

Straw analysis status, [2023-03-29 Wed]

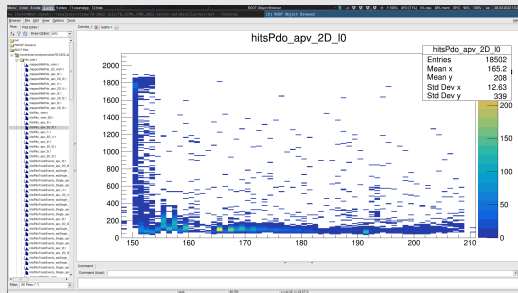
Straw TB team

April 1, 2023

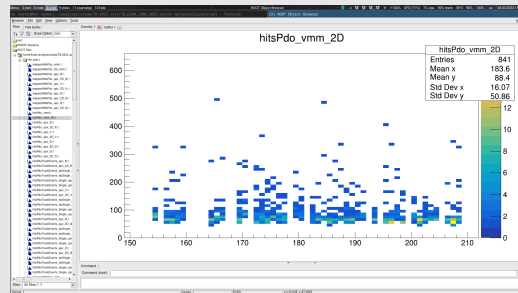
July TB: Bad strips in DR

Hits W/O overflow cut shown

APV DR



VMM DR

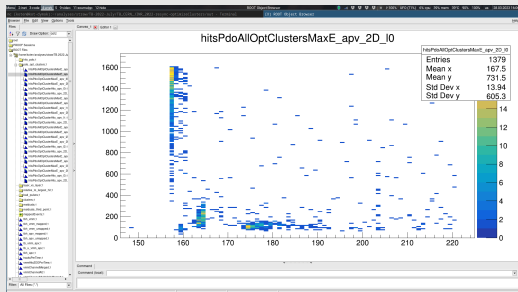


- Strips 150-153 are full on APV and no signal on VMM
- Strip 150 about every time in overflow

July TB: Bad strips in DR

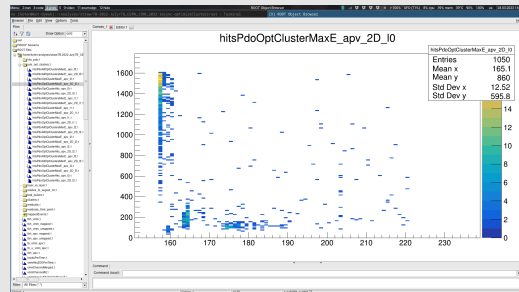
After cluster optimization ("before" method)

Maximal charge in cluster, all clusters



- Strips 150-153 are full on APV and no signal on VMM
- Strip 150 about every time in overflow

Maximal charge in cluster, max sumE clusters



Merging, July TB

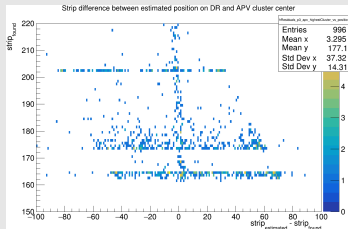
Parameters

- Alignment – first variant, linear
- Merging tolerance – 5 / 10 strips (maximal difference between estimated value on DR and hit to VMM)
- Requirement for APV cluster in DR – yes / no
- DR hits – Removed hits 150-153; only hits from central APV
- Default (without optimization) –

Optimization	Tolerance	APV cluster in DR	Merged	Good	Noise
default	5	no	326	316	39
default	5	yes	228	220	22
default	10	no	351	335	65
default	10	yes	244	231	41
optimized	5	no	348	339	35
optimized	5	yes	163	159	12
optimized	10	no	368	351	67
optimized	10	yes	174	170	46
optimized, cut 100	5	no	346	339	36
optimized, cut 100	5	yes	108	106	8
optimized, cut 100	10	no	363	348	67
optimized, cut 100	10	yes	116	109	14

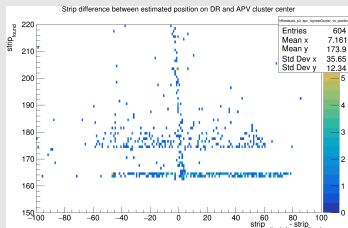
Merging: residuals on DR, 1 spill

Default (without optimization)

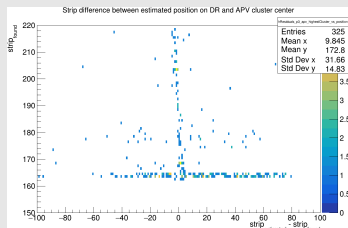


- Need to remove three left strips
- Optimization + cut looks better
- Need larger statistics
- Alignment have to be optimized

Optimized

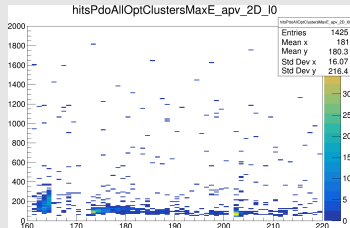


Optimiiized + cut 100



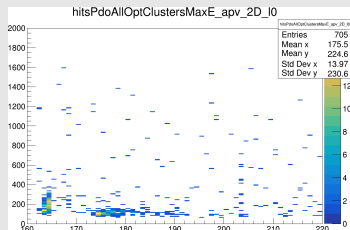
max for clusters, 1 spill

Default (without optimization)

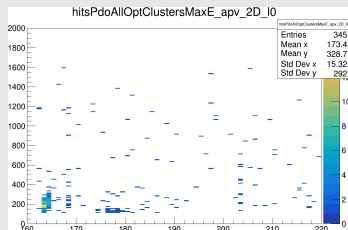


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Optimized

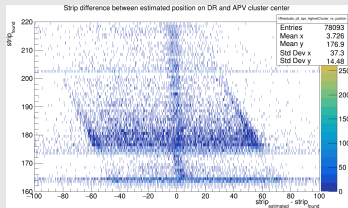


Optimized + cut 100



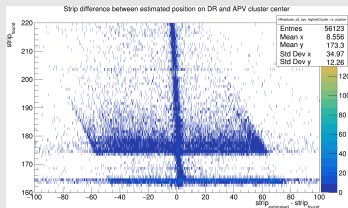
Merging: residuals on DR, run 49

Default (without optimization)

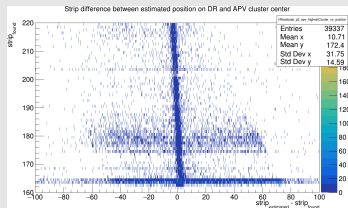


- Need to remove three left strips
- Optimization + cut looks better
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Optimized



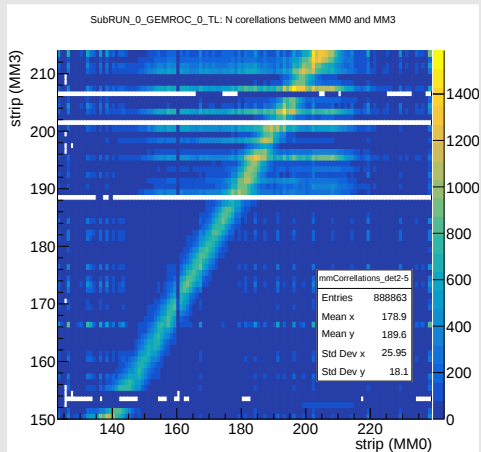
Optimized + cut 100



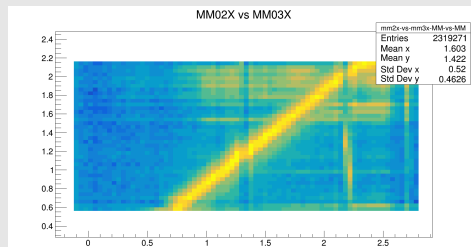
October: reminder

RUN 51: Noise in MM 3: problem:

Hit corellation between hits in MM0 and MM3

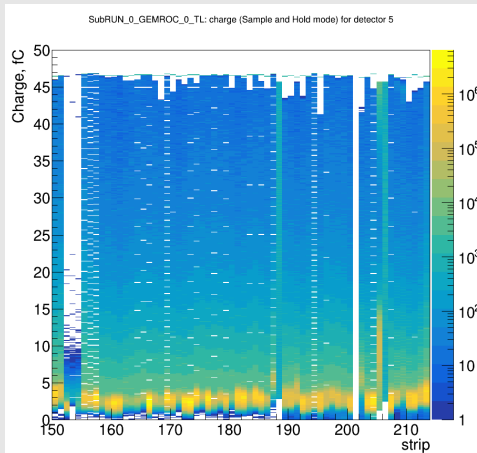


Corellation between clusters in MM0 and MM3

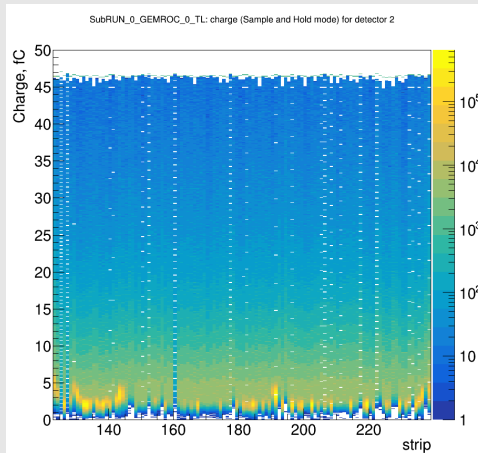


RUN 51: Charge in MM (logz)

Charge in MicroMegas 3 (B-board)



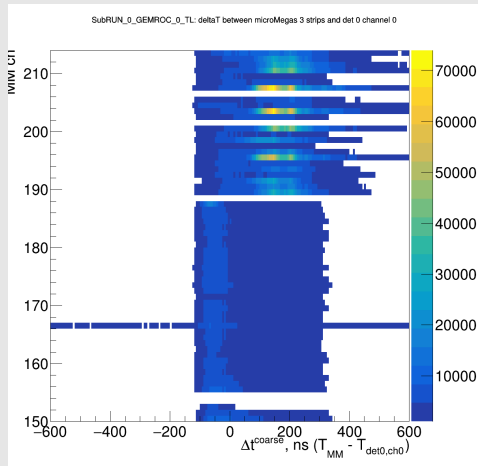
Charge in MicroMegas 0 (B2-board)



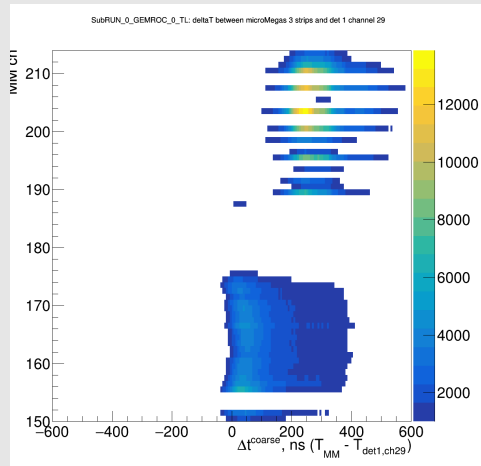
Seems more or less similar

RUN 51: Noise in MM 3

Time difference between hits in MM strips and Scint 0



Time difference between hits in MM strips and Straw 29



LEMO connectors

RUN 51

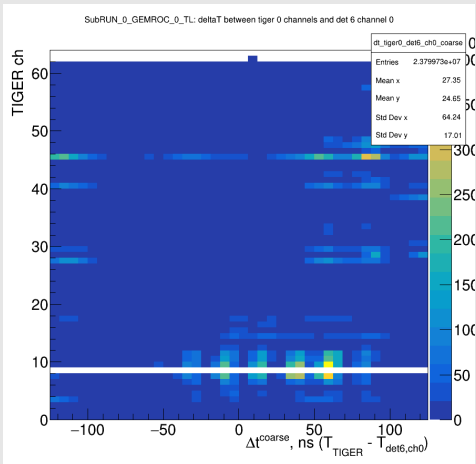
TIGER	Channel	LEMO type	Comment
7	22	Scint 0	
7	46	Scint 1	
7	50	Straw 29	
7	28	Straw 30	
7	51	Straw 31	
7	26	Straw 32	
7	23	Straw 33	
7	14	LEMO #2	no signal
0	8	LEMO #8	
1	15	LEMO #9	
2	8	LEMO #10	
3	15	LEMO #11	
4	8	LEMO #12	
5	15	LEMO #13	

RUN 62

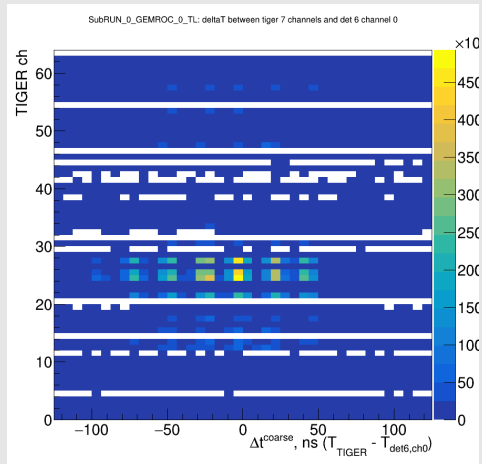
TIGER	Channel	LEMO type	Comment
7	22	Scint 0	
7	46	Scint 1	
7	50	Straw 29	
7	28	Straw 30	
7	51	Straw 31	
7	26	Straw 32	
7	23	Straw 33	
0	8	SHiP straw	
7	14	LEMO #2	no signal
1	15	LEMO #9	
2	8	LEMO #10	
3	15	LEMO #11	
4	8	LEMO #12	
5	15	LEMO #13	

RUN 62: DeltaT vs SHiP straw

TIGER 0 and SHiP straw

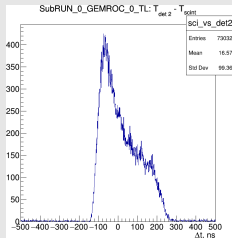


TIGER 7 and SHiP straw

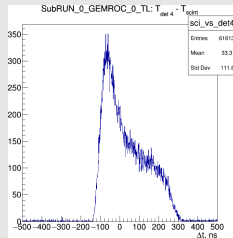


October TB, MM drift time (run 51, before thresholds)

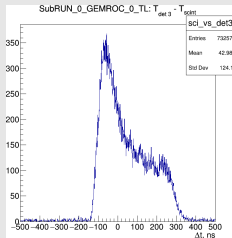
MM0 (B2-board)



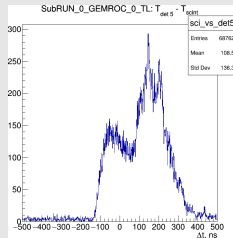
MM2 (B2-board)



MM1 (B2-board)

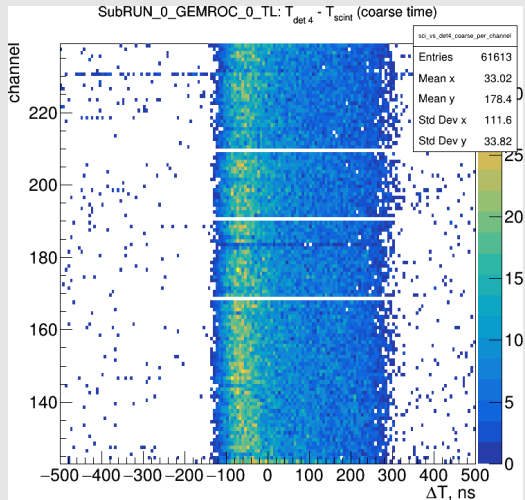


MM3 (B-board, with scint & straw)

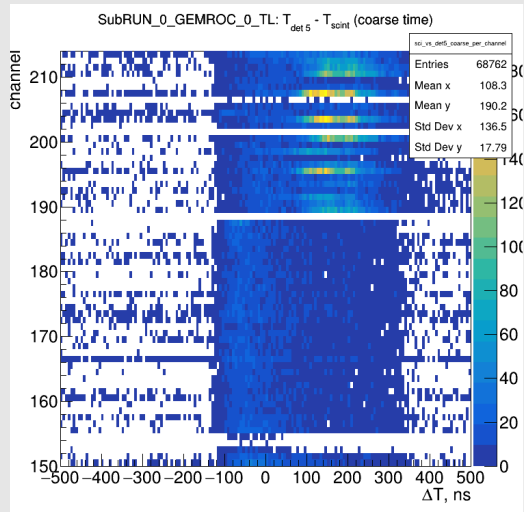


MM drift time 2D

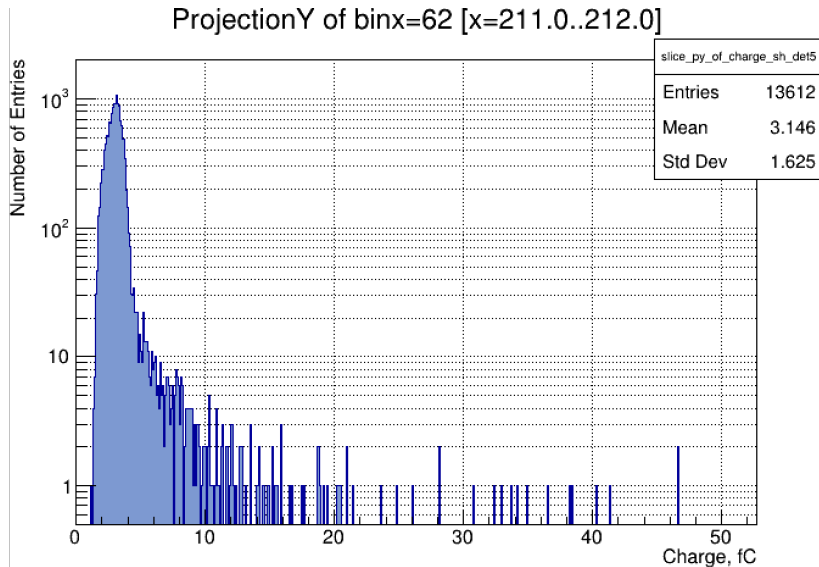
MM0



MM3

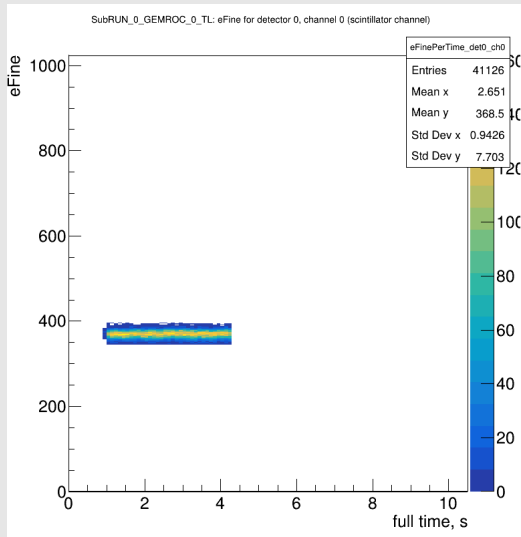


Charge for MM channel (thr selection)

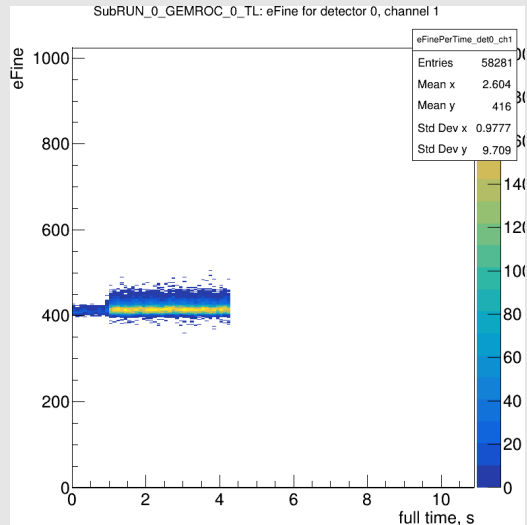


eFine for Sci LEMOs

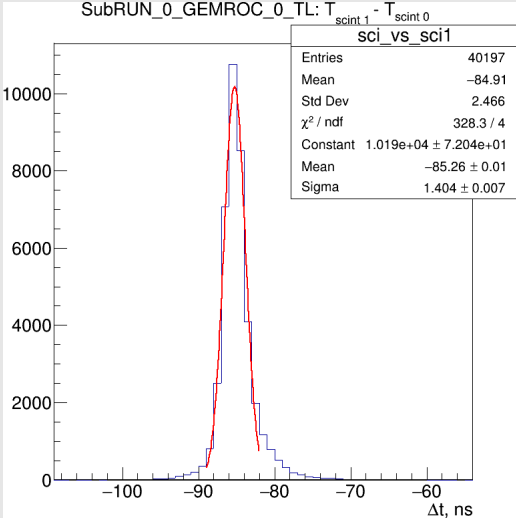
Sci coincidence



Sci 1



Sci 1 - SciCoinc, Fitted with Gaus



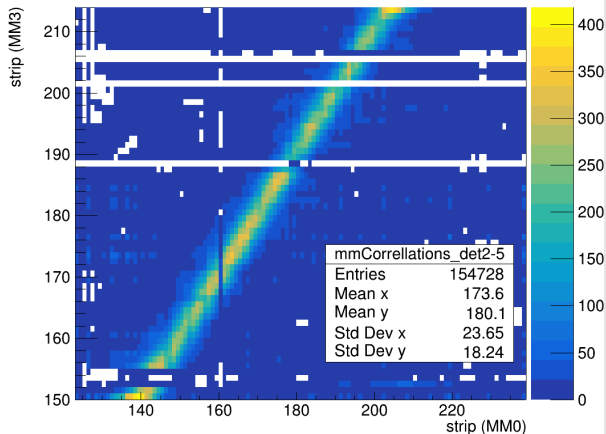
????

MM3 thresholds

```
// MM3 channels
{{6, 4}, 5.0}, // MM3 strip 151
{{6, 60}, 4.0}, // MM3 strip 166
{{6, 5}, 7.0}, // MM3 strip 187
{{7, 30}, 5.0}, // MM3 strip 189 -- ?
{{7, 18}, 5.0}, // MM3 strip 190
{{7, 24}, 5.5}, // MM3 strip 191
{{7, 5}, 4.0}, // MM3 strip 192
{{7, 10}, 4.0}, // MM3 strip 193
{{7, 8}, 4.0}, // MM3 strip 194 -- strange?
{{7, 21}, 4.0}, // MM3 strip 195
{{7, 17}, 4.5}, // MM3 strip 196
// {{7, 2}, 5.0}, // MM3 strip 197 -- ?
{{7, 53}, 4.5}, // MM3 strip 198
{{7, 57}, 4.0}, // MM3 strip 199
{{7, 35}, 4.0}, // MM3 strip 200
{{7, 13}, 7.0}, // MM3 strip 202
{{7, 27}, 4.0}, // MM3 strip 203
{{7, 1}, 4.0}, // MM3 strip 204
{{7, 7}, 60.0}, // MM3 strip 205 -- currently, disabled
{{7, 25}, 4.5}, // MM3 strip 207
{{7, 9}, 4.5}, // MM3 strip 208
{{7, 6}, 5.0}, // MM3 strip 209
{{7, 37}, 4.0}, // MM3 strip 210
{{7, 39}, 4.5}, // MM3 strip 211
{{7, 33}, 5.0}, // MM3 strip 212
{{7, 43}, 5.5}, // MM3 strip 213
```

MM0-MM3 corellation

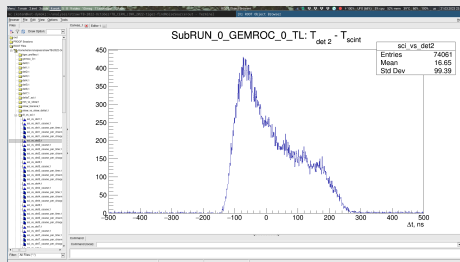
SubRUN_0_GEMROC_0_TL: N corellations between MM0 and MM3



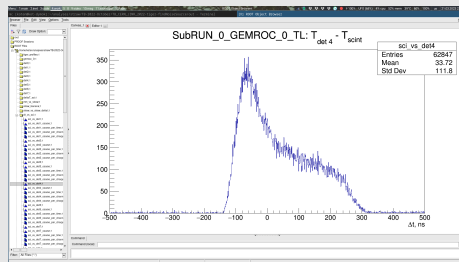
But most of other channels has noise level around 4 fC

October TB, MM drift time (run 51, thr applied)

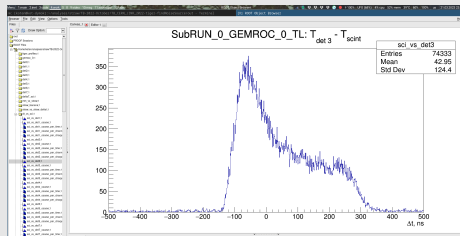
MM0 (B2-board)



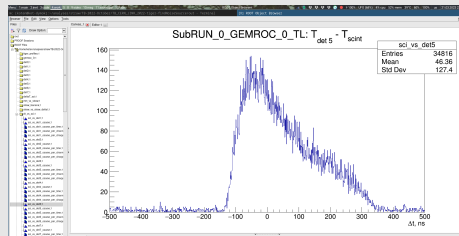
MM2 (B2-board)



MM1 (B2-board)



MM3 (B-board, with scint & straw)



Boards we have (reminder)

Boards we have (reminder):

- A-board (? items):
 - ▶ Up to 118 MM channels:
 - ★ 112 in central connector
 - ★ 118 in left/right connector
 - ▶ no LEMO channels
- B-board (1 item):
 - ▶ 64 MM channels
 - ▶ 8 lemo connectors (all to single TIGER)
- B2-board (3 items):
 - ▶ Up to 122 MM channels:
 - ★ 122 of 122 in <right> connector;
 - ★ 116 out of 116 in central connector
 - ★ 116 out of 122 in <left> connector)
 - ▶ 120 MM channels (on central & **left** MM)
 - ▶ 2 LEMO connectors, 1 per TIGER

Summary after meeting with Vitalii:

Summary after additional mid-evening meeting

- ① 200ns looks like failing signal edge (signal width on the right plot is about 200ns)
- ② That x-talks should be from LEMO connectors
- ③ SHiP straw creates noise on tigers connected to LEMO – looks like grounding problem
- ④ 85ns between Scint.Coinc. and single scintillator:
 - ▶ Check if CAEN system was used
 - ▶ Maybe, 32ns cables was used
 - ▶ About 100ns difference can be found on right plot
 - ▶ About 100ns between first hits to MM and Scint.Coinc.

Looks like normal value

- ⑤ We do not know about problems in B2-board **now**, LEMO connectors wasn't used normally yet.
- ⑥ Since we have SHiP straw (20mm diameter) in straw-combined-plane:
 - ▶ single B2-board utilizes 120 MM channels, e.g. 30mm
 - ▶ B-board can use only 64 MM channels (15mm) – **less then SHiP size!**

Seems, we need B2-board for **all** MM

Signals on CAEN

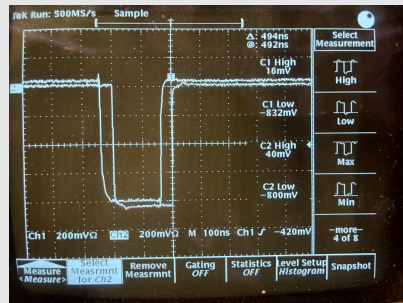
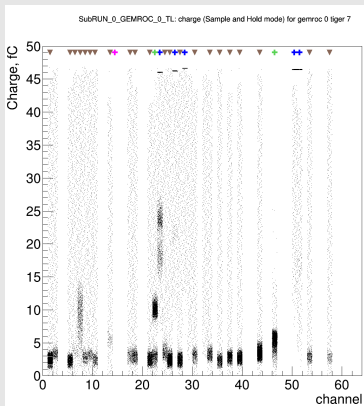


photo from Vitalii

Backup

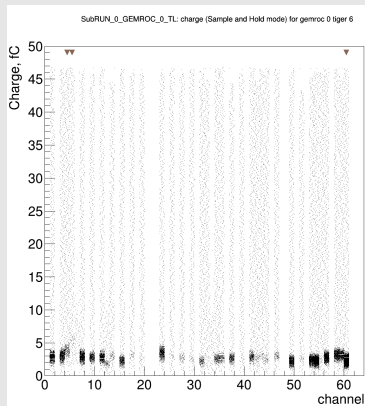
Charge in TIGERs

TIGER 7 charge (MM3)



- Green cross: Sci
- Blue cross: Straw

TIGER 6 charge (MM3)



- Magenta cross: LEMO unconnected
- Brown triangles: "bad" channels