CFT Data Quality Analysis

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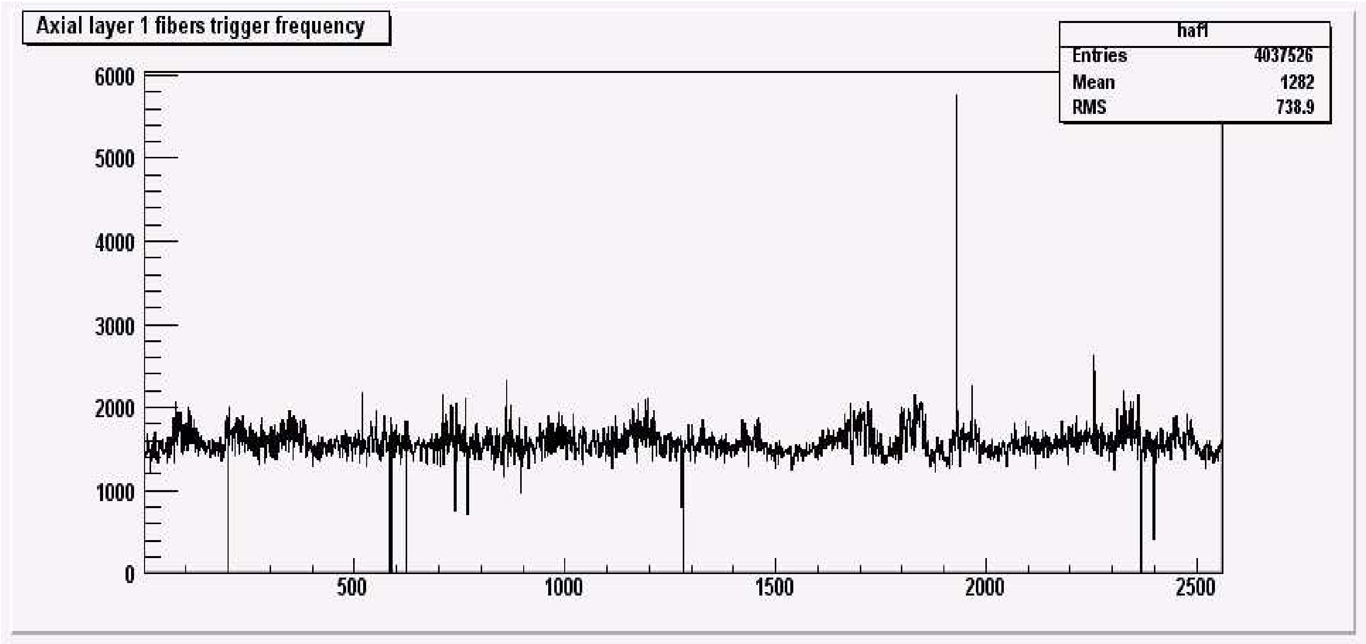
Introduction

- Initiative: CFT Offline Monitor
- Keep track of occupancy and triggered percentage of 16 layers and 8 axial discriminators
- Package: cft_offline_mon
- Designed to work with reco

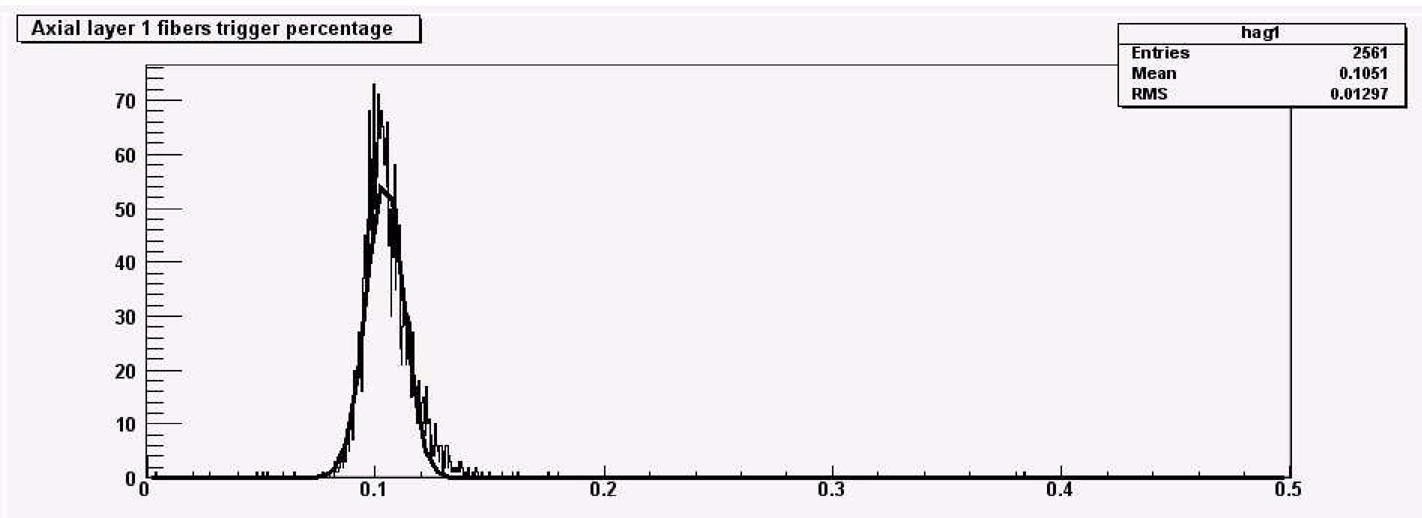
Analysis

- Gather the total number of fired fibers into occupancy plots
- ex. Run 167013, 15000 events



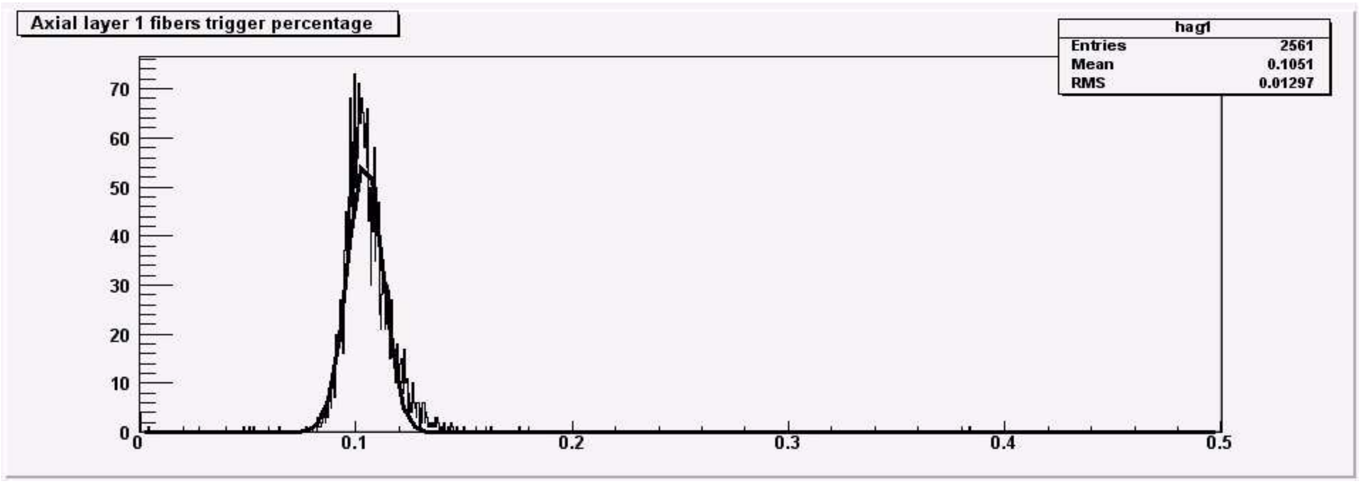
Analysis (cont.)

- Divide by total number of events to obtain the trigger percentage
- Do a Gaussian fit on the trigger percentage plot for each layer



Analysis (cont.)

- Pull the mean and standard derivation from a number of events to obtain the standard
- Decide on the cut (i.e. Number of sigma) to identify "hot" and "dead" fibers

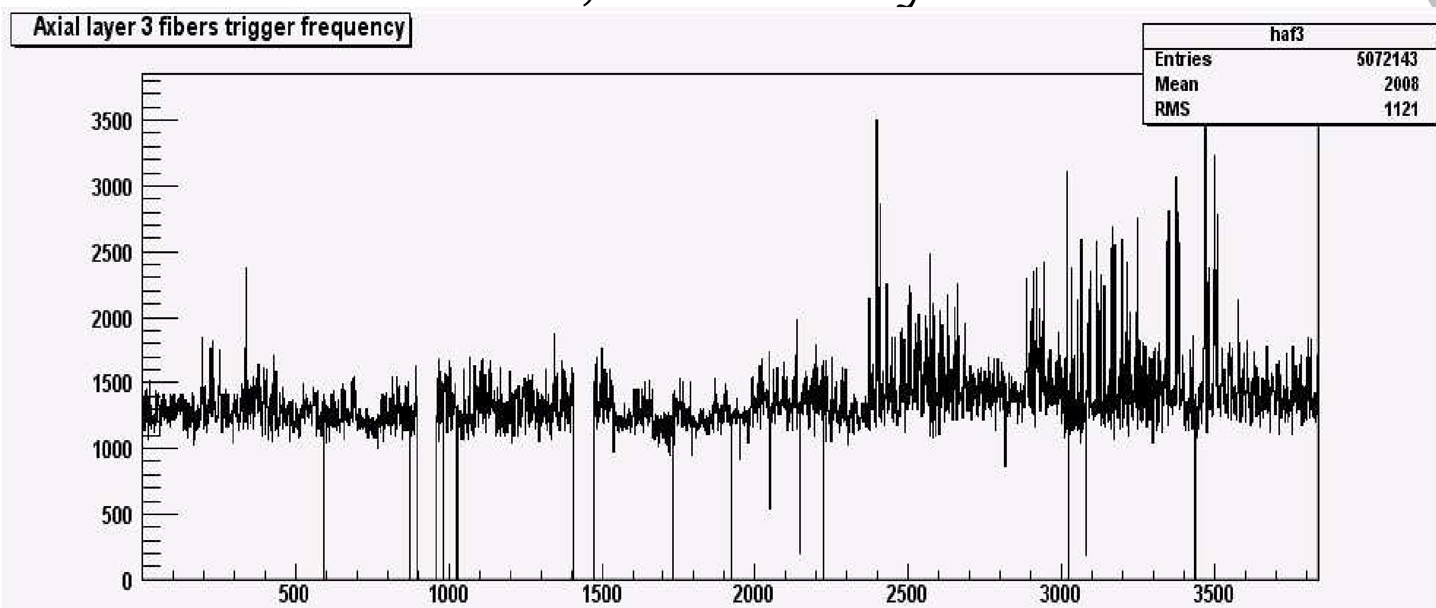


Reasonable cut?

- Only ~ 5–10% of the fibers are sampled
- Divide into 2 sets: experience with sigma to see if the recognized hot and dead fibers match in 2 sets
- 5 sigma for dead channels
- Long "tail" in the triggered percentage distribution –a larger sigma (7) is chosen for hot fibers

Example

- Run 167013, Axial layer 3



Output (text file) :=

Axial layer 3 fibers trigger percentage
Calculated mean: 0.088058 Calculated sigma: 0.0225354
Standard mean: 0.087 Standard sigma: 0.0155
(5 sigma) Lower cut–off: 0.010558 Total Dead fibers: ***136***
(7 sigma) Upper cut–off: 0.196558 Total Hot fibers: 7

Normal (run 170371) :=

:
(5 sigma) Lower cut–off: 0.015061 Total Dead fibers: 12

Contiguous fibers

- Also search for contiguous blocks of hot/dead fibers within a sector
- Identify possible chip failure
- Same ex. 167013 Axial layer 3

Output: List of max contiguous dead fibers counts

Sectors 0 1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33...
: :
Axial 3 : 0 0 0 0 0 0 0 0 0 0
0 0 1 0 0 0 0 0 ***16*** ***48*** 1 1 0
0 0 0 0 0 0 ***32*** ***32*** 0 0 0....

Results

- Run Number 170371 (no 20 ADC)

Layer	Hot	Hot %	Dead	Dead %
Axial 1	0	0	9	0.35%
Axial 2	1	0.03%	11	0.34%
Axial 3	1	0.03%	11	0.29%
Axial 4	6	0.13%	12	0.27%
Axial 5	1	0.02%	27	0.53%
Axial 6	1	0.02%	8	0.14%
Axial 7	0	0	12	0.19%
Axial 8	17	0.24%	10	0.14%
Stereo 1	0	0	8	0.31%
Stereo 2	0	0	7	0.18%
Stereo 3	0	0	18	0.31%
Stereo 4	1	0.02%	10	0.16%
Stereo 5	4	0.16%	3	0.09%
Stereo 6	0	0	23	0.51%
Stereo 7	1	0.02%	5	0.09%
Stereo 8	0	0	4	0.06%
Total	33	0.04%	178	0.23%

Results

- 170371 Discriminator

Layer	*Hot*	*Hot %*	*Dead*	*Dead %*
Axial 1	0	0	9	0.35%
Axial 2	4	0.12%	10	0.26%
Axial 3	0	0.00%	12	0.23%
Axial 4	6	0.13%	11	0.17%
Axial 5	1	0.02%	29	0.91%
Axial 6	1	0.02%	5	0.11%
Axial 7	1	0.02%	12	0.21%
Axial 8	0	0.00%	10	0.14%
Total	13	0.03%	98	0.25%

Dead Fibers

- Using results from 166900, 167017, 167546, 170371, 172359, 174238

Run #	166900	167013	167546	170371	172359	174238
Axial 1	7	7	10	9	9	12
Axial 2	10	10	13	11	17	17
Axial 3	138	136	10	11	21	26
Axial 4	10	2	14	12	13	12
Axial 5	10	23	25	27	27	33
Axial 6	25	4	5	8	7	27
Axial 7	4	2	15	12	22	28
Axial 8	3	3	10	10	66	26
Stereo 1	7	7	8	8	14	14
Stereo 2	8	8	11	7	12	15
Stereo 3	29	27	17	18	5	24
Stereo 4	4	5	7	10	8	19
Stereo 5	4	4	4	3	3	2
Stereo 6	10	2	18	23	15	2
Stereo 7	8	8	11	5	8	14
Stereo 8	5	7	19	4	9	8
Total	282	255	196	178	233	279

Hot Fibers

Run #	166900	167013	167546	170371	172359	174238
Axial 1	1	1	0	0	0	8
Axial 2	5	4	2	1	3	13
Axial 3	6	7	1	1	15	10
Axial 4	0	2	0	6	27	68
Axial 5	22	18	2	1	30	39
Axial 6	2	1	1	1	20	34
Axial 7	24	20	2	0	29	29
Axial 8	29	23	0	17	45	40
Stereo 1	0	0	0	0	3	3
Stereo 2	20	19	0	0	9	12
Stereo 3	65	66	2	0	5	19
Stereo 4	17	18	0	1	35	57
Stereo 5	2	1	1	4	1	3
Stereo 6	7	7	0	0	17	38
Stereo 7	6	6	1	1	4	13
Stereo 8	16	13	0	0	11	11
Total	222	255	12	33	254	397

Discriminator

- Hot/Dead

Dead #	166900	167013	167546	170371	172359	174238
Axial 1	23	20	24	11	11	25
Axial 2	14	13	14	13	18	20
Axial 3	140	140	13	13	24	27
Axial 4	2	12	54	15	12	11
Axial 5	1	24	30	33	30	39
Axial 6	58	63	62	9	22	31
Axial 7	13	15	39	41	32	39
Axial 8	12	13	22	31	95	39
Total	263	300	258	166	244	231
Hot #	**166900**	**167013**	**167546**	**170371**	**172359**	**174238**
Axial 1	0	0	0	2	0	2
Axial 2	1	1	2	1	2	2
Axial 3	0	0	0	0	0	0
Axial 4	2	1	0	1	1	1
Axial 5	1	1	0	0	0	0
Axial 6	2	1	1	1	2	4
Axial 7	0	0	0	0	1	3
Axial 8	5	5	0	0	5	4
Total	11	10	3	5	11	16

Conclusion

- CFT performance deteriorates after the shutdown
- Results: text file, Root plots
- Also output CPS plots (hot/dead strips are not ready yet...)
- Suggestions/Questions?