HFT software Meeting

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03/31/14

Dead Chip/Channels procedure

- Goal is to make Permanent dead Chip/Channels tables based on all run.
  - 209 Cosmic runs is used plots at :
  - http://www4.rcf.bnl.gov/~babakabi/public_html/plots/index.htm
    - I. **Pedestal/noise per ladders (3rd Timebin)**
    - II. **Pedestal/Noise/ComModeNoise for All time bins .**
    - III. **Pedestal/Noise Stability for time bins 0 to 5 from Cosmic runs days 32 to 40**

- General Characteristics of Silicon Strip Modules

1) Pedestal of Strip *i* from *M* events :

$$p_i = \frac{1}{M}\sum_{j=1}^{M} r_{ij} \ ,$$

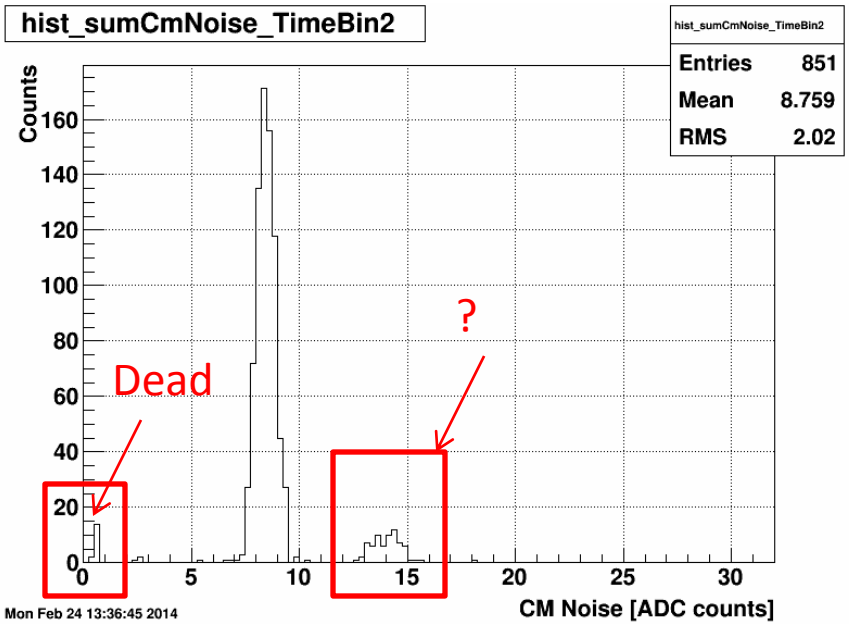
2) Pedestal-noise of Strip *i* from *M* events

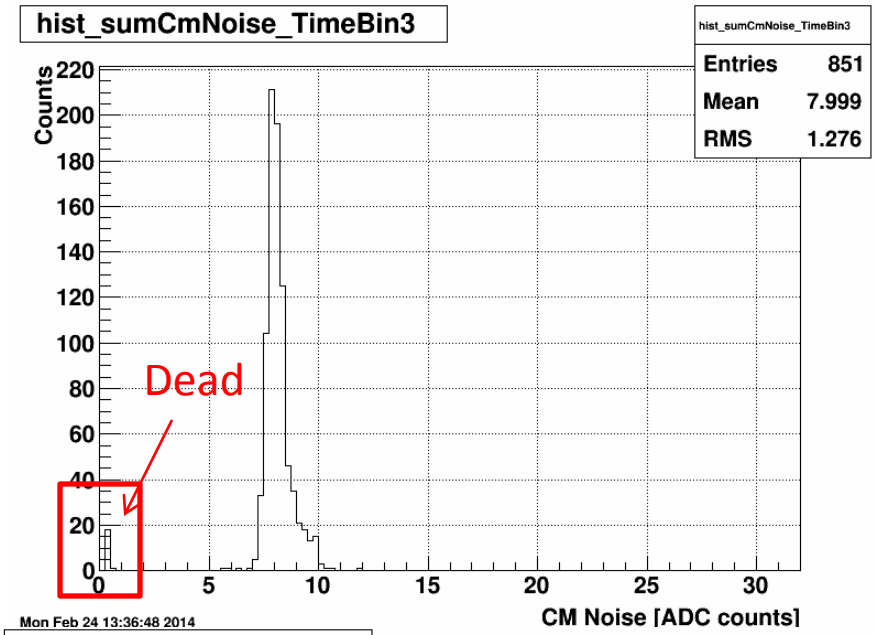
$$\sigma_i = RMS(r_{ij}) = \sqrt{\frac{1}{M}\sum_{j=1}^{M}(r_{ij} - p_i)^2}$$

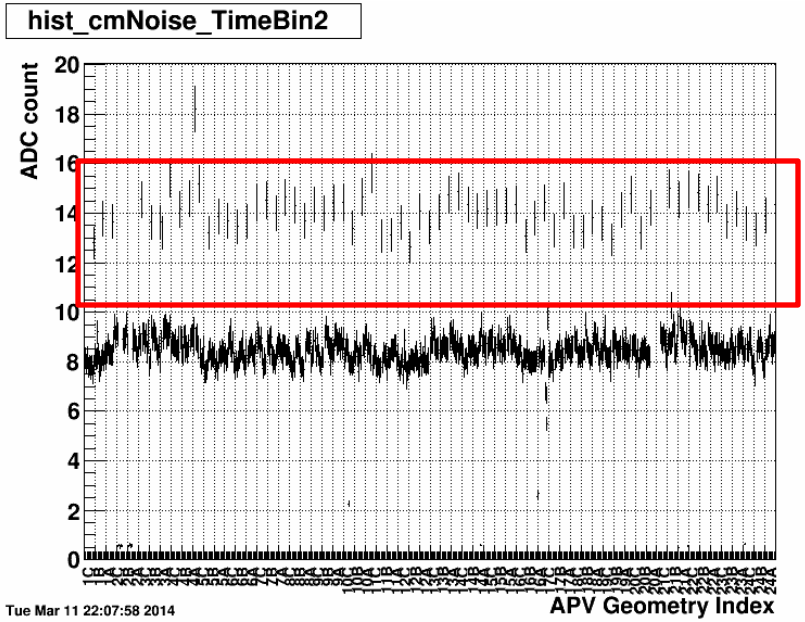
3) Common mode offset (noise) of APV chip event *j.*
   - The common mode noise is the RMS of the common mode distribution

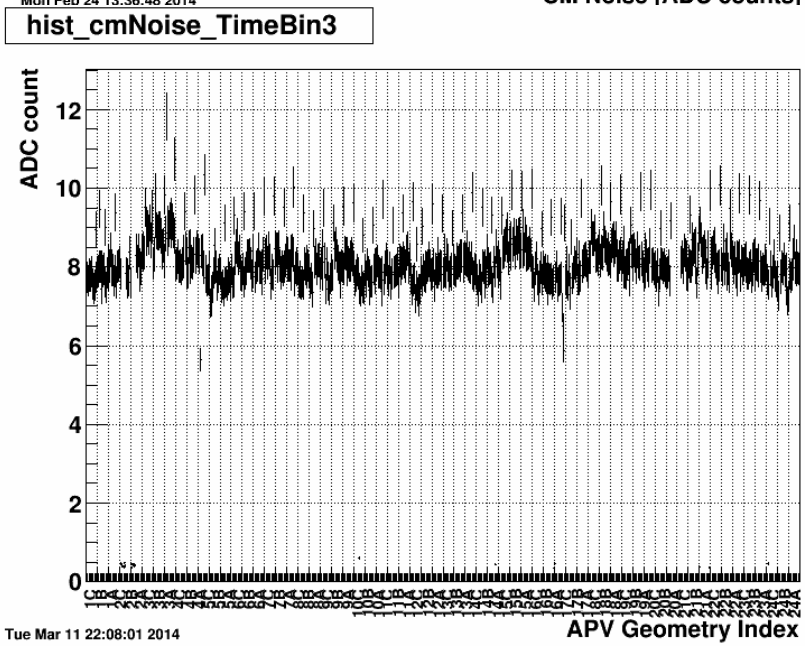
$$CM_j = \frac{1}{128}\sum_{i=1}^{128}(r_{ij} - p_i)$$

Chips Common Mode noise



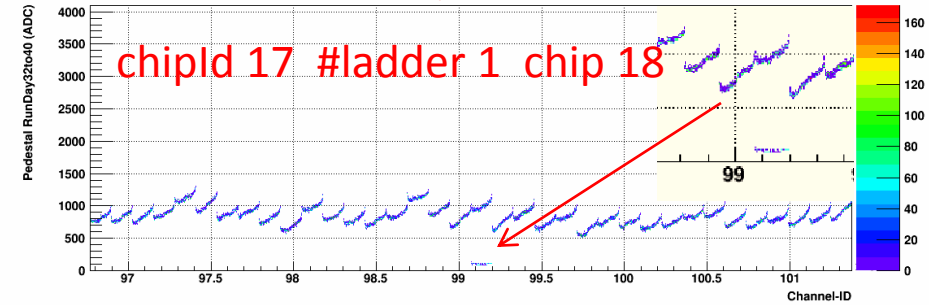




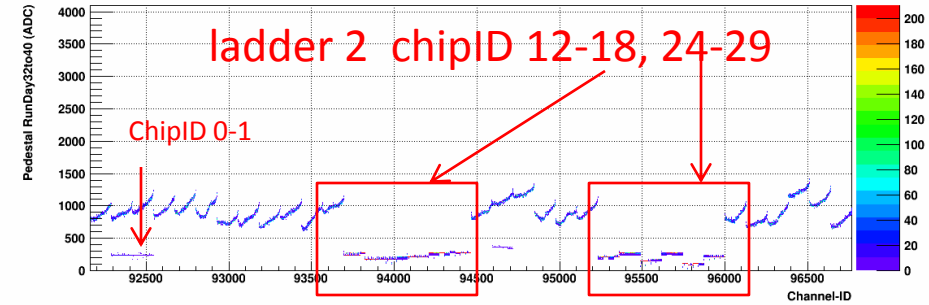


Ladder #1 Time-bin1

Pedestal distribution /allruns

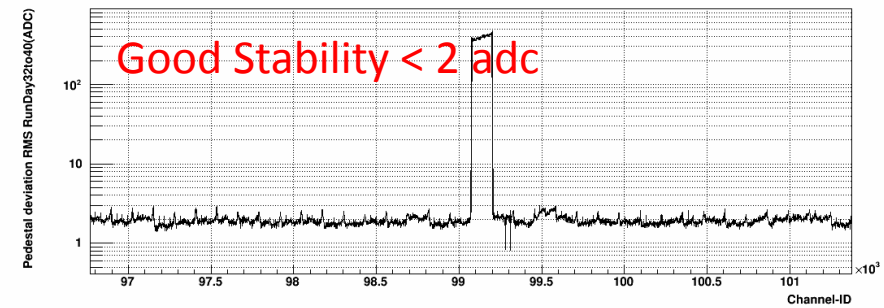


Ladder #2 Time-bin1

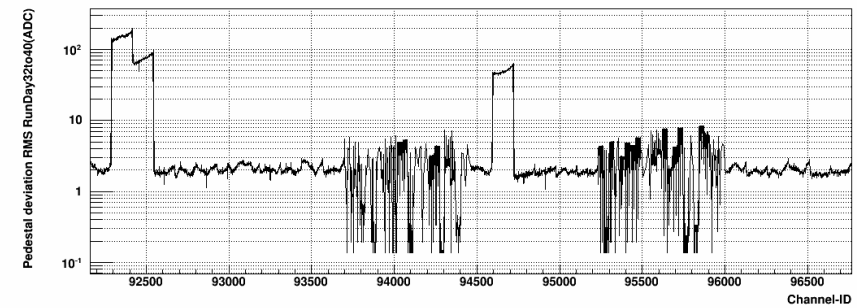


Ladder #1 Time-bin1

Pedestal deviation rms/allruns

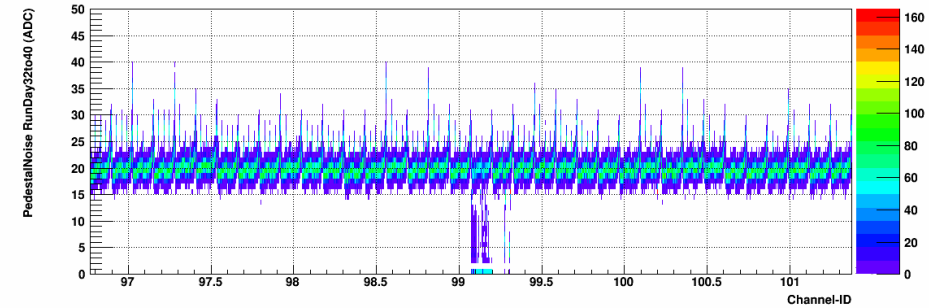


Ladder #2 Time-bin1

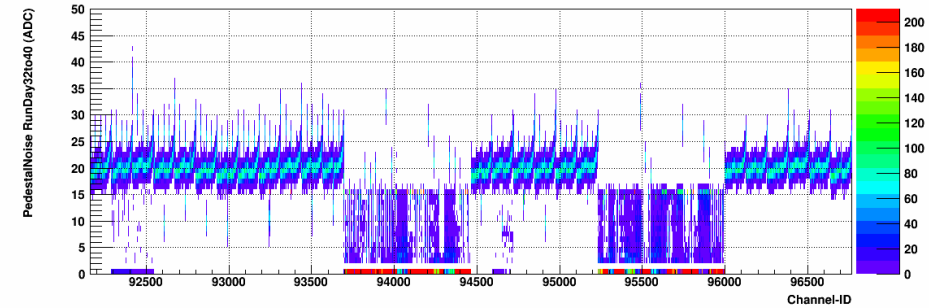


Ladder #1 Time-bin1

Pedestal -Noise distribution /allruns

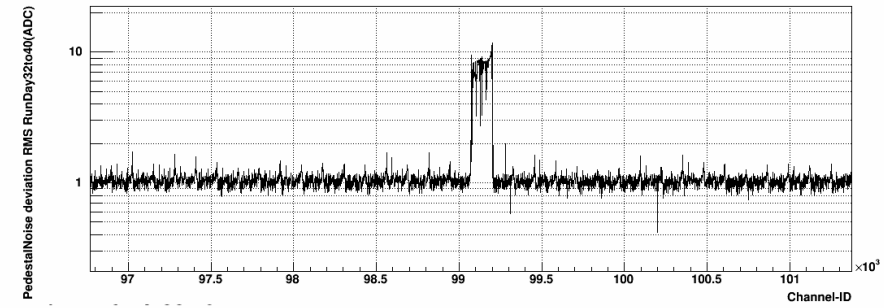


Ladder #2 Time-bin1

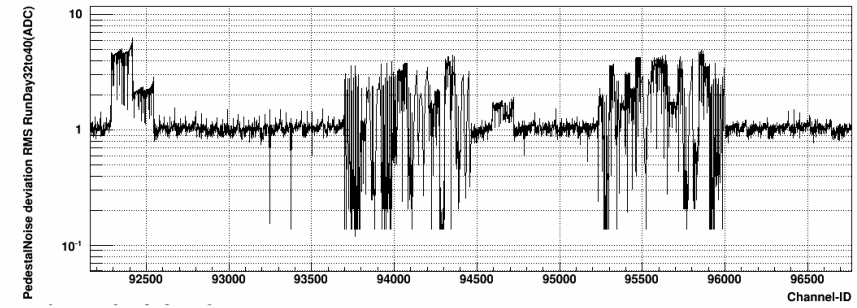


Ladder #1 Time-bin1

Pedestal –noise deviation rms/allruns

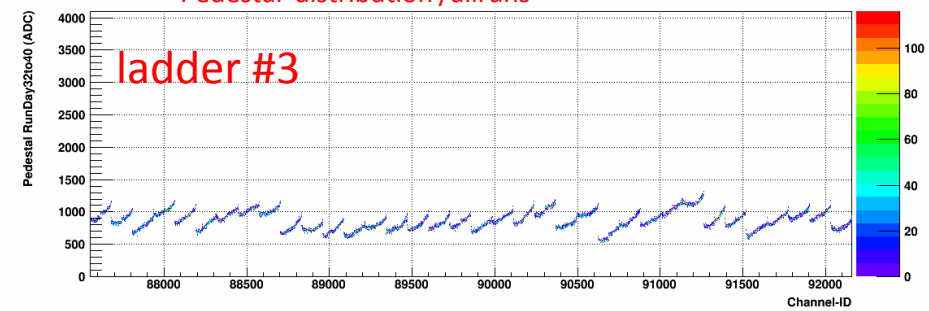


Ladder #2 Time-bin1

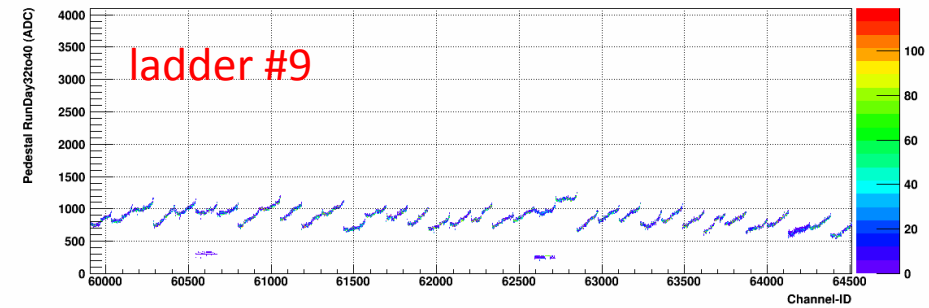


Ladder #3 Time-bin1

Pedestal distribution /allruns

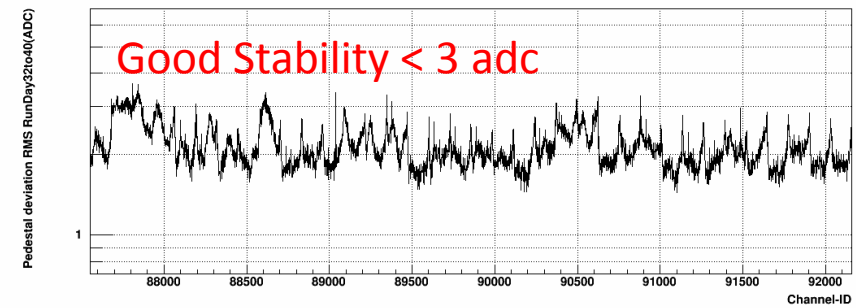


Ladder #9 Time-bin1

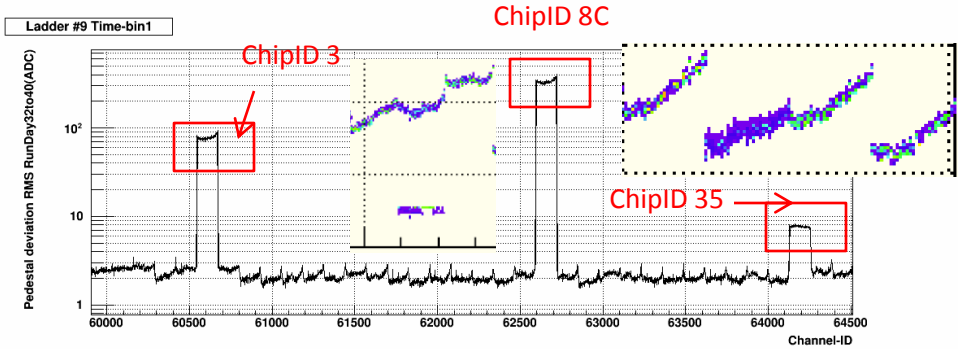


Ladder #3 Time-bin1

Pedestal deviation rms/allruns

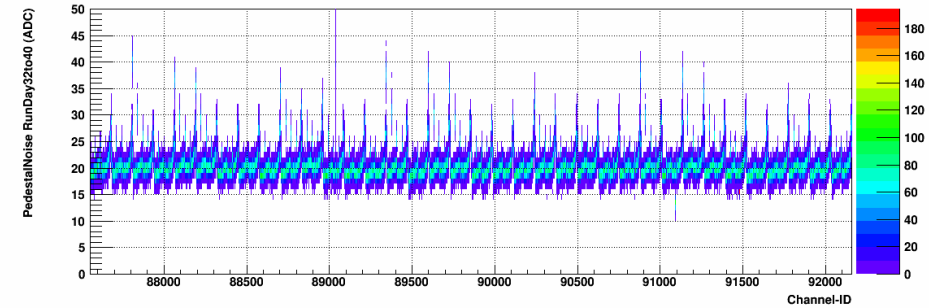


Ladder #9 Time-bin1

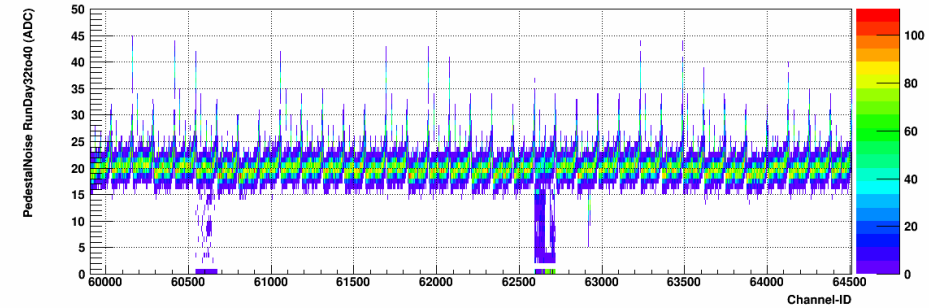


Ladder #3 Time-bin1

Pedestal -Noise distribution /allruns

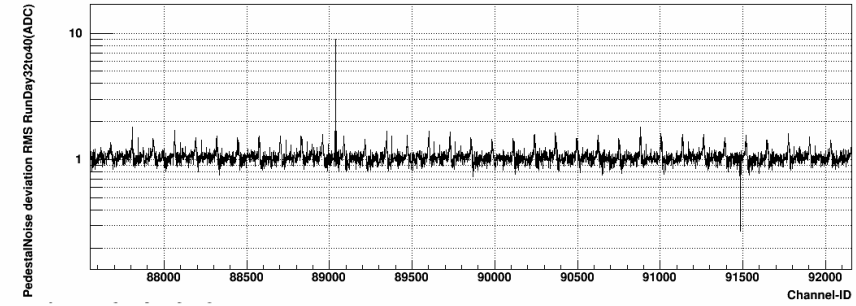


Ladder #9 Time-bin1

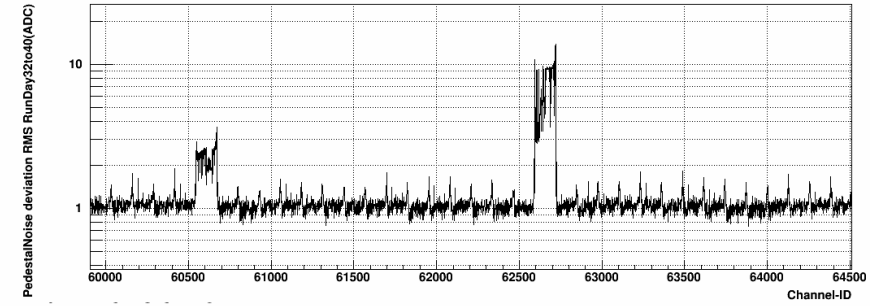


Ladder #3 Time-bin1

Pedestal –noise deviation rms/allruns



Ladder #9 Time-bin1



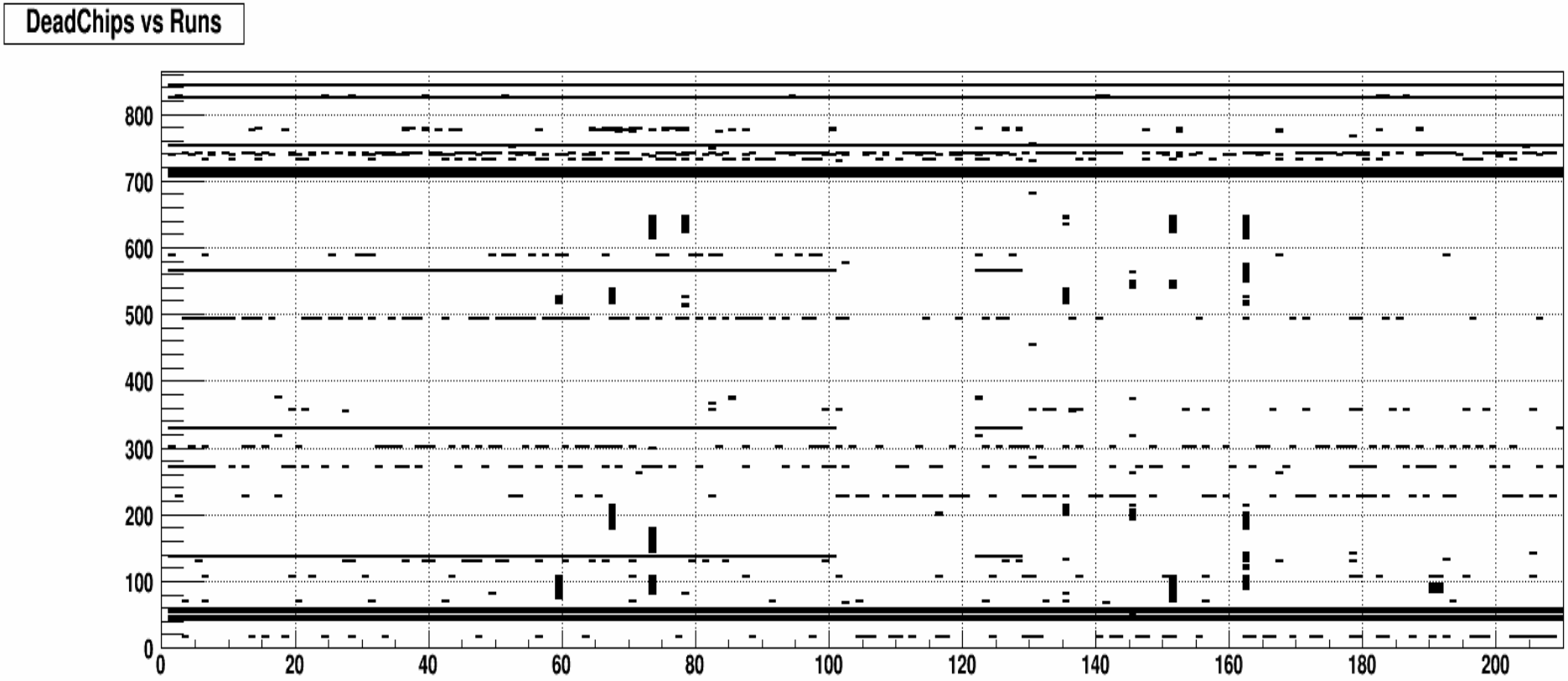
Dead Chip/Channels procedure

- Current scheme :
  - 3 sigma deviation from average (over all chips/channels) of Pedestal/Pedestal-noise/Common mode-noise marked as bad chip/channel (coming in next slides)
- One of time Bin (0 to 5) (ladder based)
  - CM mode noise cut 5< Commode noise < 16(adc)
    1. Low CM noise definitely dead but High CM noise need more careful consideration (No cut for chips with higher CM- noise)
    2. Mark all channels dead (exclude all of them from further steps)
  - Cut in Pedestal noise
    1. It is not Gaussian, cut 10acd <PedestalNoise <60adc (regard to S/N) up (2 iteration) (next slide why no upper sigma cut)
    2. Common noise subtracting to have higher difference level between bad channels and good ones (to be investigated yet)
  - Pedestal cut
    1. 2 iteration (remove the 3 sigma)
    2. Cut on PD-average - 5sigma < Pedestal < PD- average +5sigma
- Decide Chip/Channels is bad if minimum 90% fractions (runs) registered as bad.

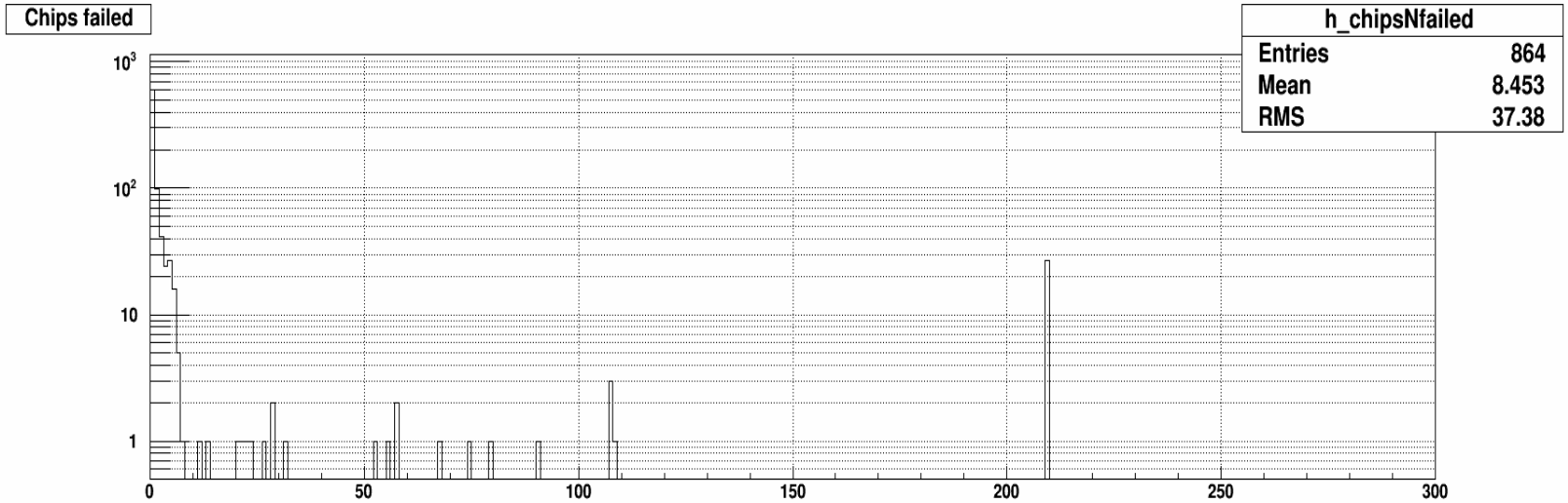
Distribution of Bad Chip/channels current scheme

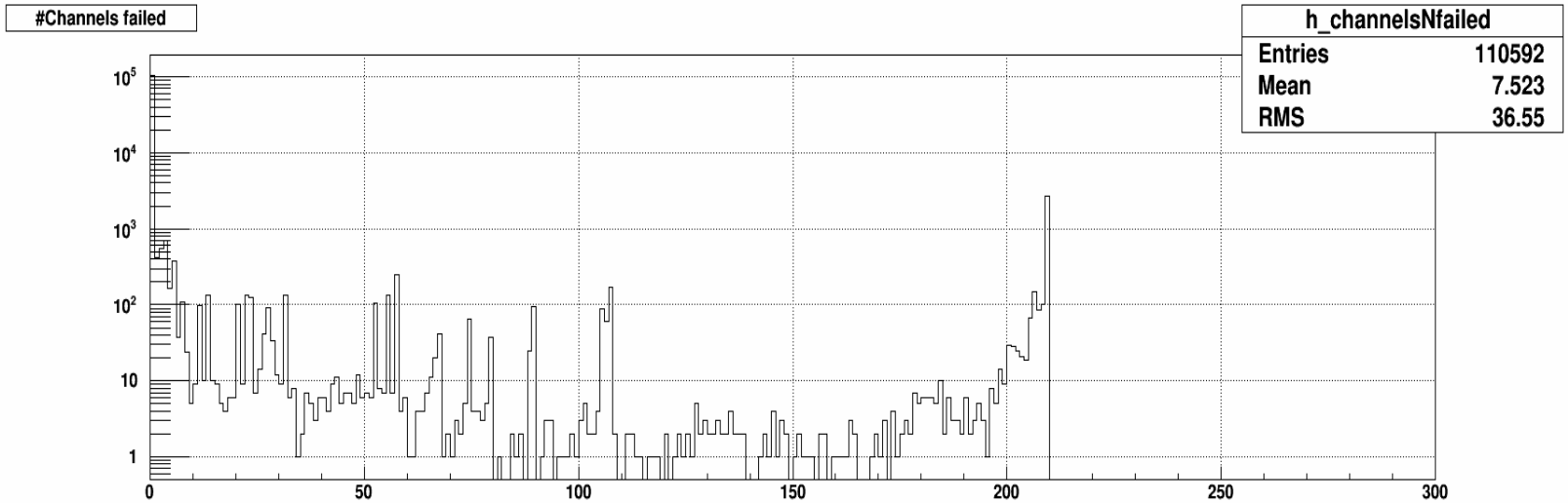
- Latest results at : (would be updated and ,ore detaile)

http://www4.rcf.bnl.gov/~babakabi/public_html/plots/BCC/bcc.htm



Rate failure for 209 runs





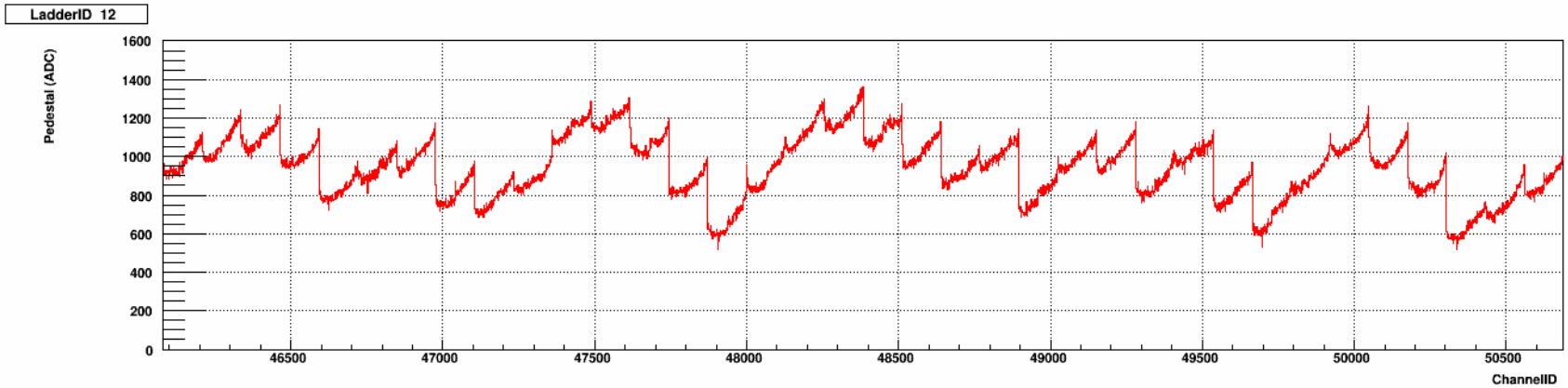
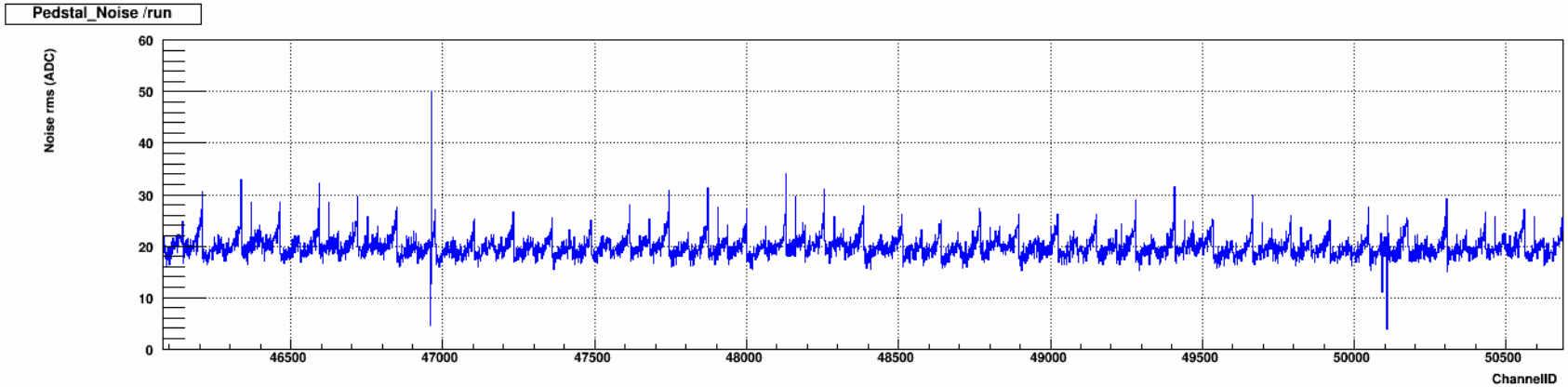
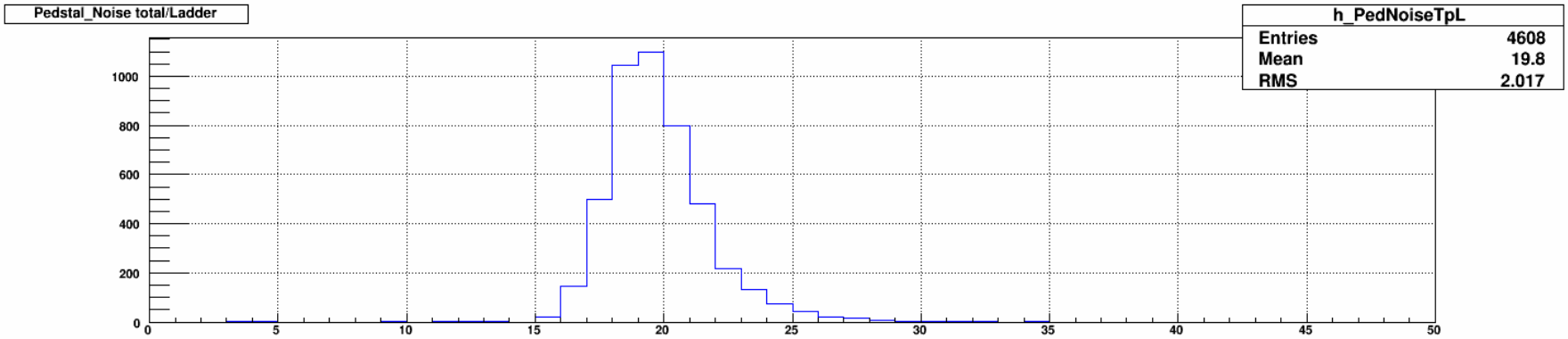
List Bad Chip/channels comparison new/old scheme

- Table in right shows the current DB in left (ChipID included both in blue and red) and suggested DB is in the same column but only blue. The chips ID marked with red are the chips that are not in new DB.
- New DB based on 209 runs in blue and rate of marked as bad chip and reason. The current DB of bad chips showed in red for comparison. **The difference between two DB appears to be only due to rate of failure**.

	Current DB		Suggested DB		ONLINE DB
		# failed (from 209runs)			
17	Low CM in all Time bins	57	ladder=1 chipIndex=18		
42	Low CM in all Time bins	209	ladder=2 chipIndex=29		ladder=2 chipIndex=29
43	Low CM in all Time bins	209	ladder=2 chipIndex=28		ladder=2 chipIndex=28
44	Low CM in all Time bins	209	ladder=2 chipIndex=27		ladder=2 chipIndex=27
45	Low CM in all Time bins	209	ladder=2 chipIndex=26		ladder=2 chipIndex=26
46	Low CM in all Time bins	209	ladder=2 chipIndex=25		ladder=2 chipIndex=25
47	Low CM in all Time bins	209	ladder=2 chipIndex=24		ladder=2 chipIndex=24
54	Low CM in all Time bins	209	ladder=2 chipIndex=17		ladder=2 chipIndex=17
55	Low CM in all Time bins	209	ladder=2 chipIndex=16		ladder=2 chipIndex=16
56	Low CM in all Time bins	209	ladder=2 chipIndex=15		ladder=2 chipIndex=15
57	Low CM in all Time bins	209	ladder=2 chipIndex=14		ladder=2 chipIndex=14
58	Low CM in all Time bins	209	ladder=2 chipIndex=13		ladder=2 chipIndex=13
59	Low CM in all Time bins	209	ladder=2 chipIndex=12		ladder=2 chipIndex=12
138	Low CM in all Time bins	107	ladder=4 chipIndex=5		ladder=4chipIndex=4
228	Low CM in all Time bins	55	ladder=7 chipIndex=23		ladder=10chipIndex=5
272	Low CM in all Time bins	67	ladder=8 chipIndex=15		ladder=16 chipIndex=8
302	Low CM in all Time bins	74	ladder=9 chipIndex=21		ladder=16 chipIndex=9
708	Low CM in all Time bins	209	ladder=2 0chipIndex=11		ladder=2 0chipIndex=11
709	Low CM in all Time bins	209	ladder=2 0chipIndex=10		ladder=2 0chipIndex=10
710	Low CM in all Time bins	209	ladder=2 0chipIndex=9		ladder=2 0chipIndex=9
711	Low CM in all Time bins	209	ladder=2 0chipIndex=8		ladder=2 0chipIndex=8
712	Low CM in all Time bins	209	ladder=2 0chipIndex=7		ladder=2 0chipIndex=7
713	Low CM in all Time bins	209	ladder=2 0chipIndex=6		ladder=2 0chipIndex=6
714	Low CM in all Time bins	209	ladder=2 0chipIndex=5		ladder=2 0chipIndex=5
715	Low CM in all Time bins	209	ladder=2 0chipIndex=4		ladder=2 0chipIndex=4
716	Low CM in all Time bins	209	ladder=2 0chipIndex=3		ladder=2 0chipIndex=3
717	Low CM in all Time bins	209	ladder=2 0chipIndex=2		ladder=2 0chipIndex=2
718	Low CM in all Time bins	209	ladder=2 0chipIndex=1		ladder=2 0chipIndex=1
719	Low CM in all Time bins	209	ladder=2 0chipIndex=0		ladder=2 0chipIndex=0
740	Low CM in all Time bins	57	ladder=21 chipIndex=15		ladder=21 chipIndex=3
742	Low CM in all Time bins	52	ladder=21 chipIndex=13		
743	Low CM in all Time bins	90	ladder=21 chipIndex=12		
754	Low CM in all Time bins	209	ladder=21 chipIndex=1		
825	Low CM in all Time bins	209	ladder=23 chipIndex=2		ladder=23 chipIndex=4
844	Big CM in all Time bins	209	ladder=24 chipIndex=19		ladder=24 chipIndex=19

Conclusion

- New study has been done to produce list of Permanent Dead Chips/channels
  - We understand the reasons why Chip/Channel is bad.
- Start to study the Hot channels (noisy) to have best data quality .
- The Pedestal taken from different runs show very stable during all runs.

Back Up slides

Pedestal / P-noise distribution run 15040040 Ladder#12