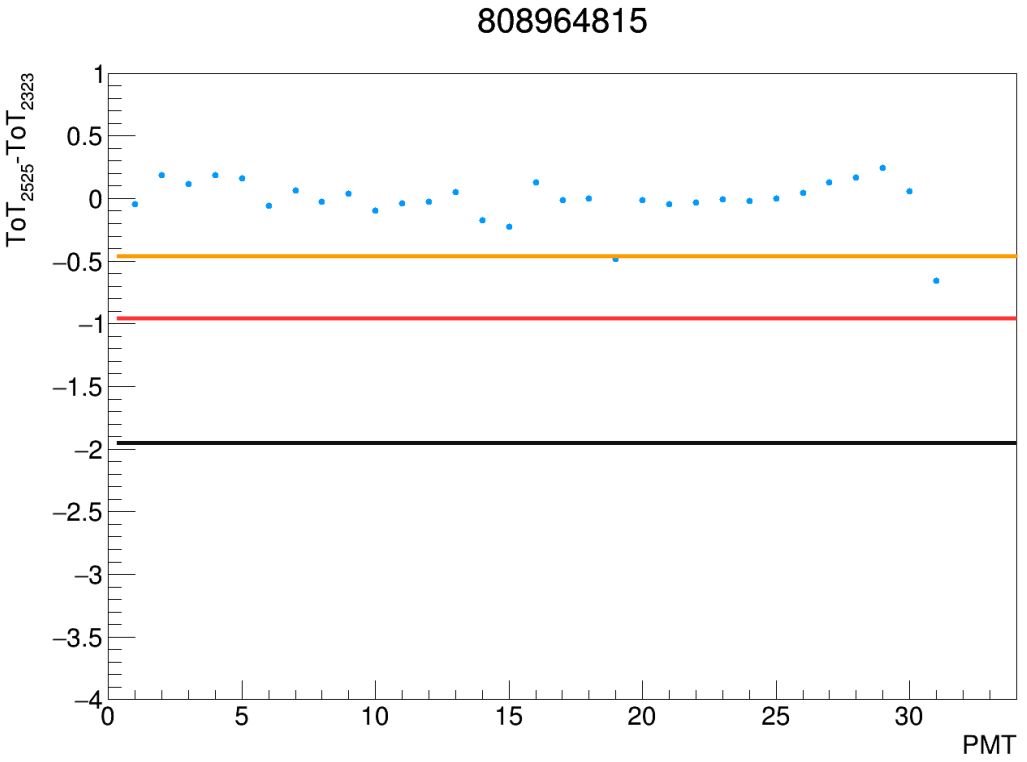
Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

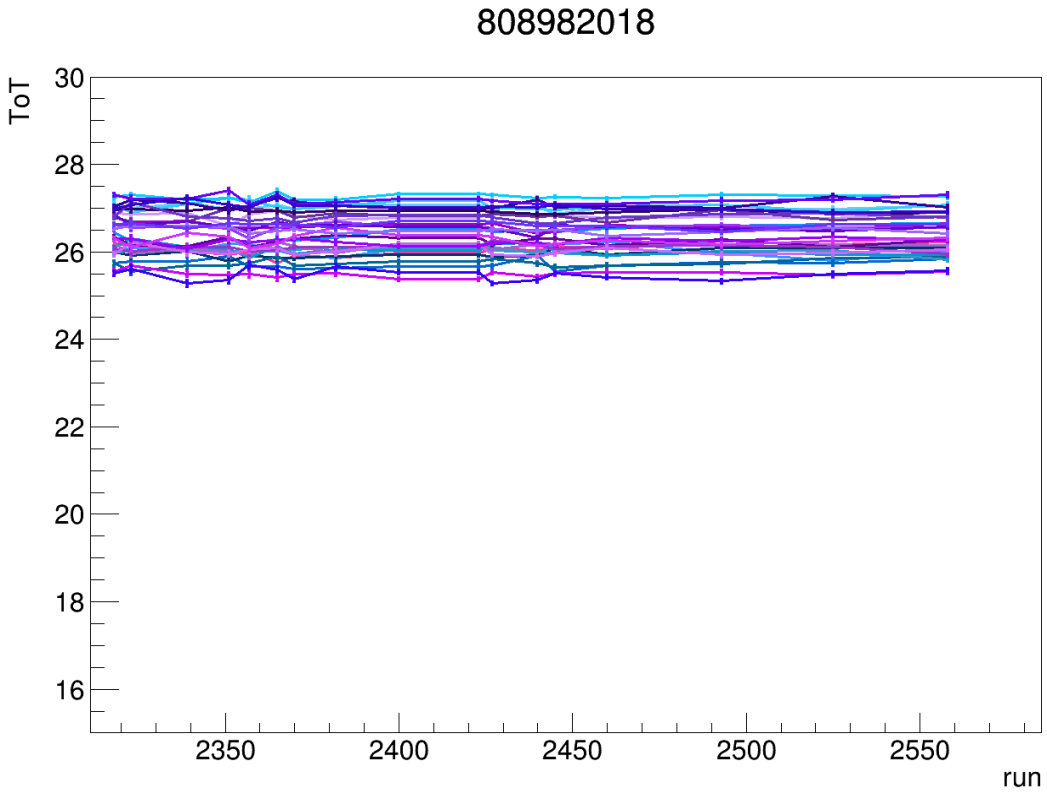
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

1 Orange PMT:
PMT31



DOM 9



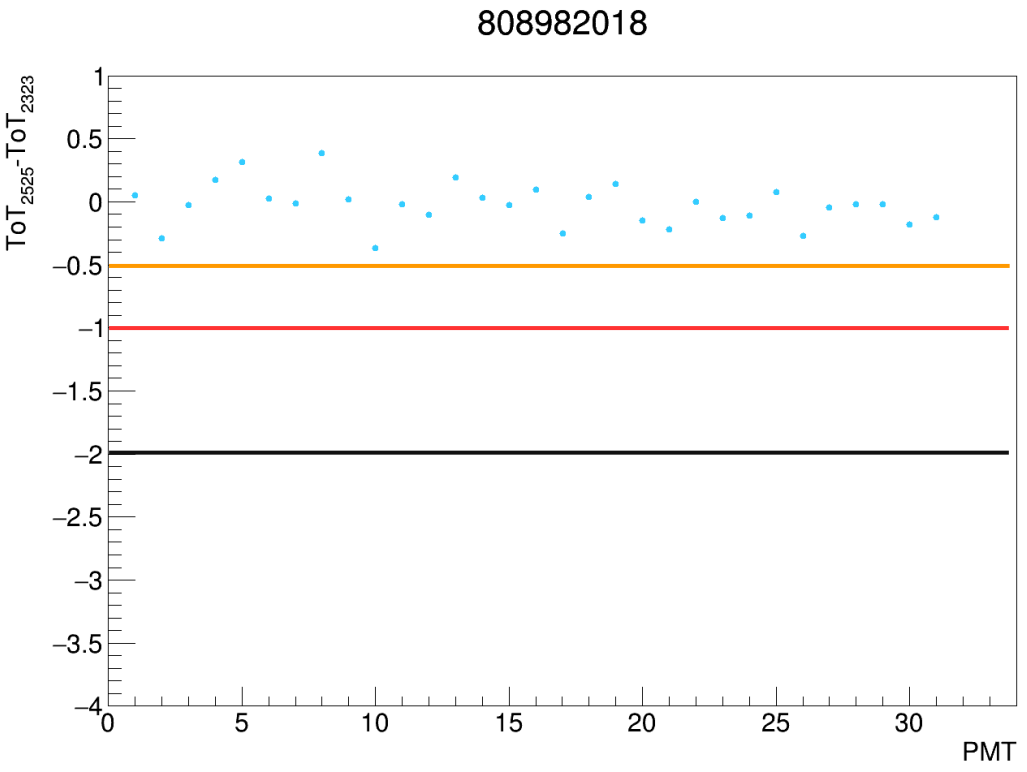
Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

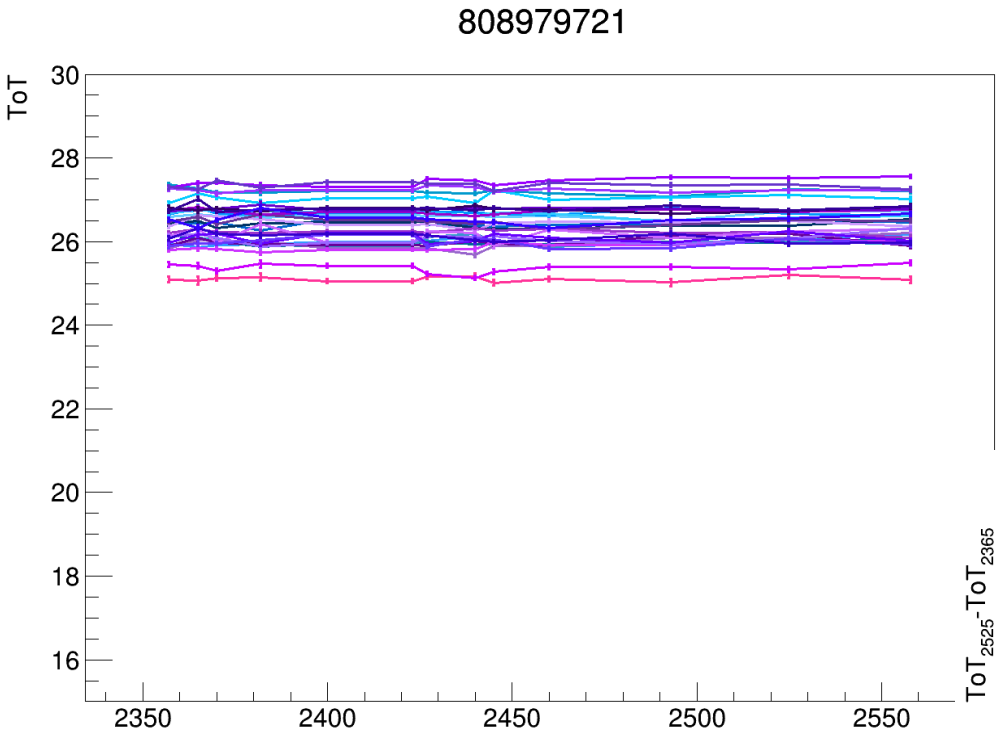
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

ALL GREEN



DOM 10



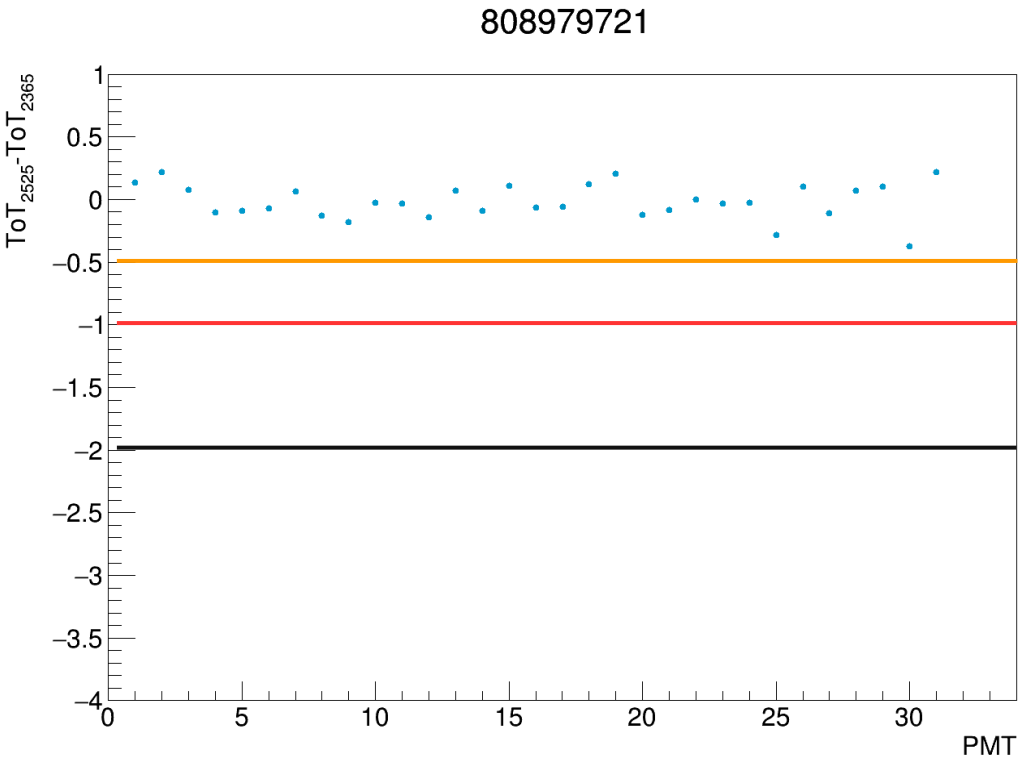
Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

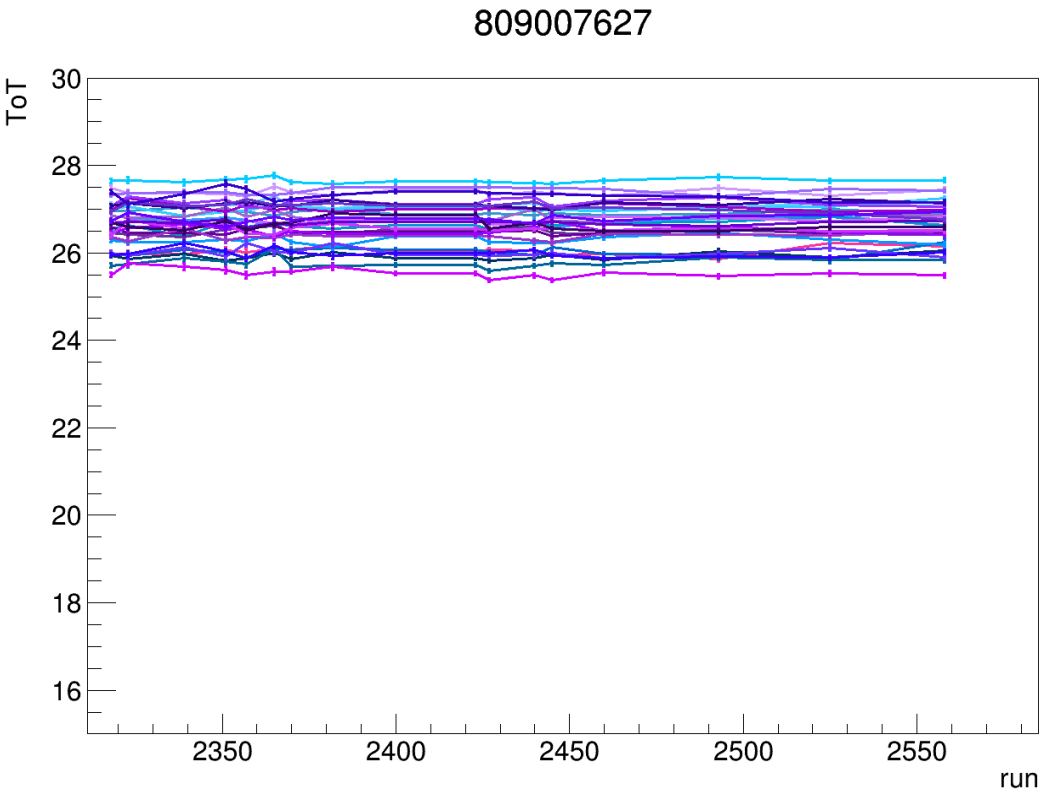
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

ALL GREEN



DOM 11



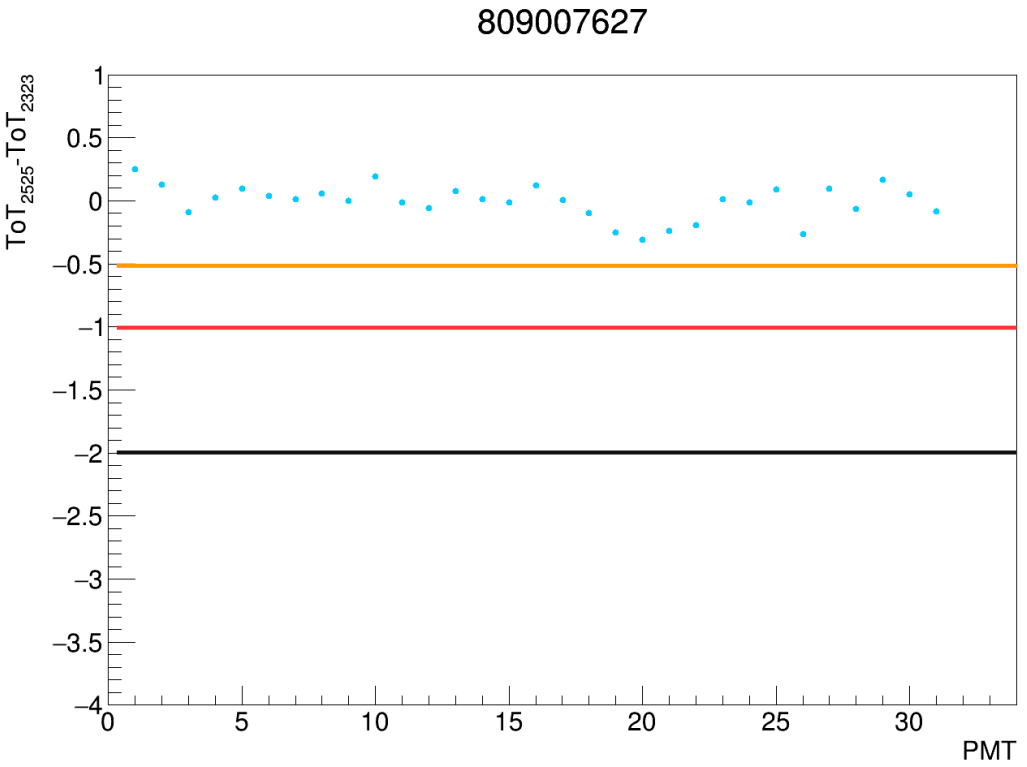
Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

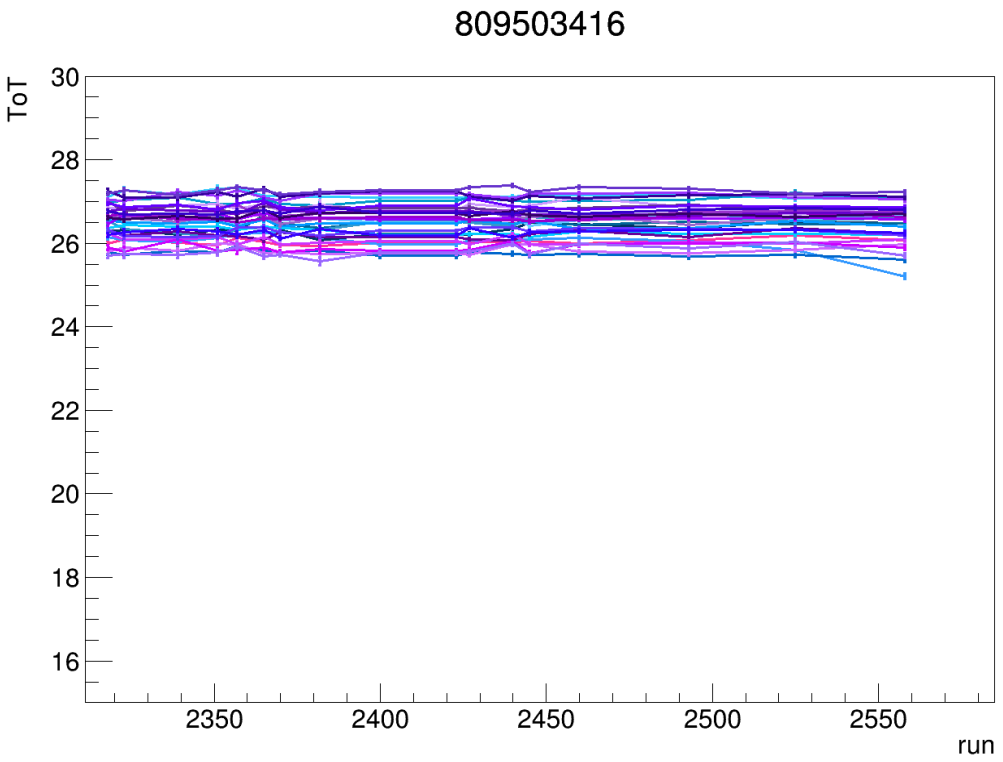
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

ALL GREEN



DOM 12

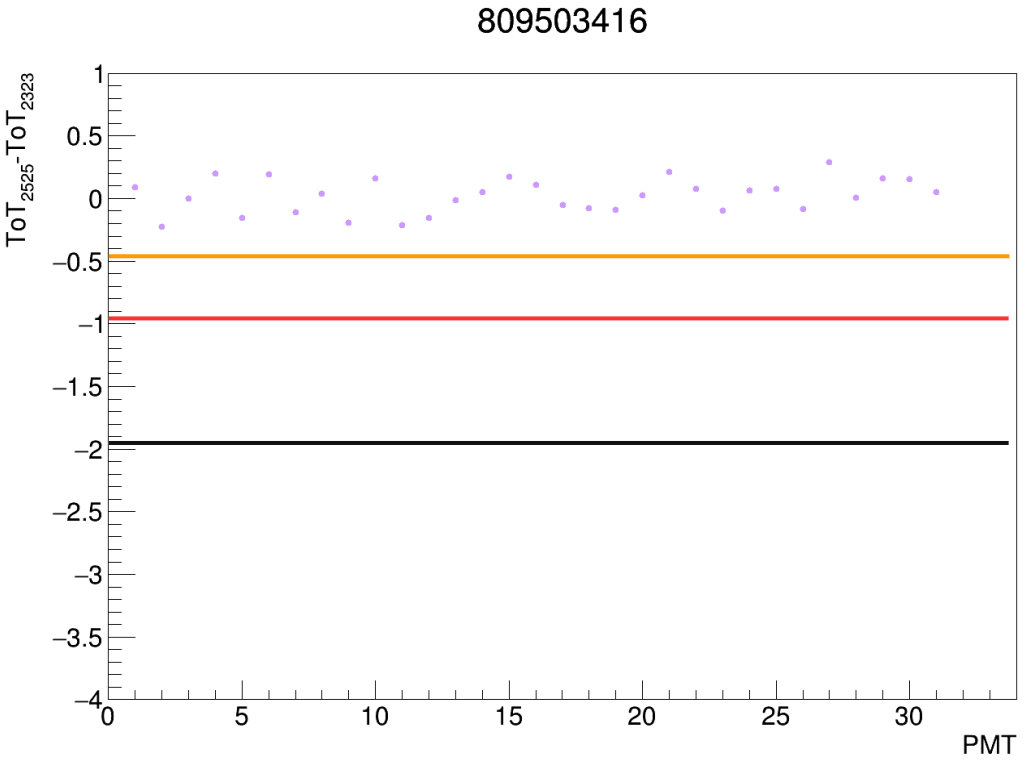


Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

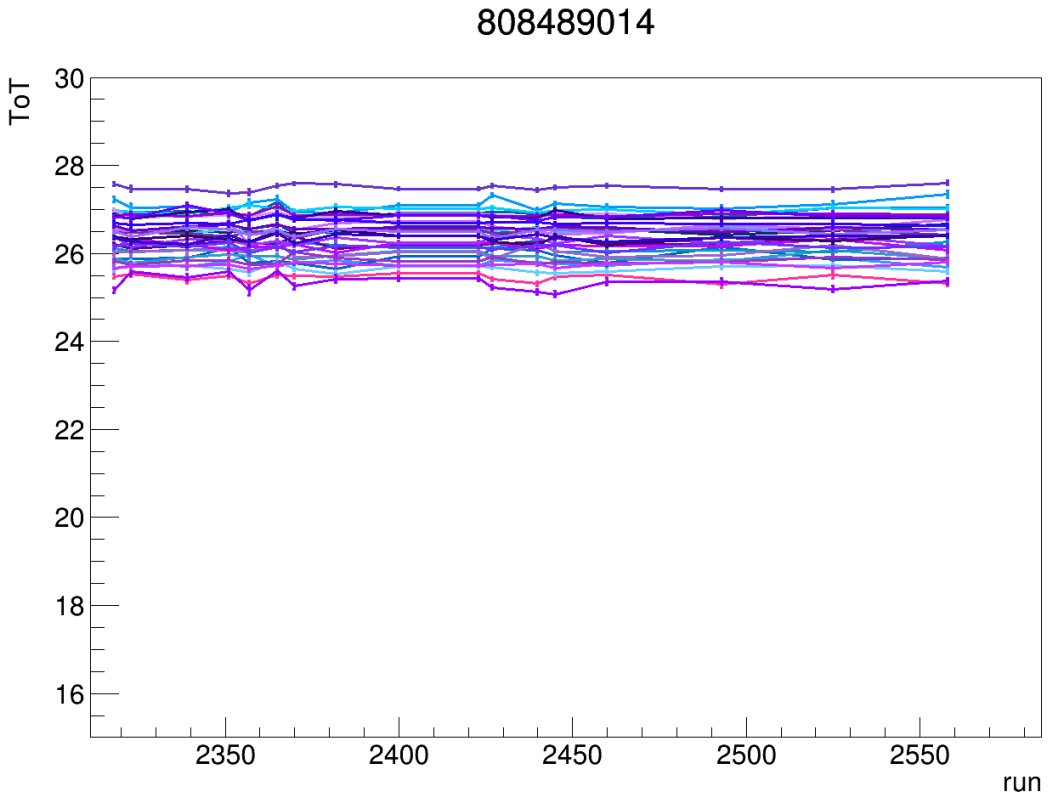
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2



ALL GREEN

DOM 13

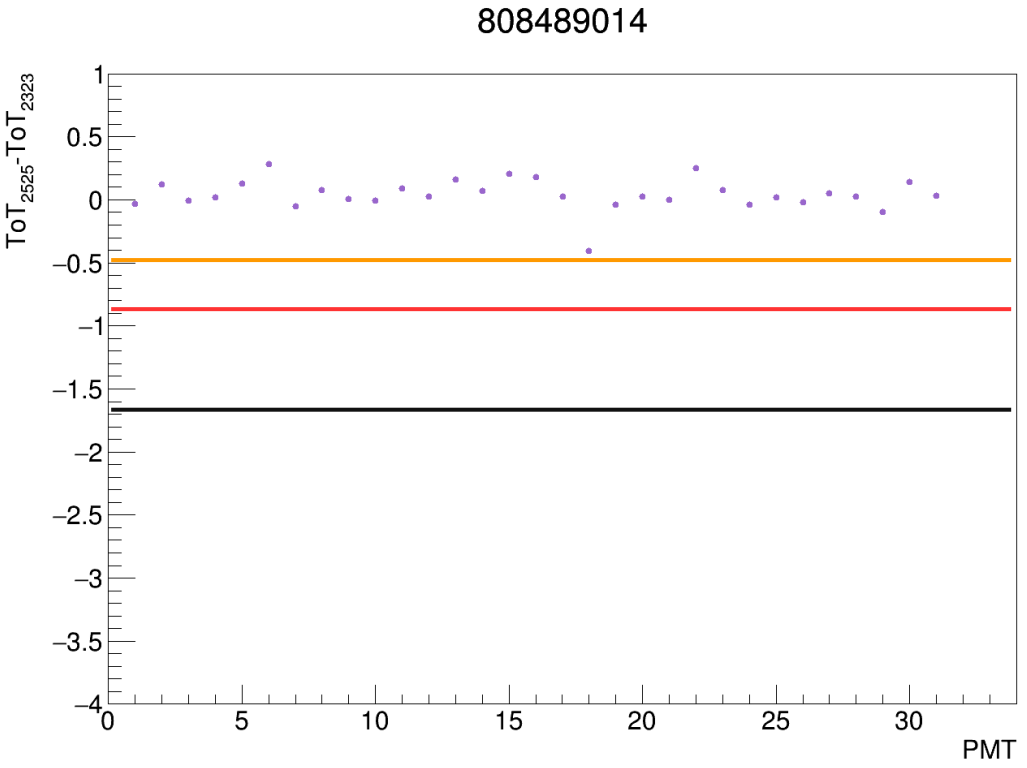


Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

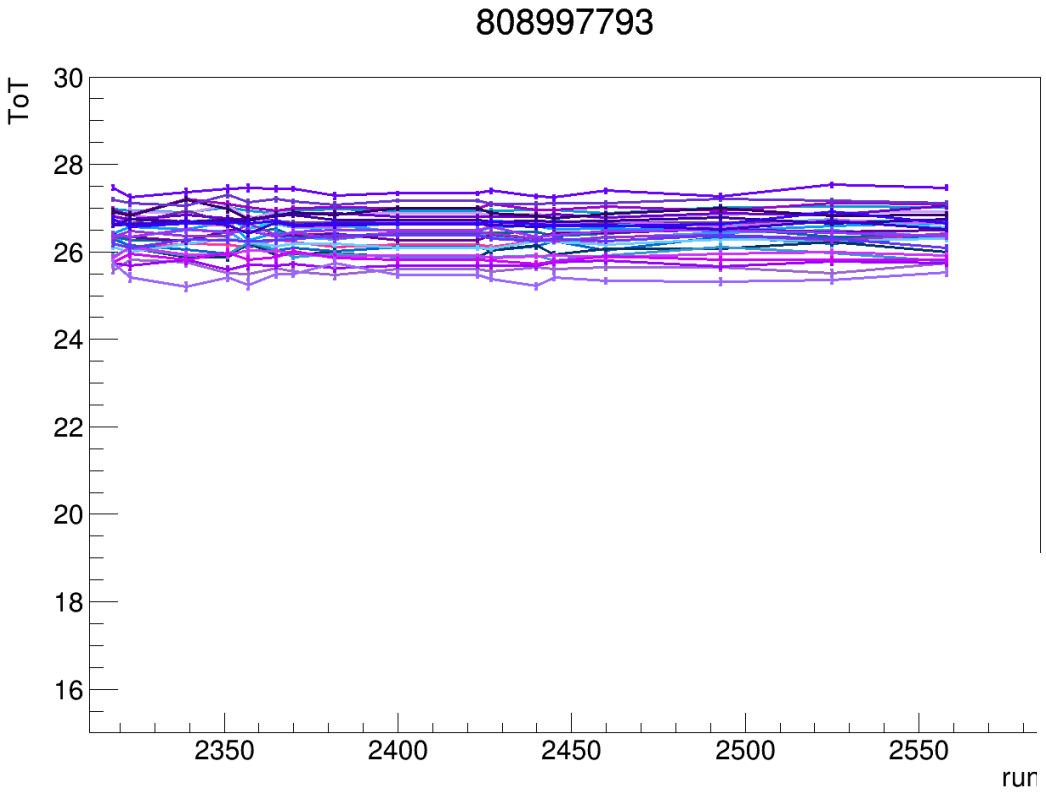
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2



ALL GREEN

DOM 14



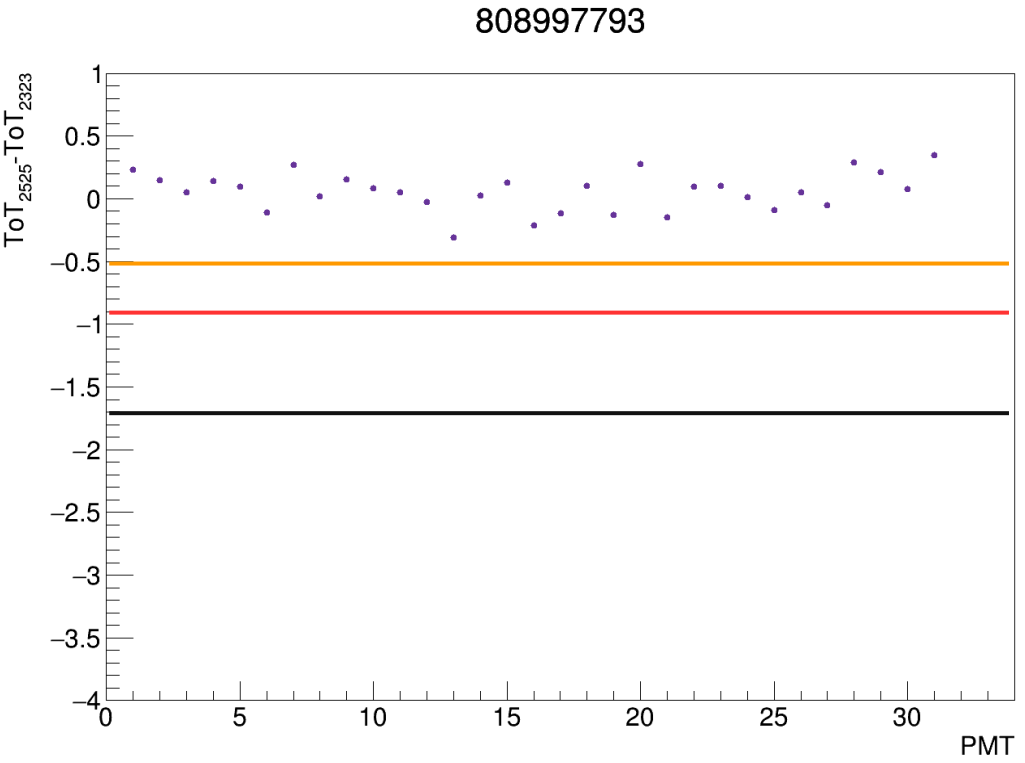
Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

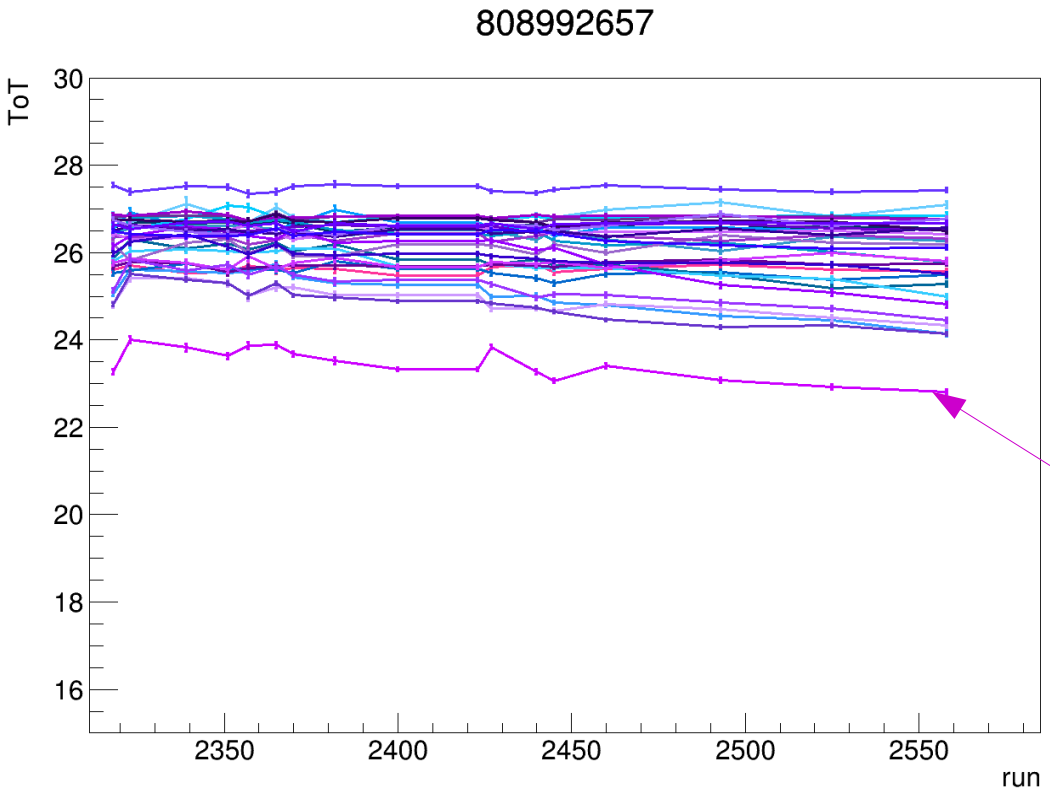
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

ALL GREEN



DOM 15

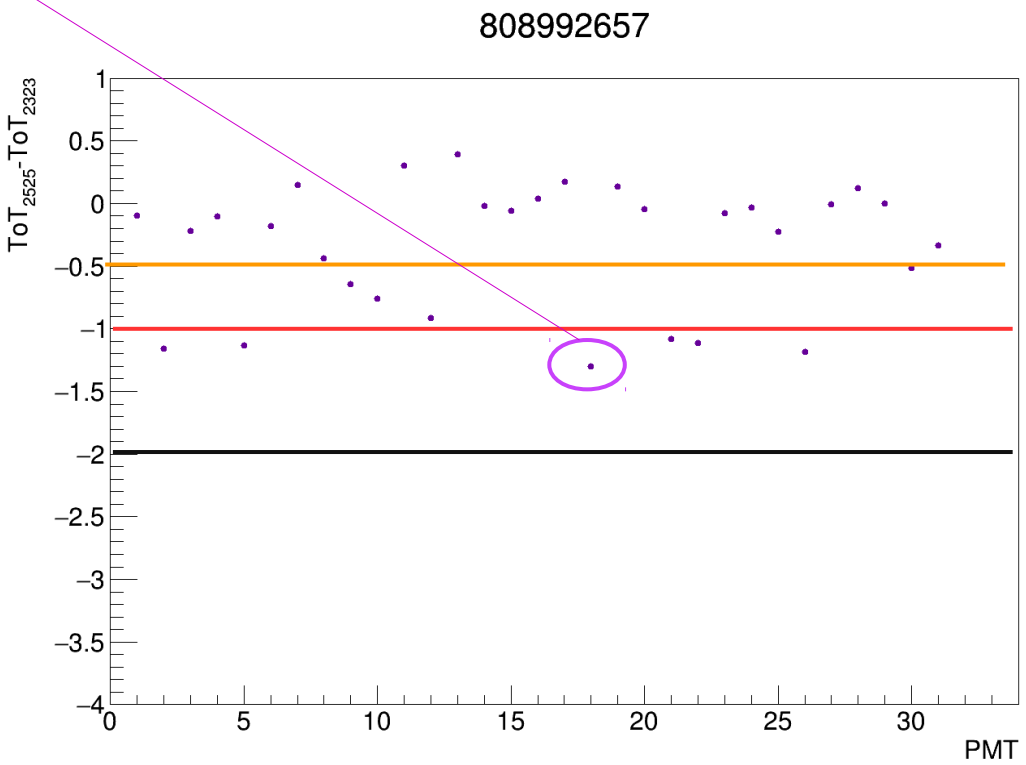


Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

Red PMT: -2<ΔToT<=-1

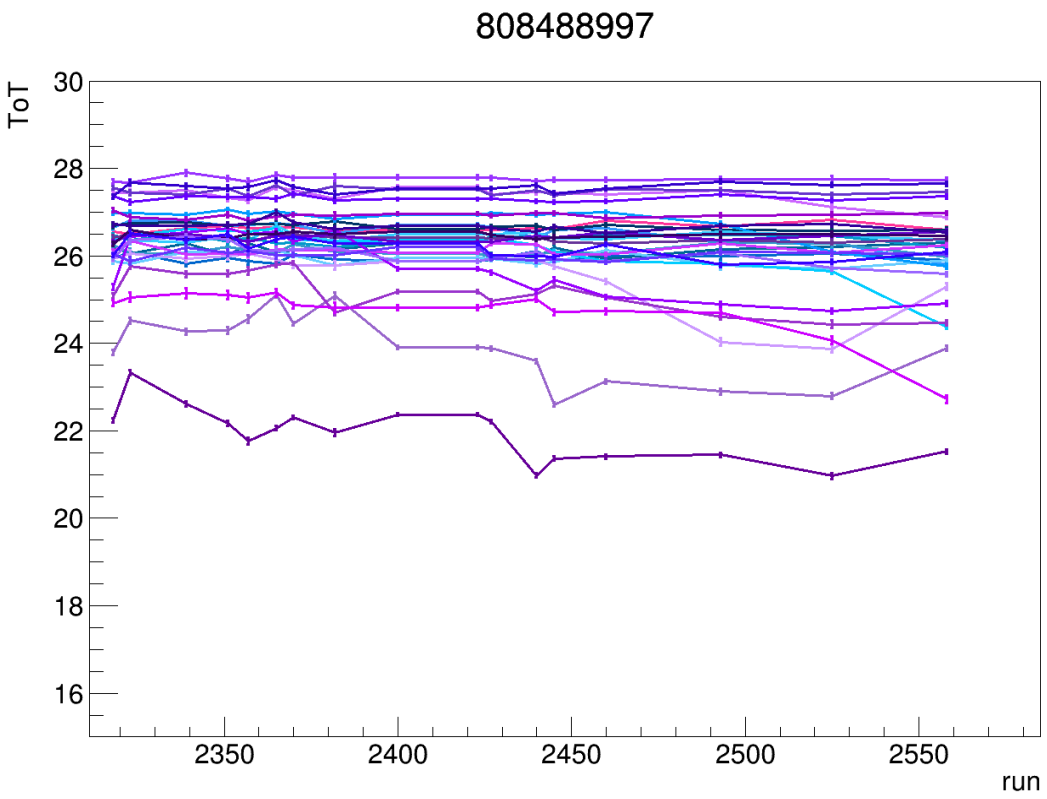
Black PMT: ΔToT<=-2



4 Orange PMT:
PMT9,PMT10,PMT12,
PMT30

6 Red PMT:
PMT2,PMT5,PMT18,
PMT21,PMT22,PMT26

DOM 16

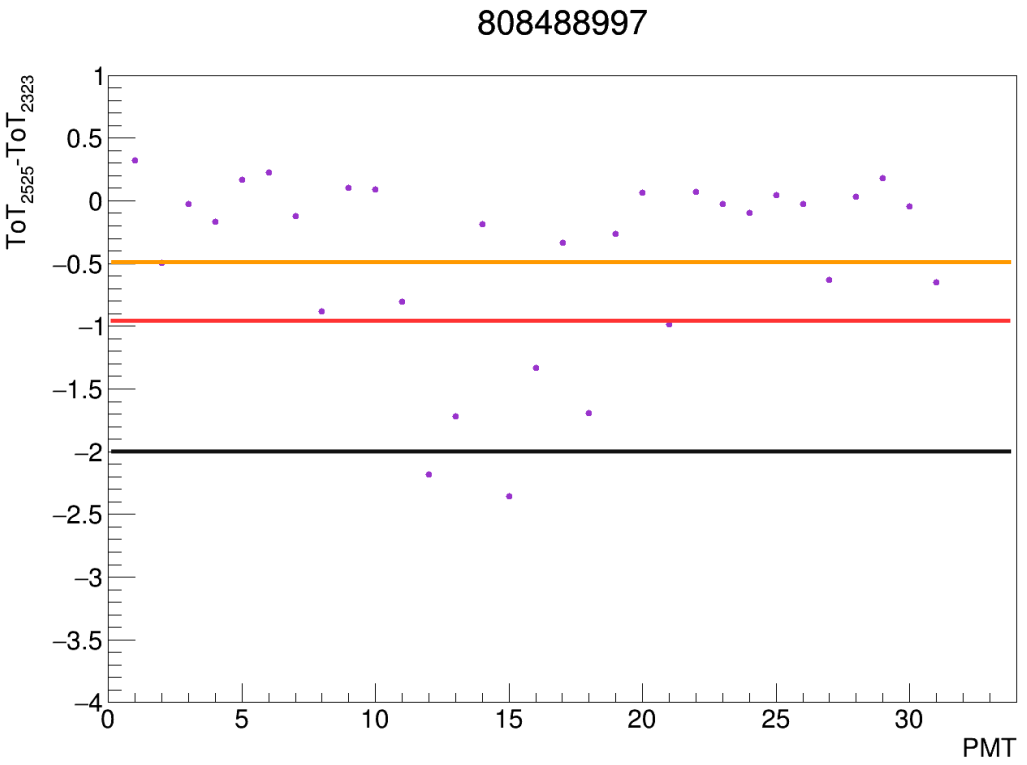


Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

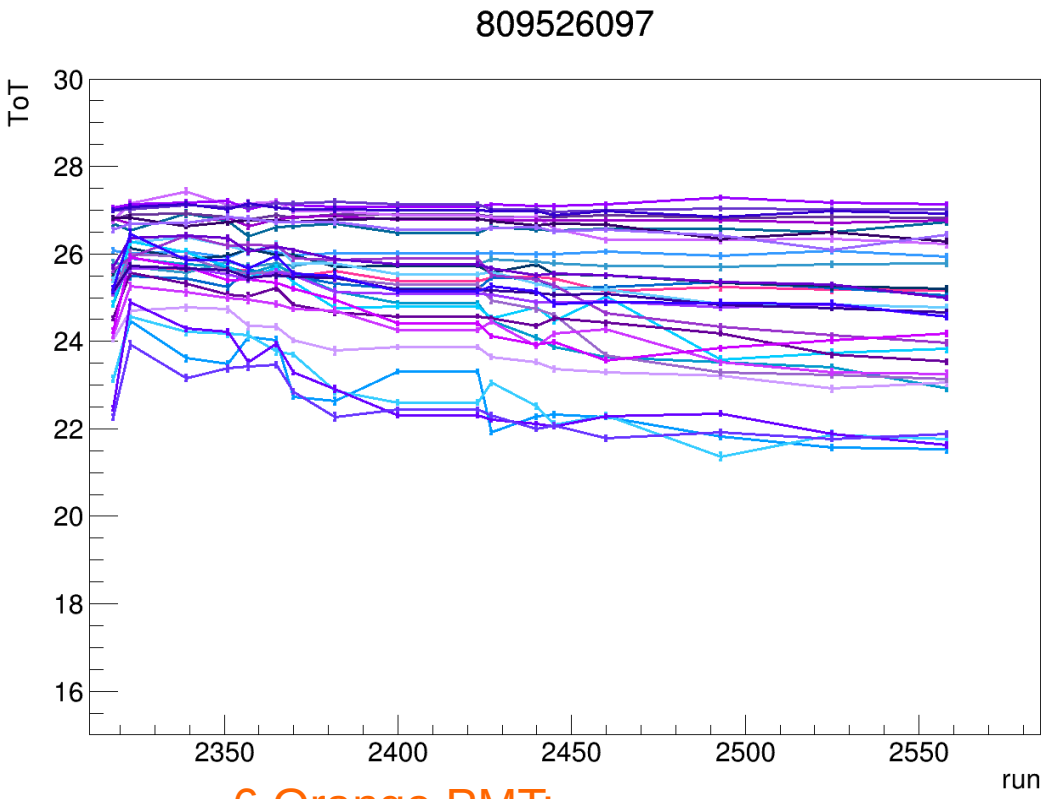
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2



2 Red PMT:
PMT12,PMT15,PMT26

DOM 17



Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

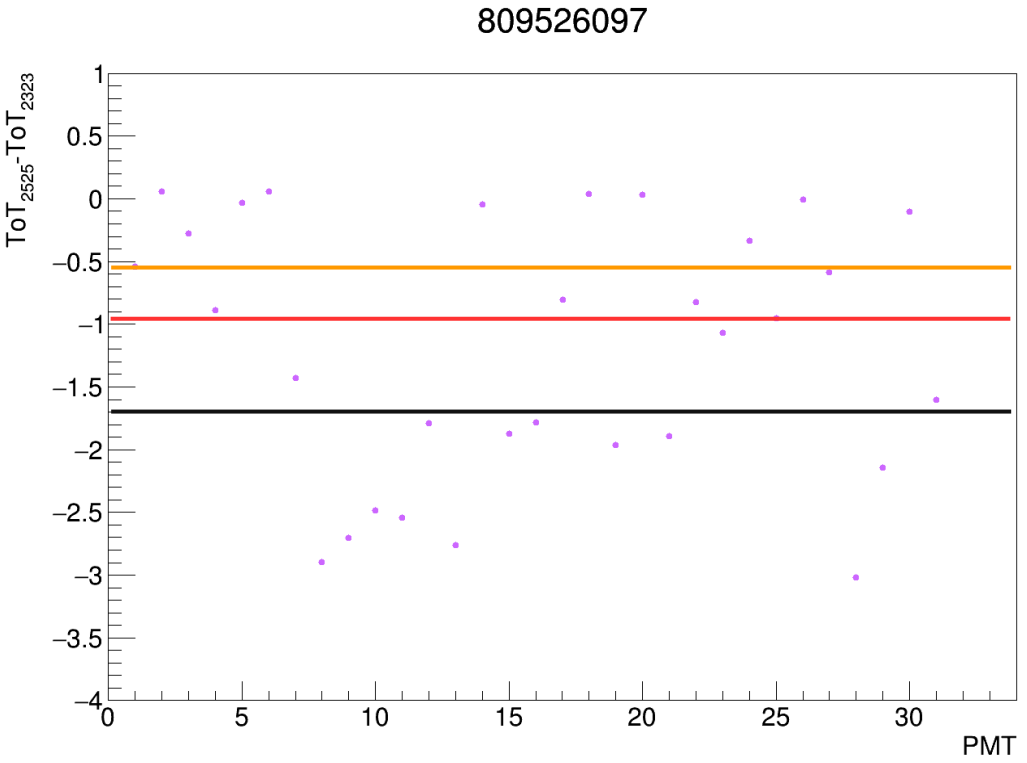
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

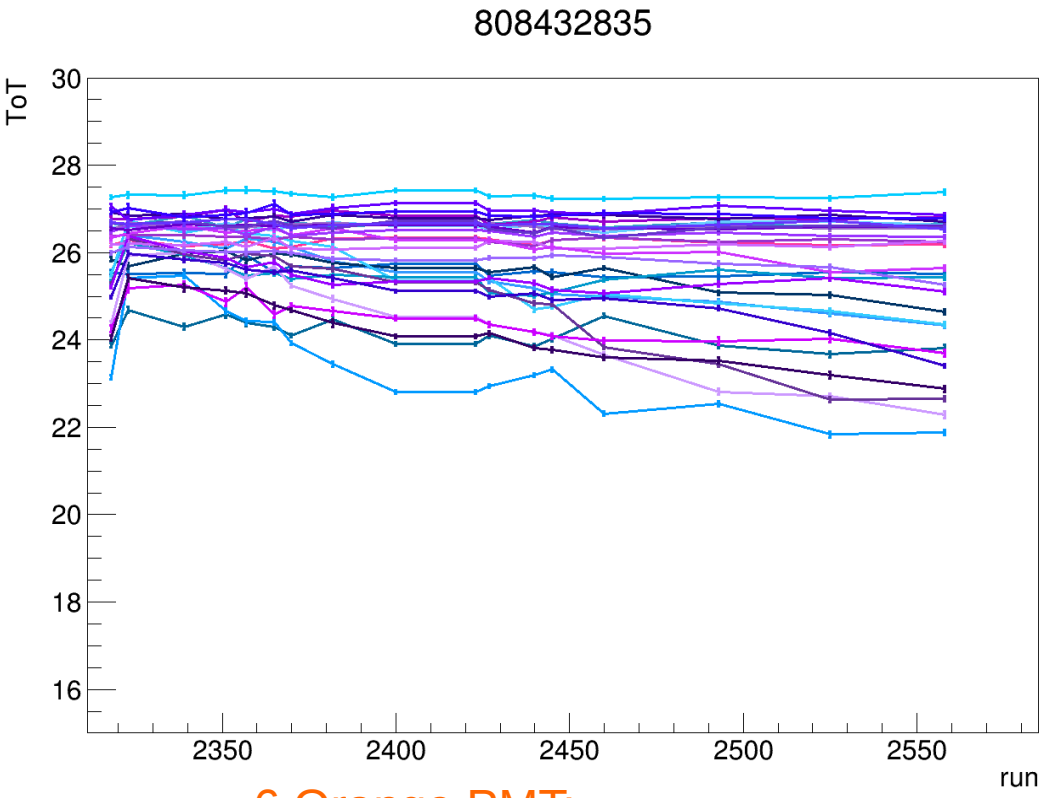
6 Orange PMT:
PMT1,PMT4,PMT17,
PMT22,PMT25,PMT27

8 Red PMT:
PMT7,PMT12,PMT15,
PMT16,PMT19,PMT21,
PMT23,PMT31

7 Black PMT:
PMT8,PMT9,PMT10,PMT11,
PMT13,PMT28;PMT29



DOM 18



Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

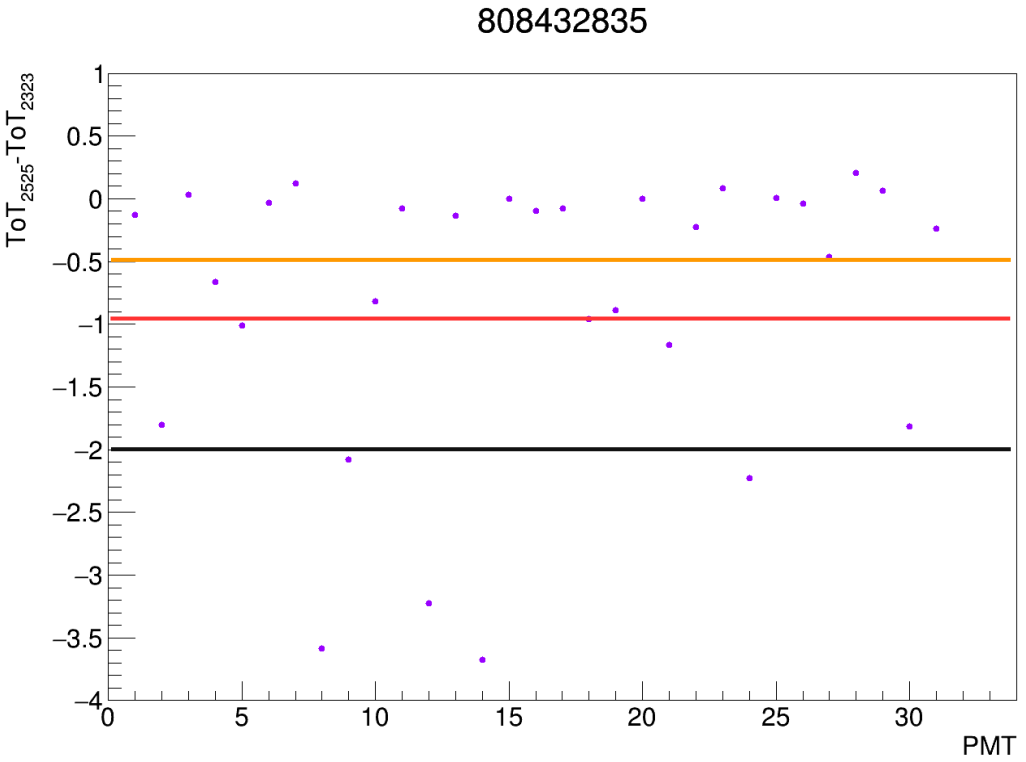
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

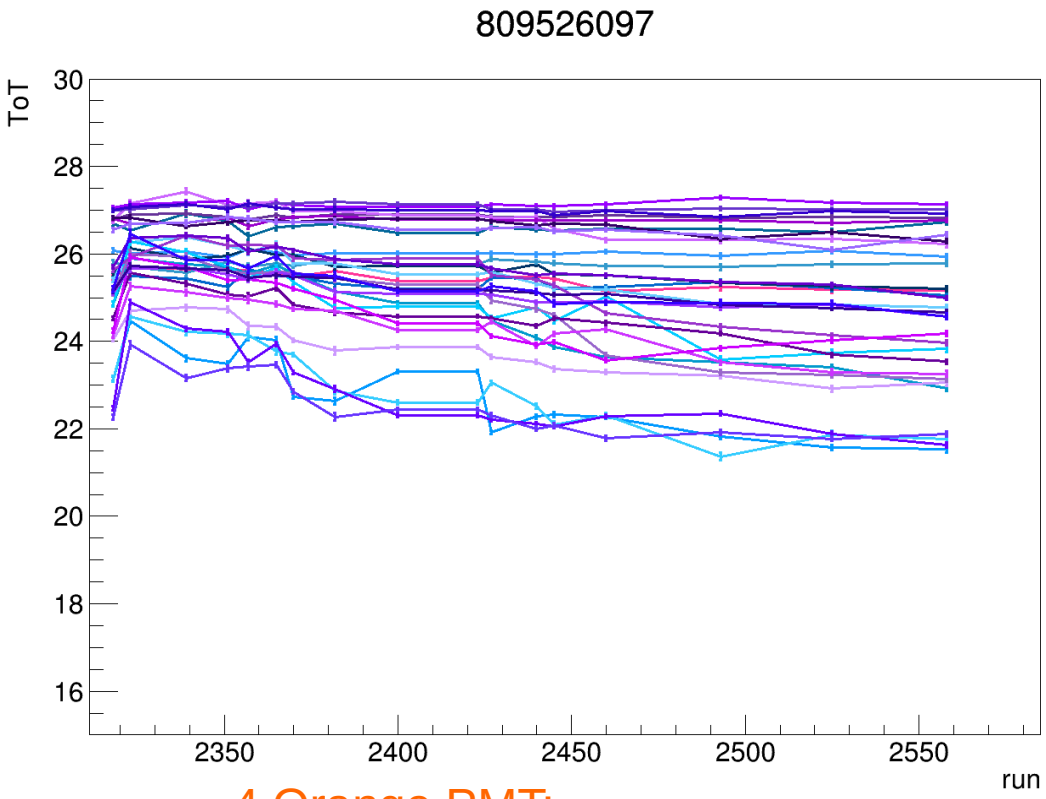
6 Orange PMT:
PMT1,PMT4,PMT17,
PMT22,PMT25,PMT27

8 Red PMT:
PMT7,PMT12,PMT15,
PMT16,PMT19,PMT21,
PMT23,PMT31

7 Black PMT:
PMT8,PMT9,PMT10,PMT11,
PMT13,PMT28;PMT29



DOM 17



Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

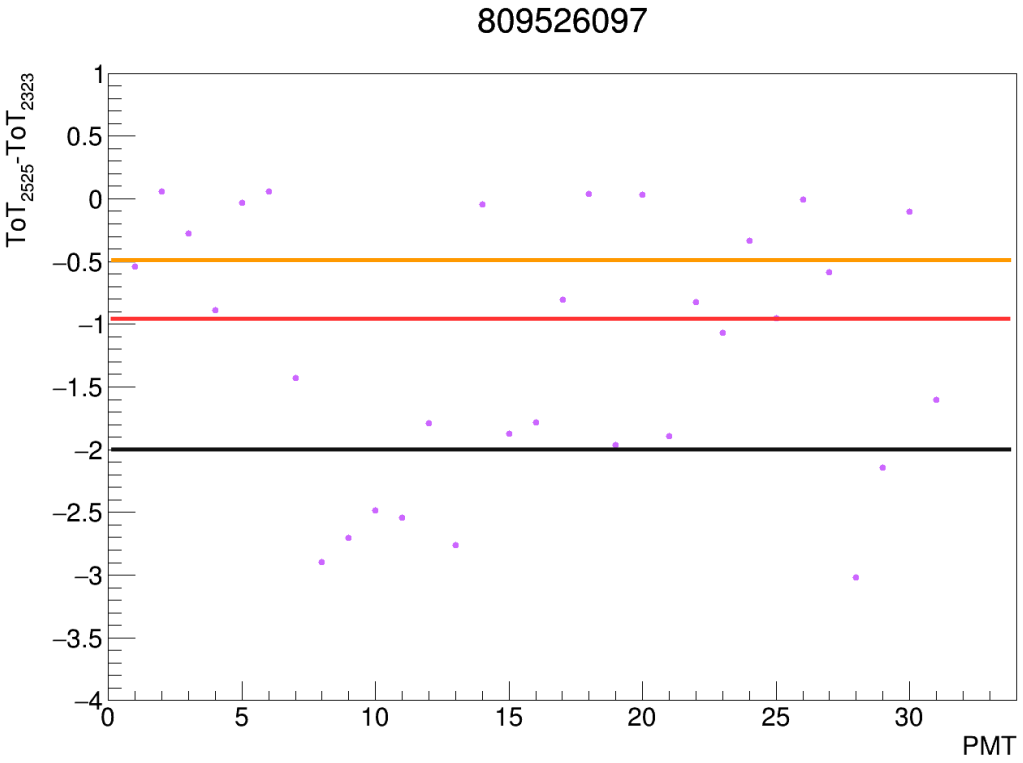
Red PMT: -2<ΔToT<=-1

Black PMT: ΔToT<=-2

4 Orange PMT:
PMT4,PMT10,PMT18,
PMT19

4 Red PMT:
PMT2,PMT5,PMT20,
PMT30

5 Black PMT:
PMT8,PMT9,PMT12,
PMT14,PMT24



Results

DOM	Orange	Red	Black	Green
1	3	2	0	26
2	1	5	3	22
3	5	2	0	24
4	4	4	3	20
5	5	2	2	22
6	1	0	0	30
7	0	0	0	31
8	1	0	0	30
9	0	0	0	31
10	0	0	0	31
11	0	0	0	31
12	0	0	0	31
13	0	0	0	31
14	0	0	0	31
15	4	6	0	21
16	5	3	2	21
17	6	8	7	10
18	4	4	5	18

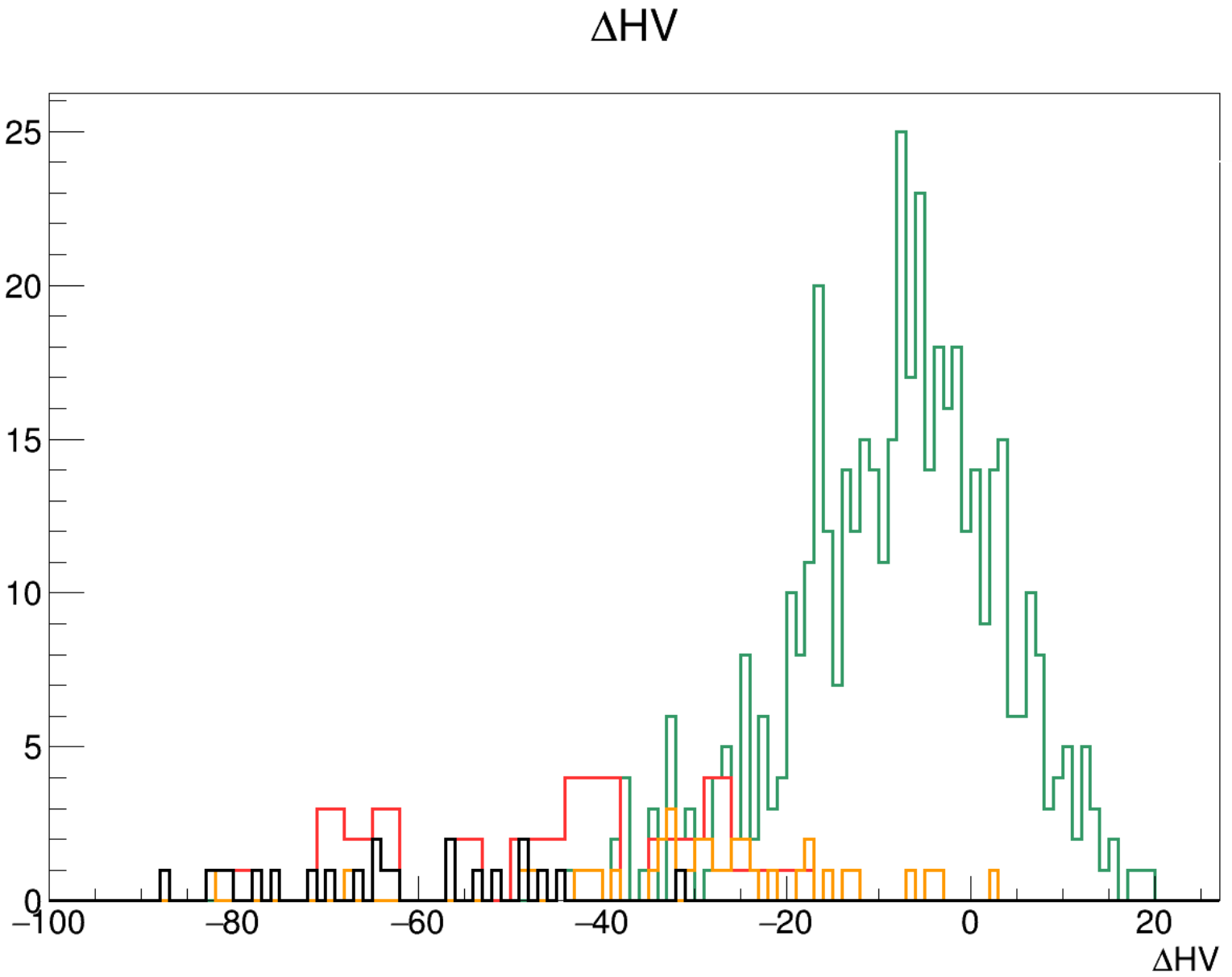
Catania “New”

Napoli “New”

Napoli “Old”

Catania “Old”

Results: HV_{tuned} - $HV_{seatuned}$



Conclusions

- Decrease rate confirmed
  –->Expecially in “old PMT”

Green PMT: ΔtoT>=-0.5

Orange PMT: -1<ΔtoT<=-0.5

Red PMT: -2<ΔToT<=-1

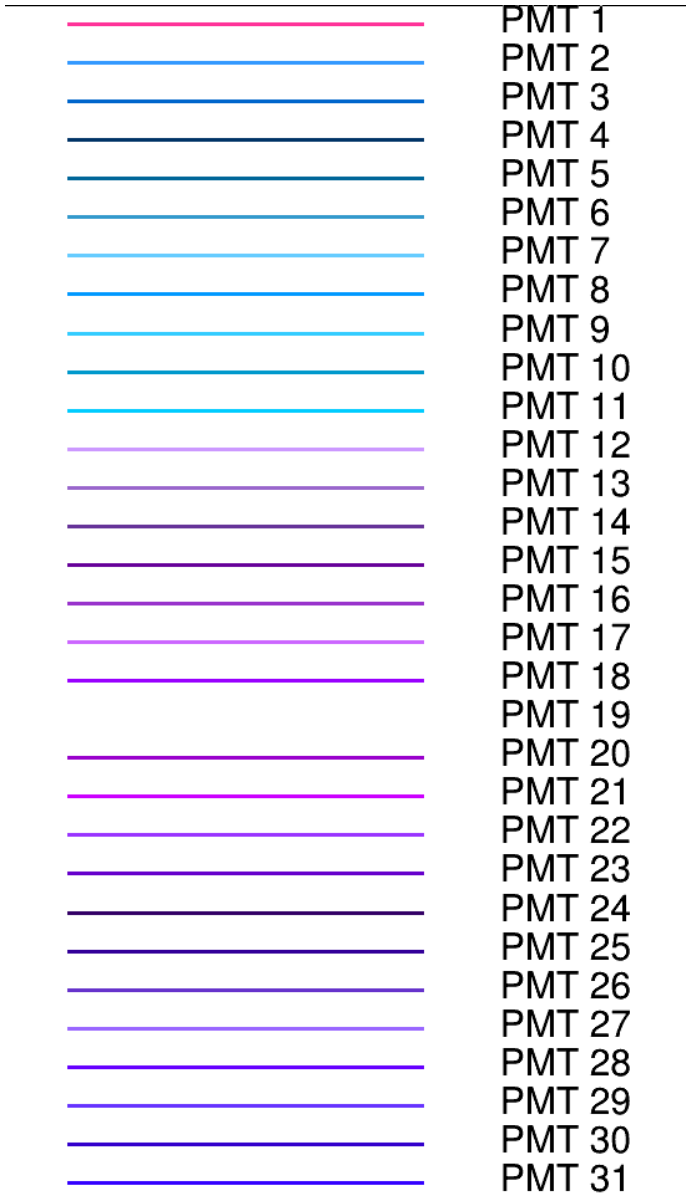
Black PMT: ΔToT<=-2

- Decrease rate different in Catania DOM and Napoli DOM.

- Decrease maybe correleted with the HV_{tuned} - $Hv_{seatuned}$

Backup Slides

PMT Color Legenda



Means ToT per DOM