# RG: The latest update for EH1 and EH2

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Nov. 1, 2011

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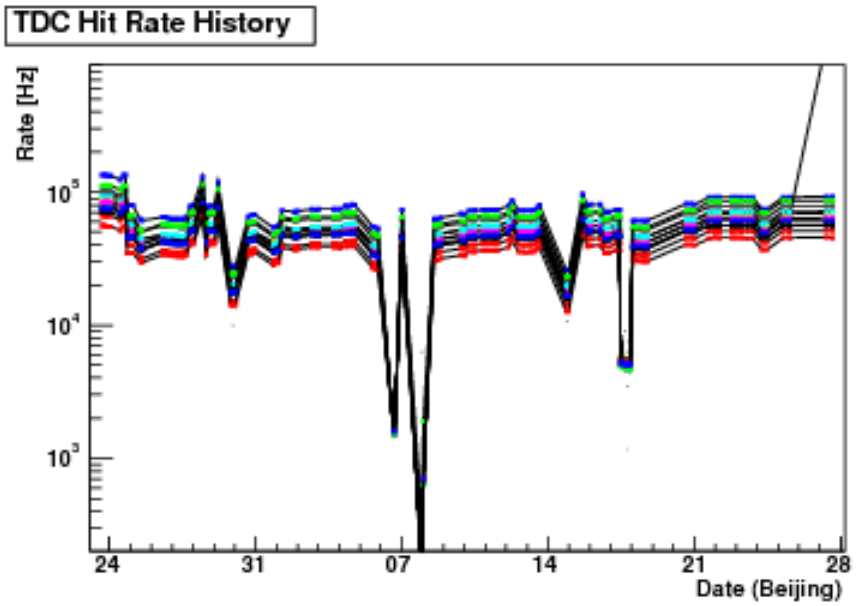
# 1. AD PMTs' dark rate tamed

- We usually saw 600kHz for dark rate at ODM

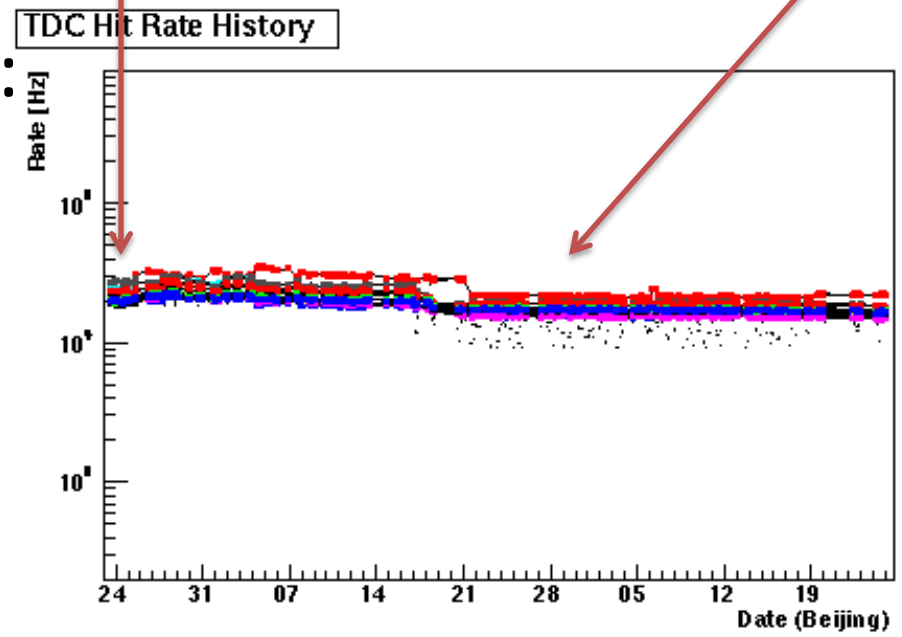
$$Rate = \frac{\#\ of\ hits\ in\ noise\ window}{\#\ of\ trigger * noise\ window\ width}$$

- There was no requirement on event type
- New cut: time to previous trigger > 20 us
- With this cut, retriggers are greatly suppressed. Now the AD PMT dark rate is around 20kHz, a lot closer to its real dark rate+background rate
- Unfortunately this doesn't work for pool PMTs.

An early singles rate plot:

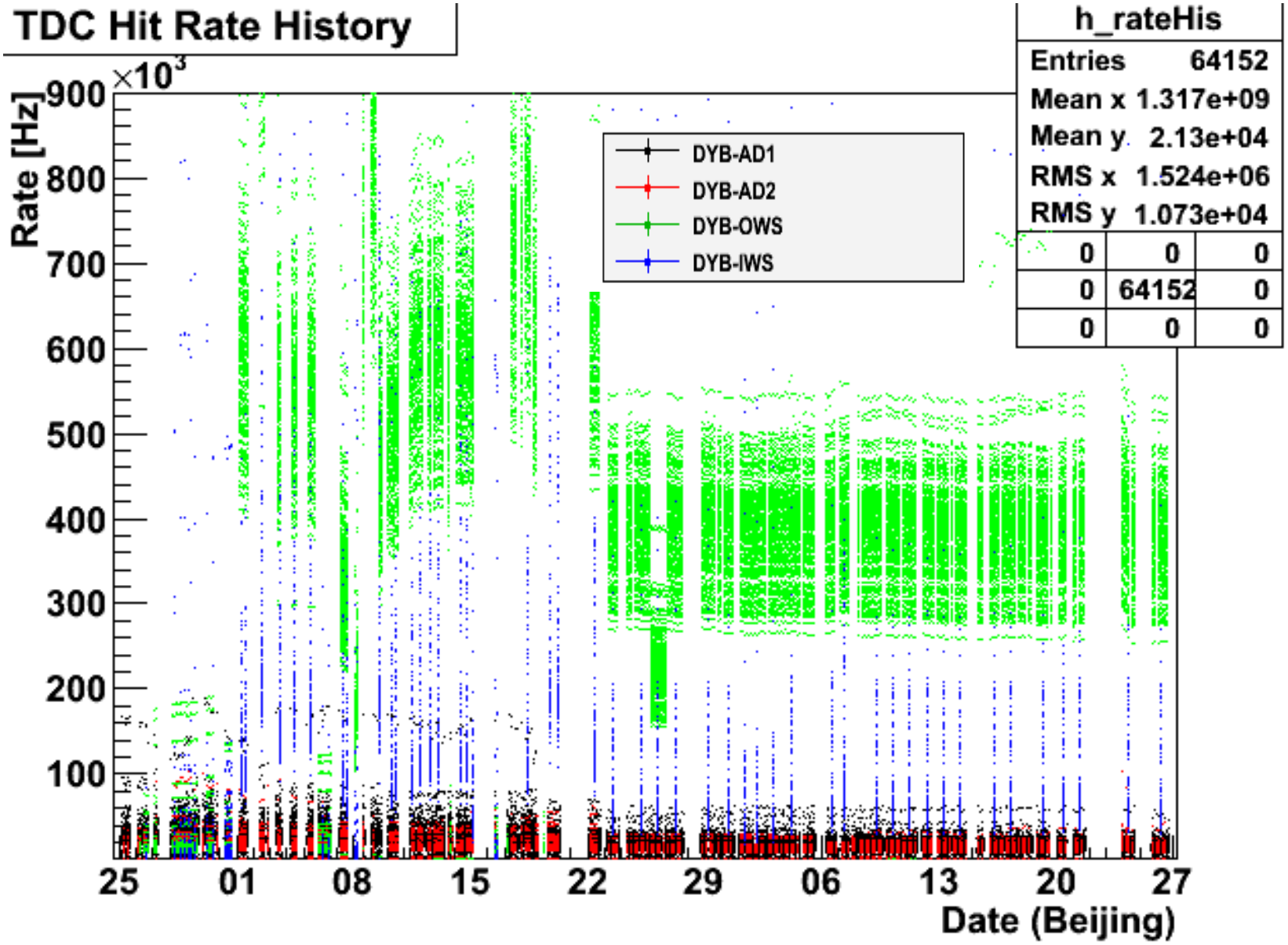



After retrigger suppressed:



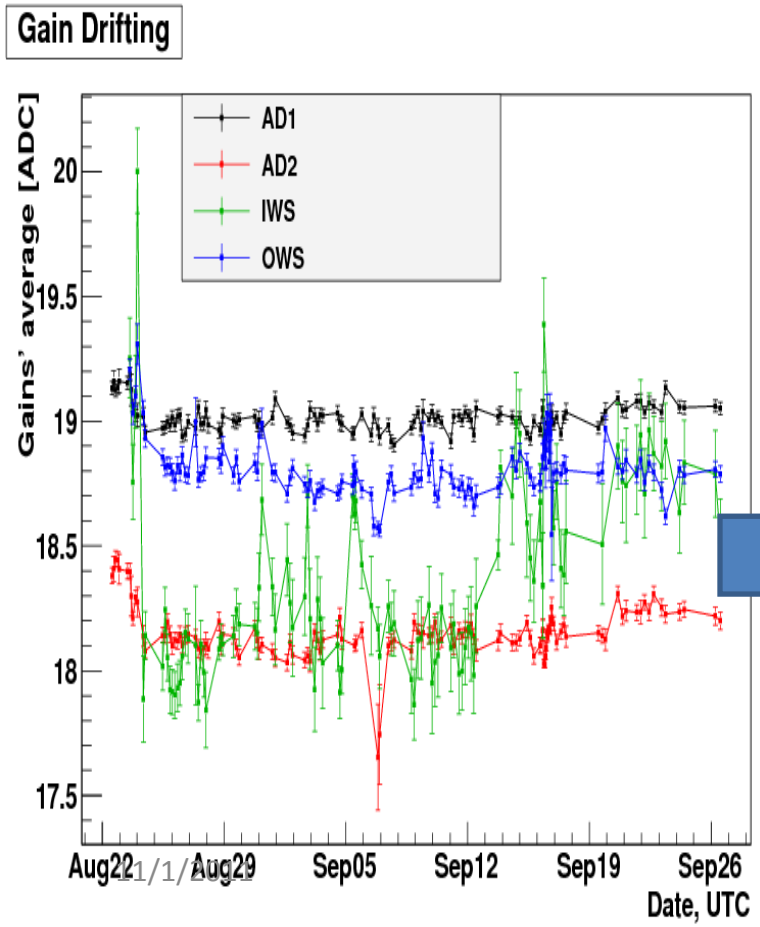

1. Not only the rate is a lot closer to the real dark rate
2. But also these spikes and dips are gone. It indicates that these electronic effects are intermittent. Maybe can be fixed, because they are not there sometimes by themselves.

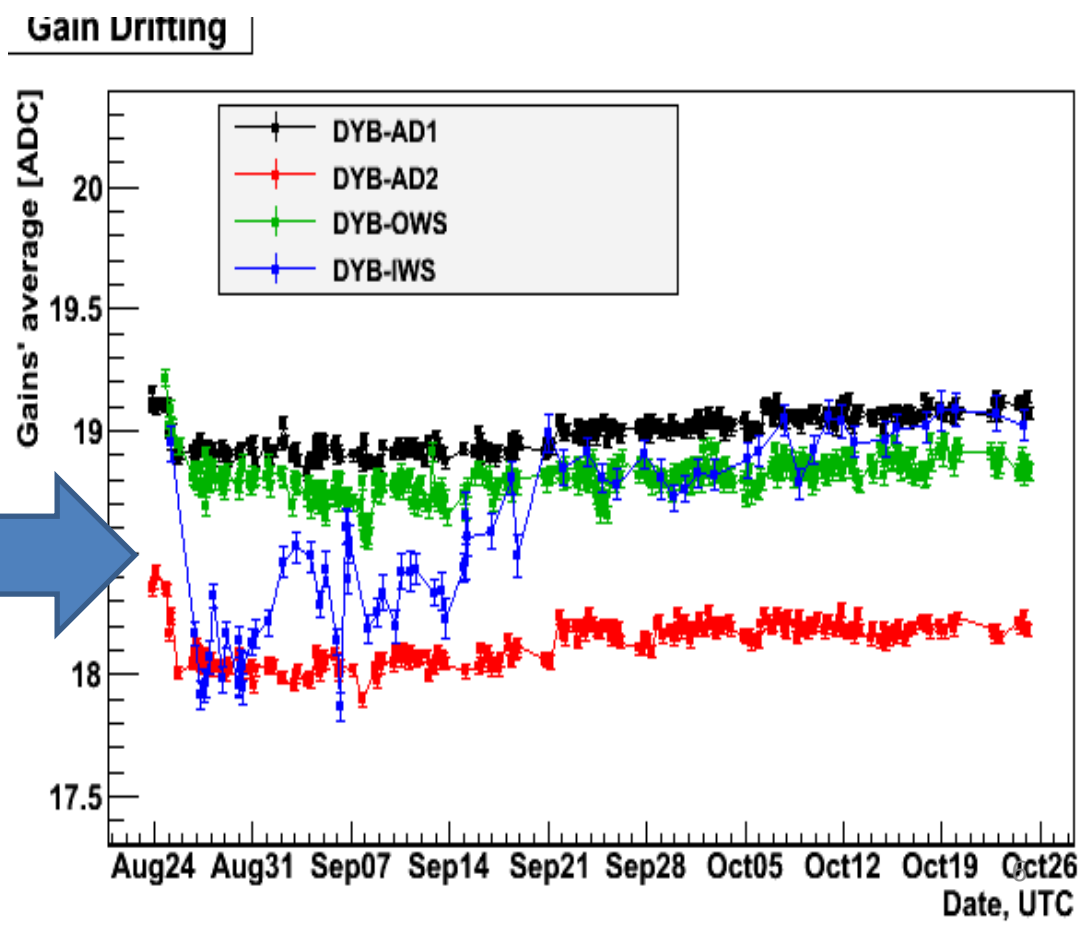
# The new result for all EH1 PMTs



# 2. Random trigger added

- The statistics is increased by ¼.
- The changes in gain is tiny 0.1 ADC



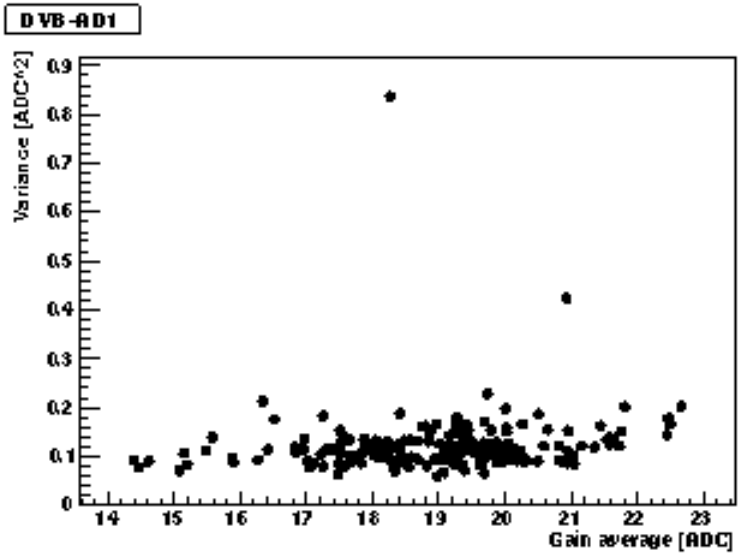



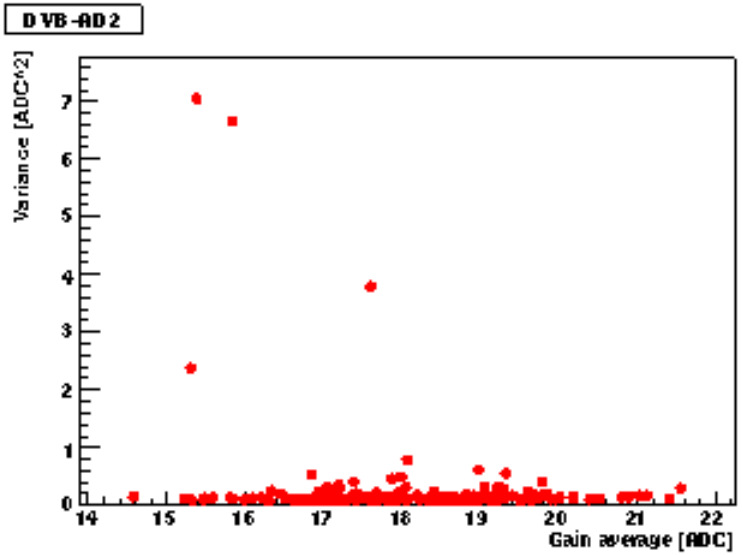
# 3. EH1 Inner water pool

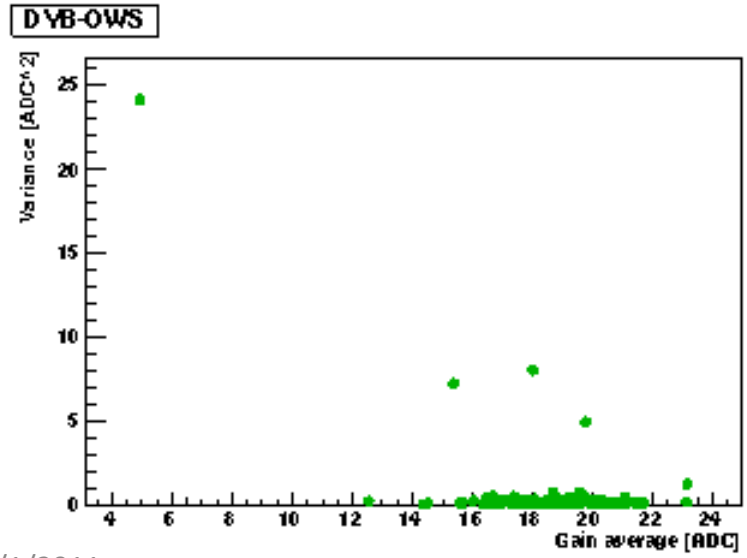
- The statistics low statistics issue is fixed.
- Hit rate:
  - 1. OWS
  - 2. AD
  - 3. IWS lowest
- One calibration for each day

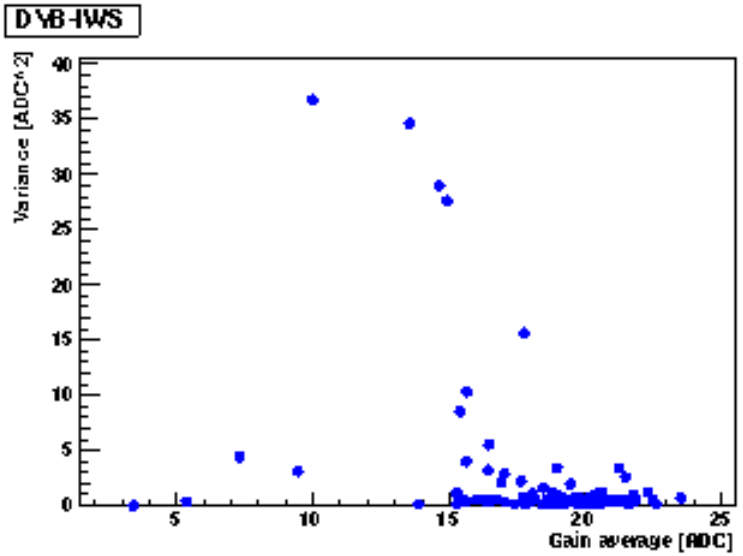
(The blue curve in previous page.)

# 4. EH1 latest result



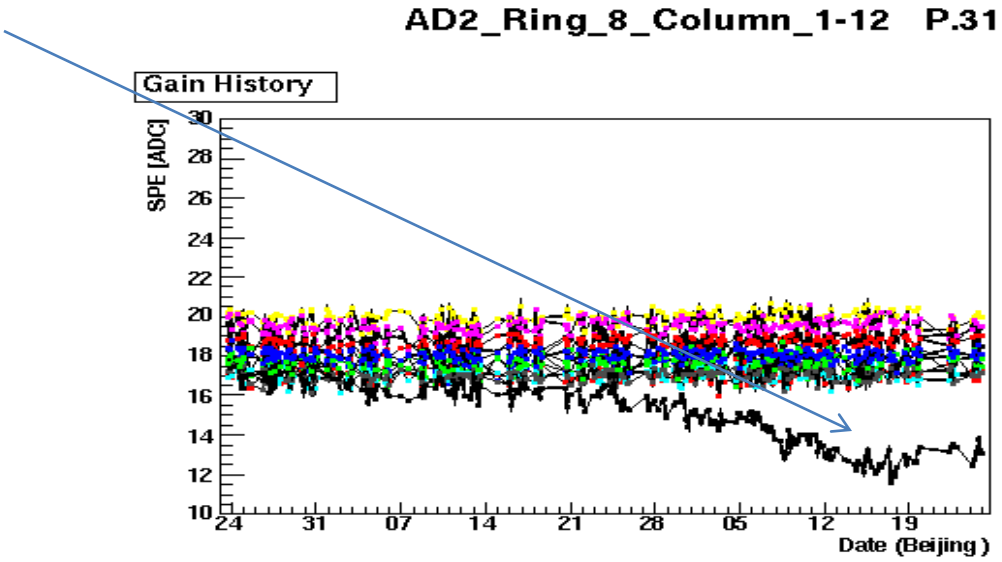



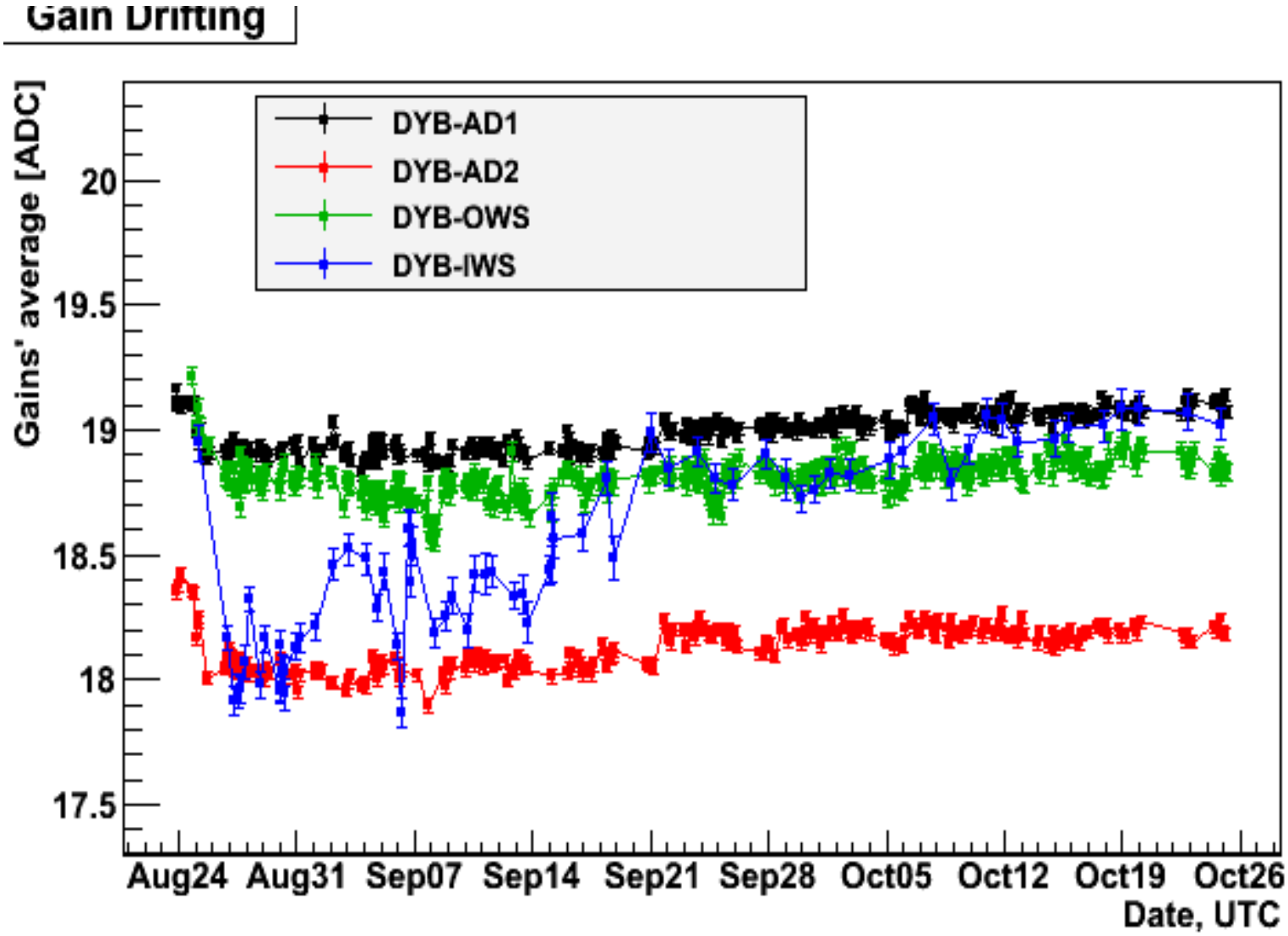



Comments:

1. After my last talk Oct. 03, 2011 there is not much surprise.
2. EH1 IWS PMTs have four outliers. But the main reason causing the bad variance is from Sep. 15, i.e. before FEE threshold adjustment.
3. AD2 ring 8 column 9 needs some attention:

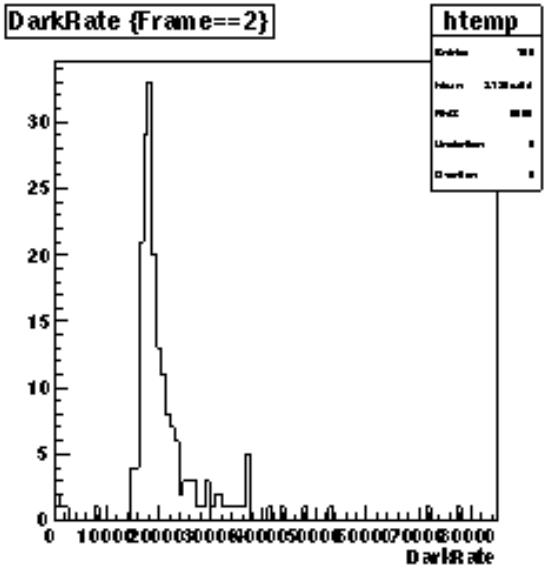





After Sep 20, everything looks fine. And AD2 is significantly lower than others.

# 5. EH2 PMTs' calibration: the good and the bad

# AD1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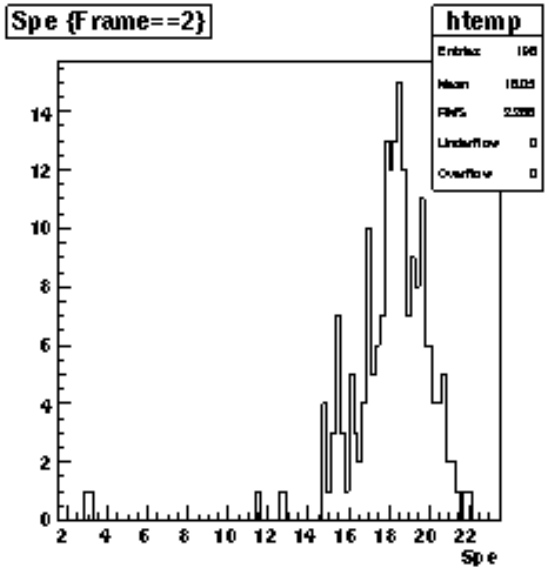
Spe {Frame==2}
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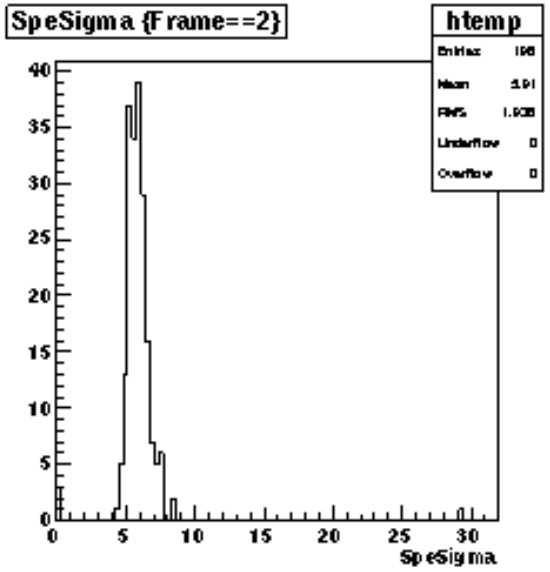
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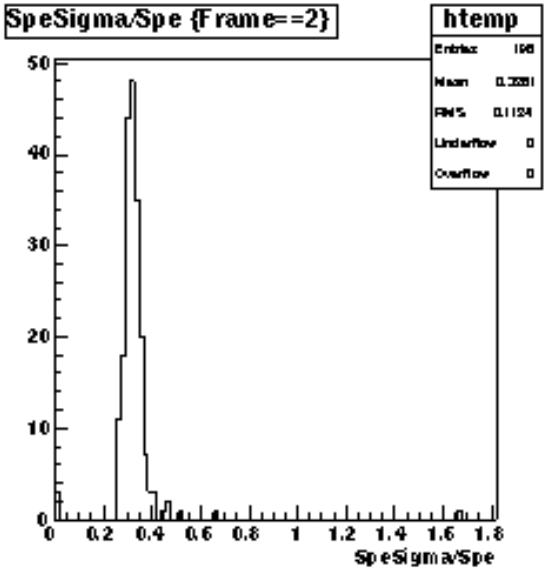
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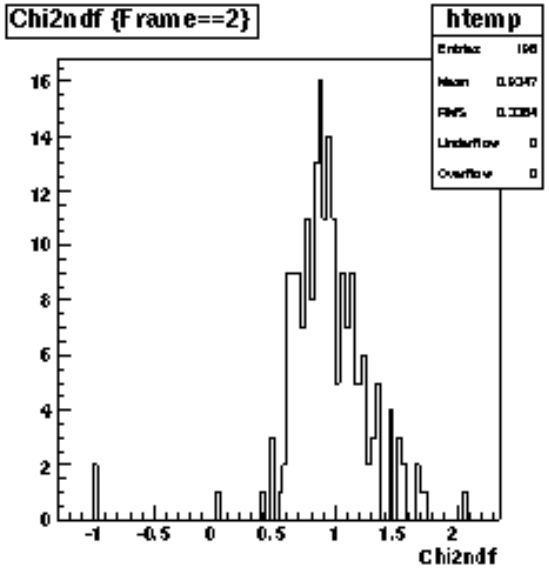
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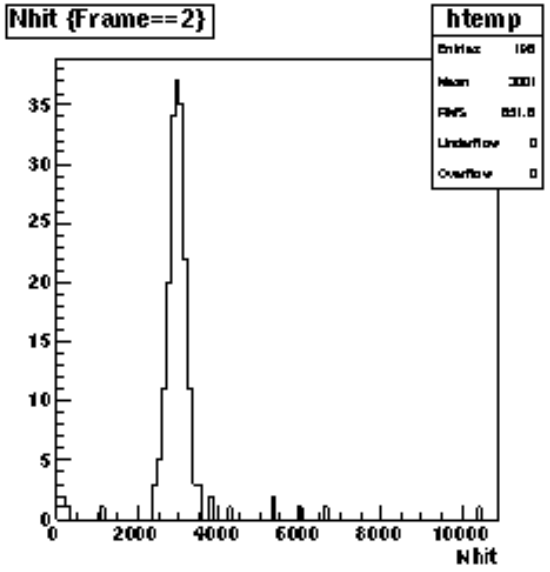
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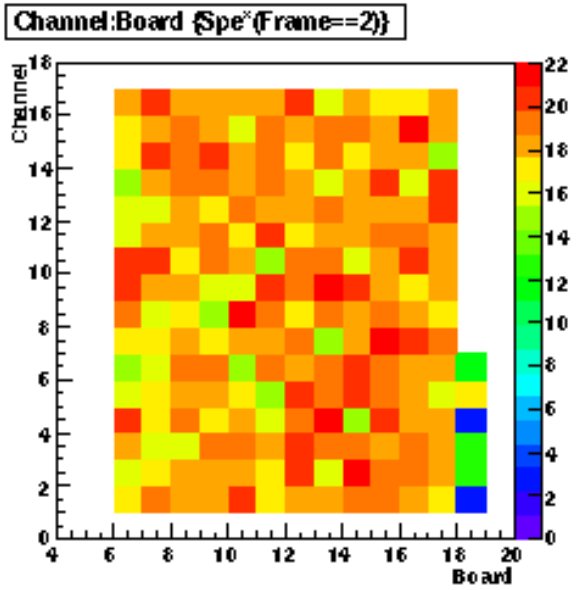
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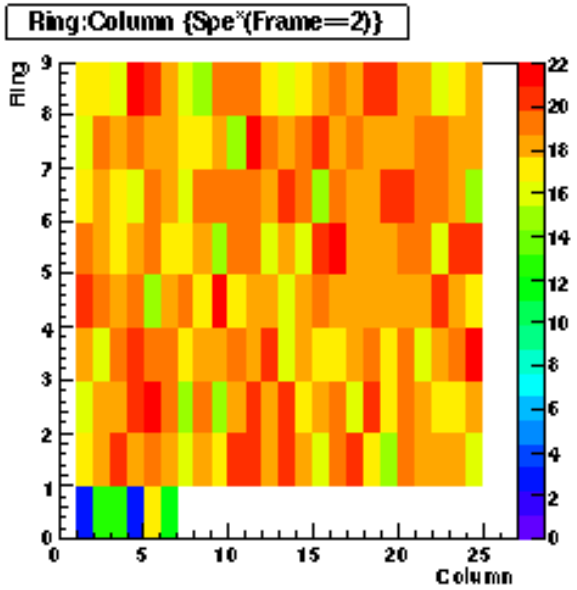
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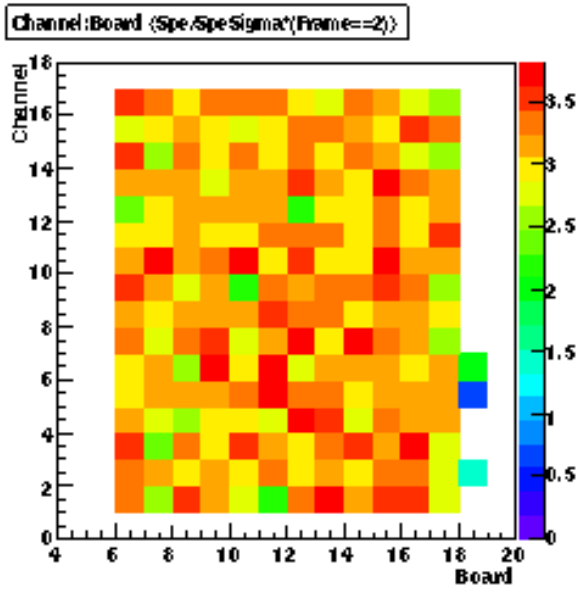
Column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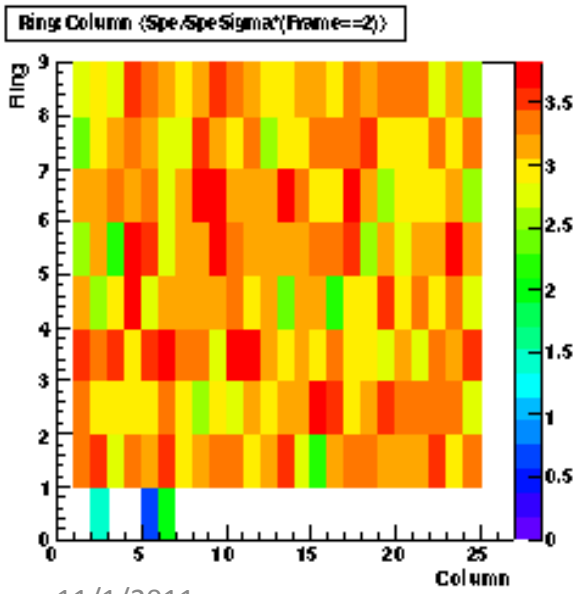
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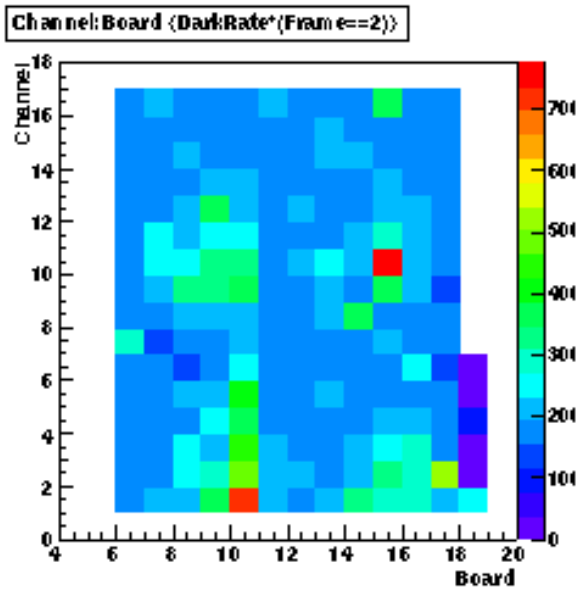
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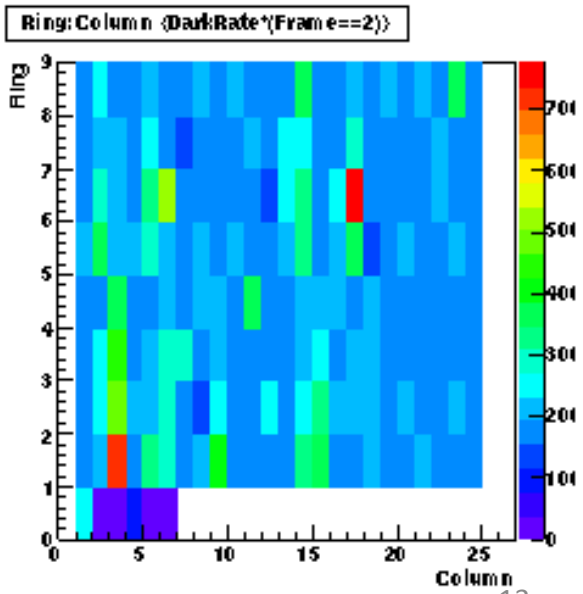
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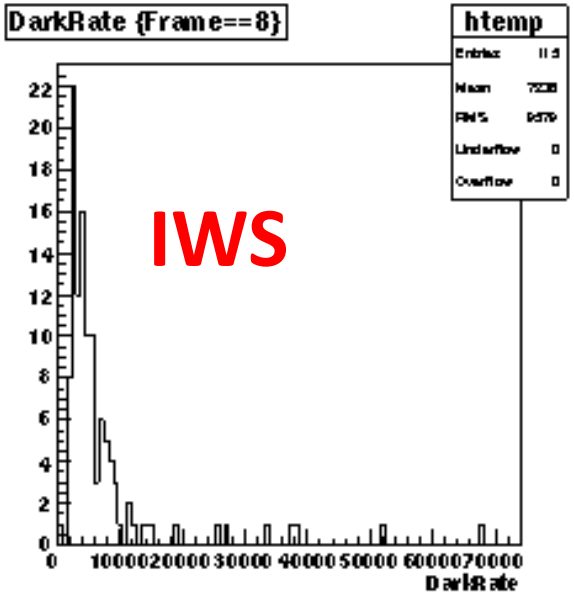
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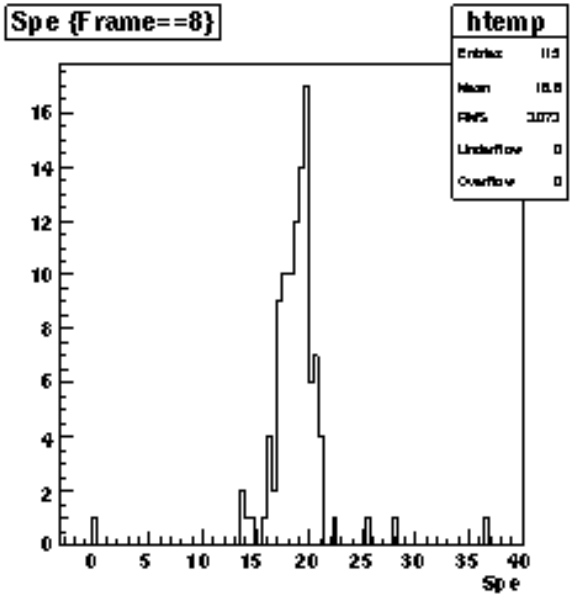
DarkRate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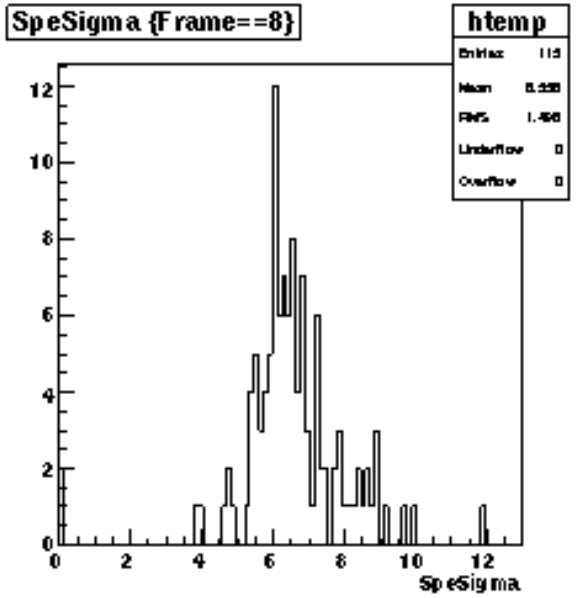
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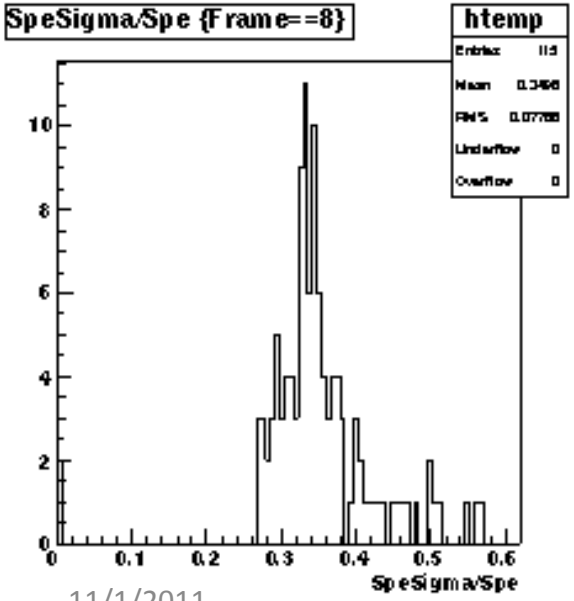
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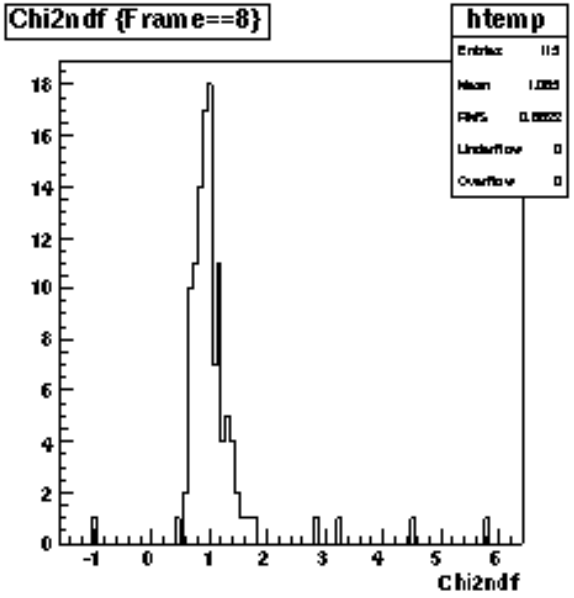
SpeSigma/Spe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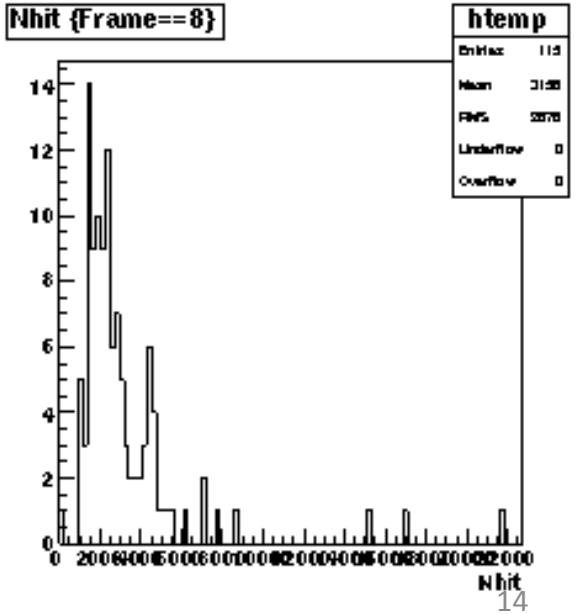
Chi2ndf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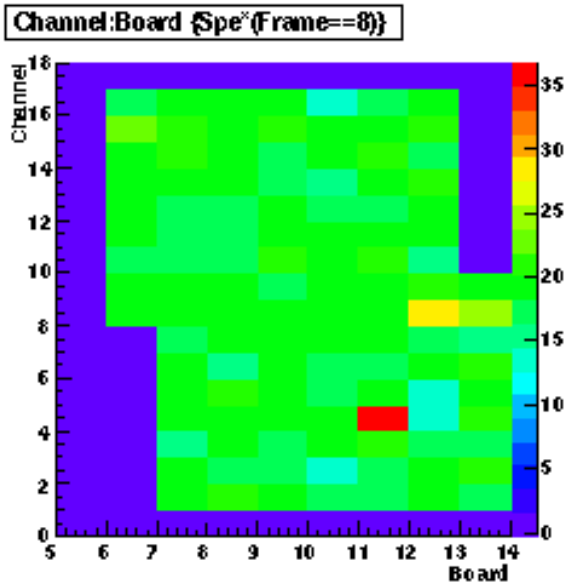
Nhit

# IWS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Channel
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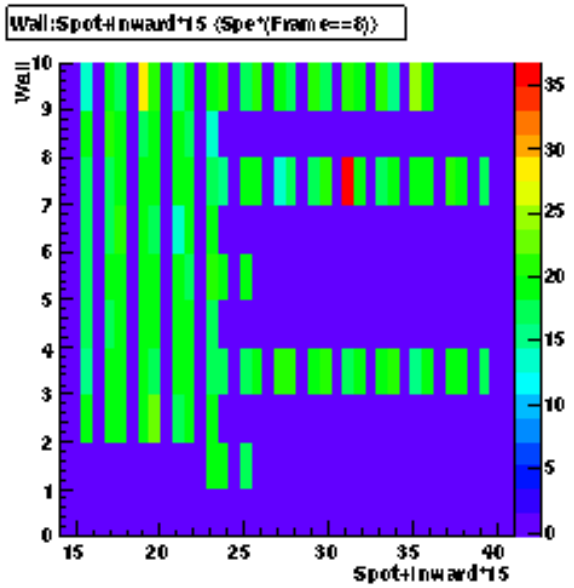
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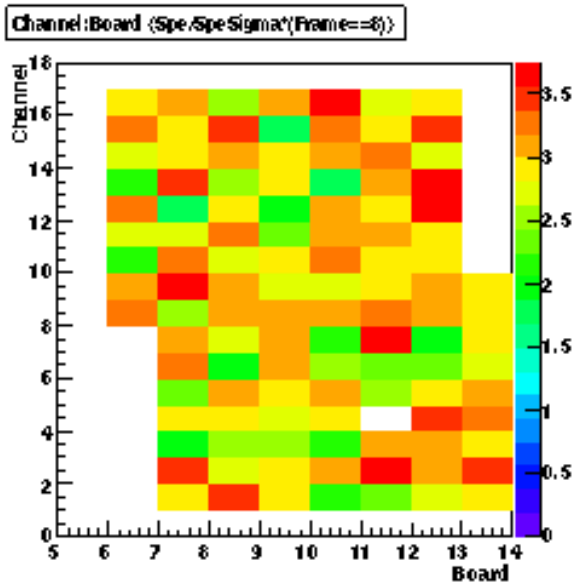
Wall
Spot+Inward*15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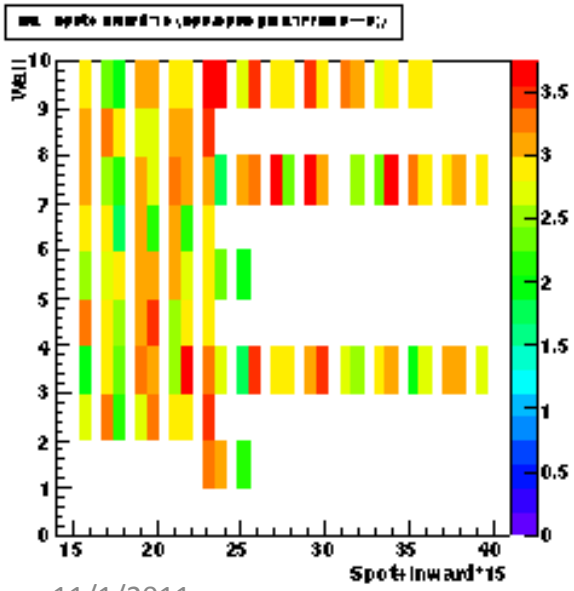
Board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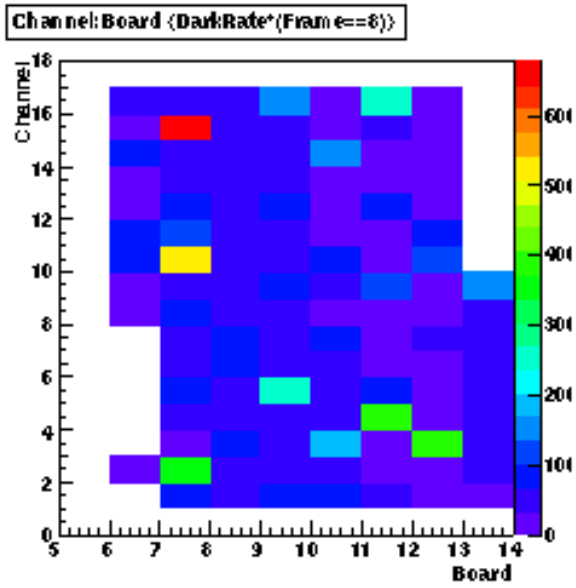
Spot+Inward*15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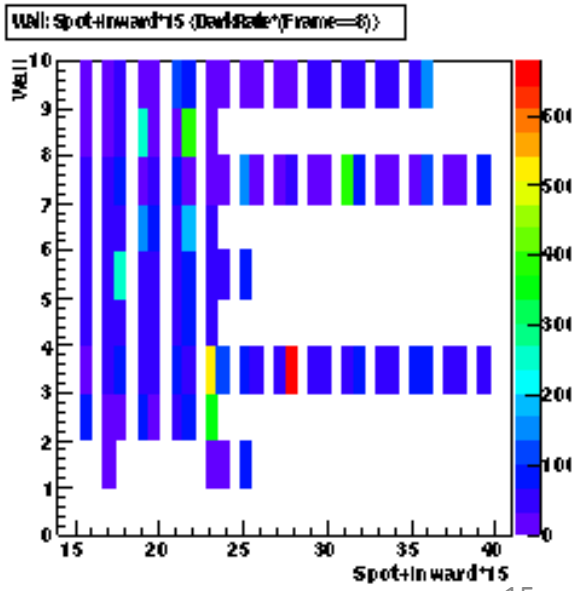
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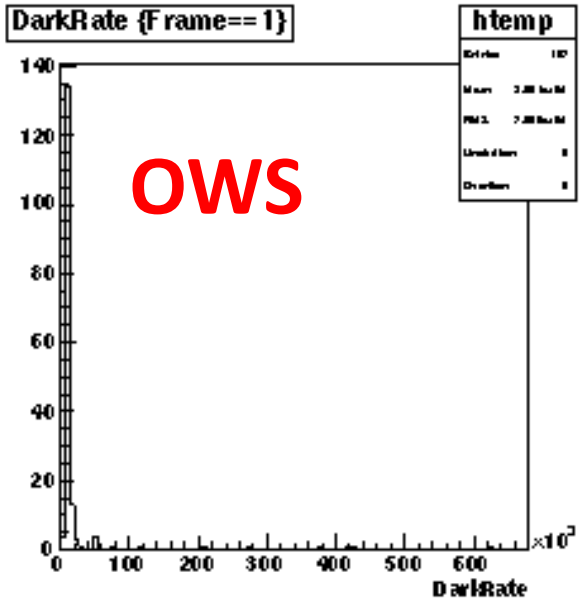
Wall
Spot+Inward*15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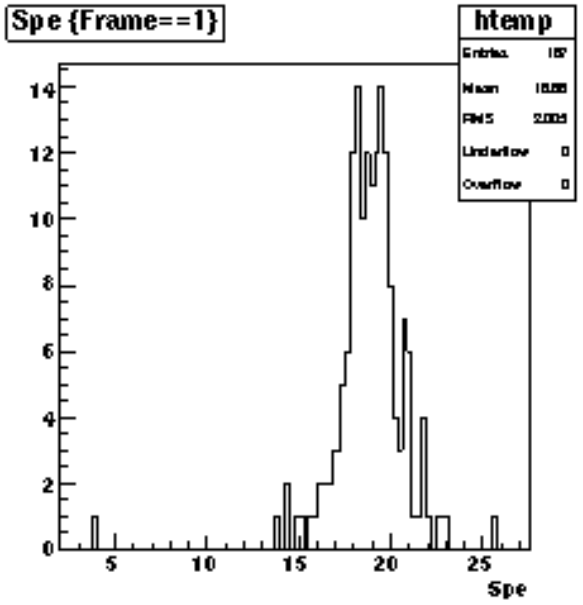
DarkRate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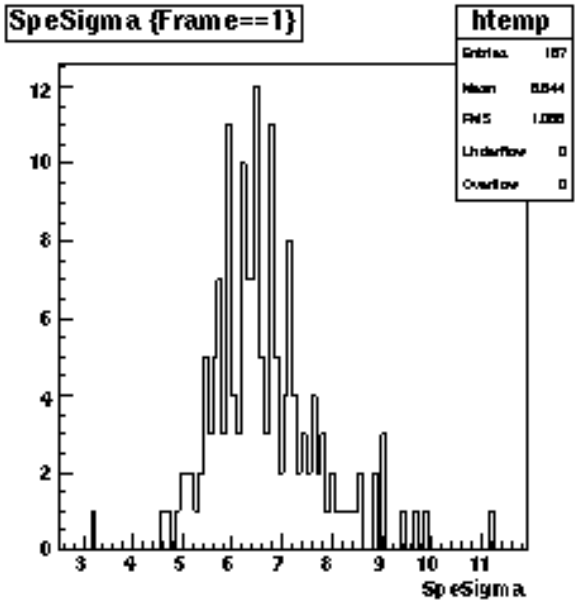
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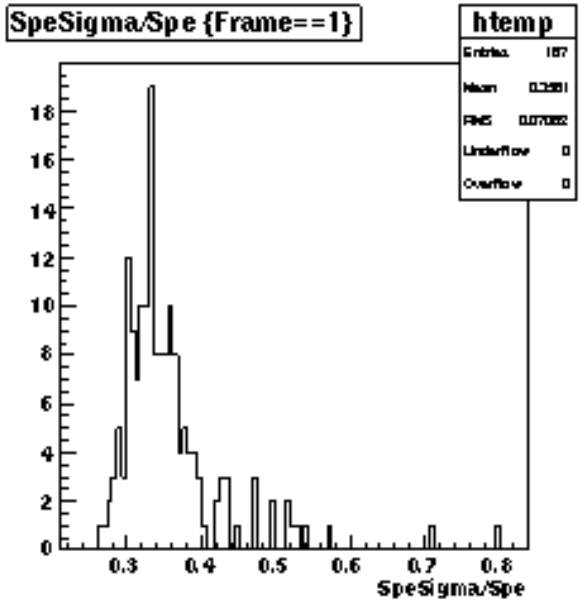
SpeSigma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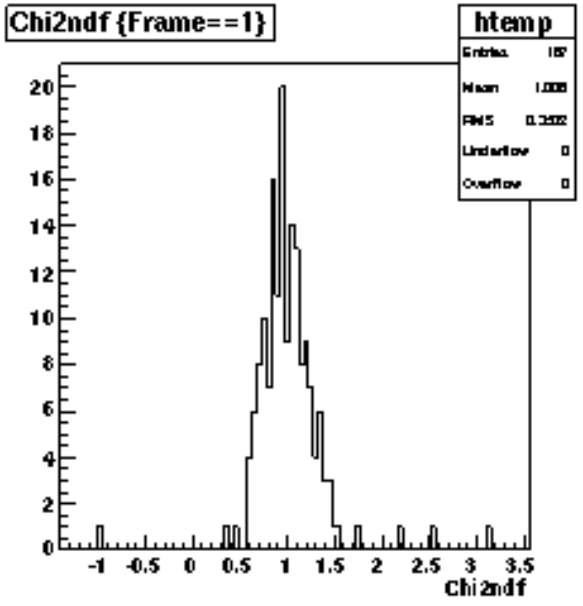
SpeSigma/Spe


Chi2ndf {Frame==1}
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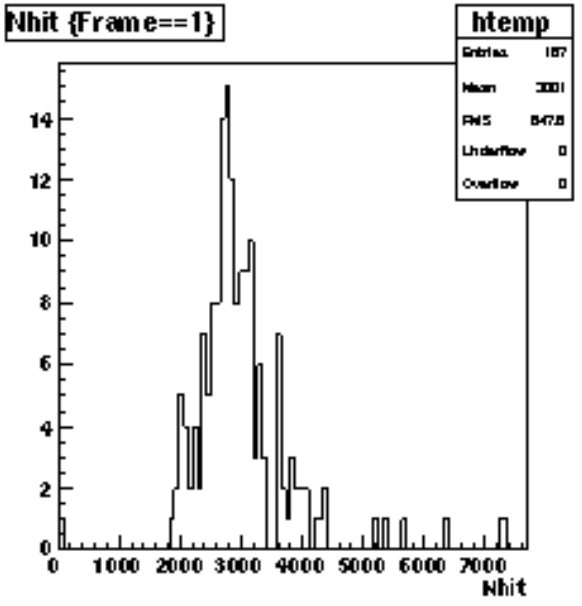
Chi2ndf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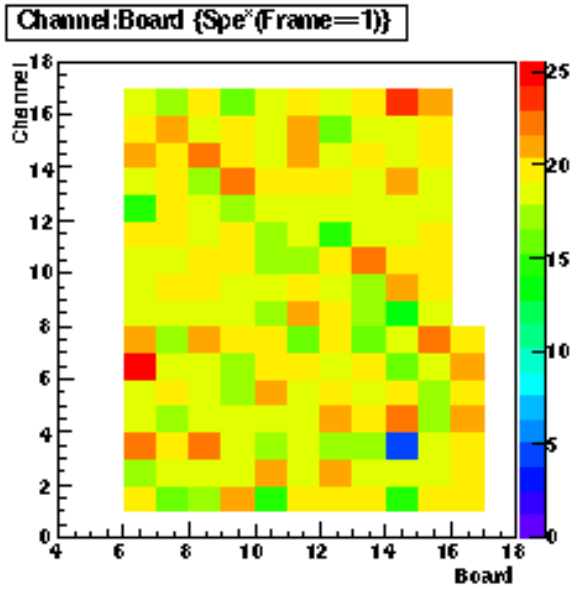
Nhit

# OWS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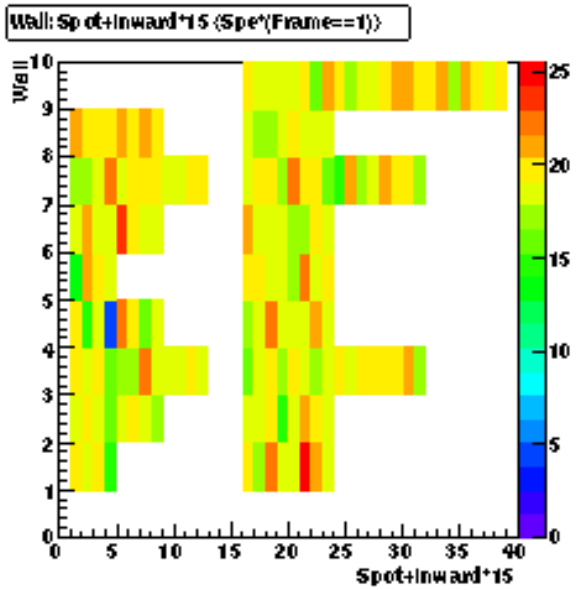
Board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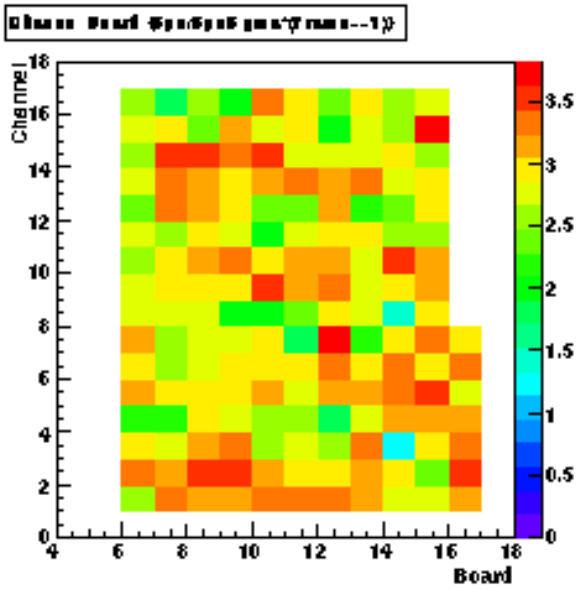
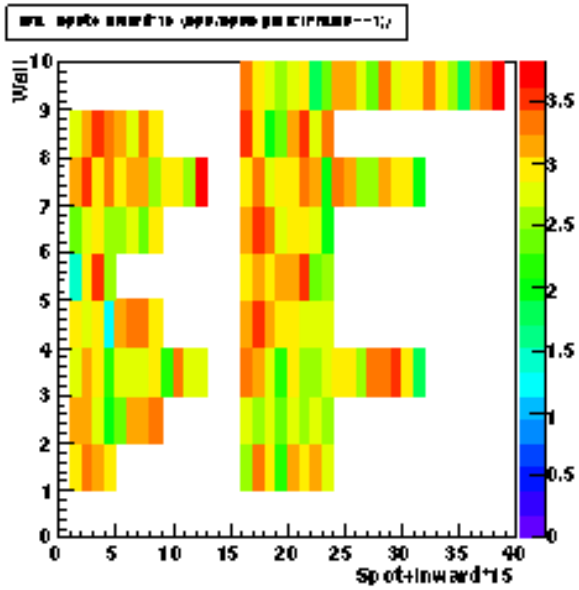
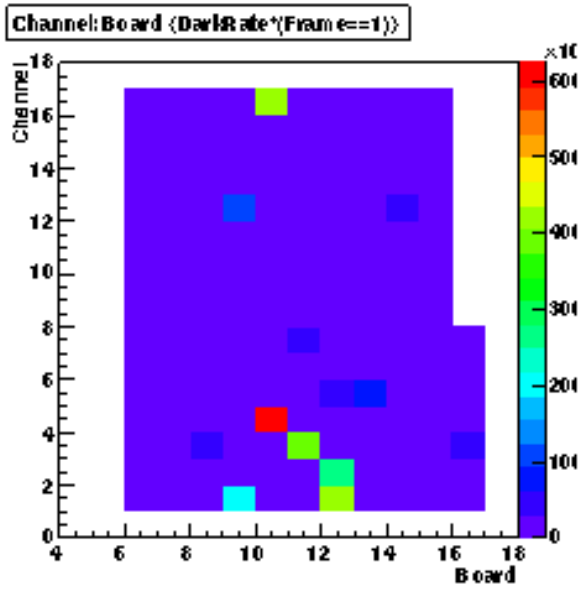
Wall
Spot+Inward*15


Channel
Board


Wall
Spot+Inward*15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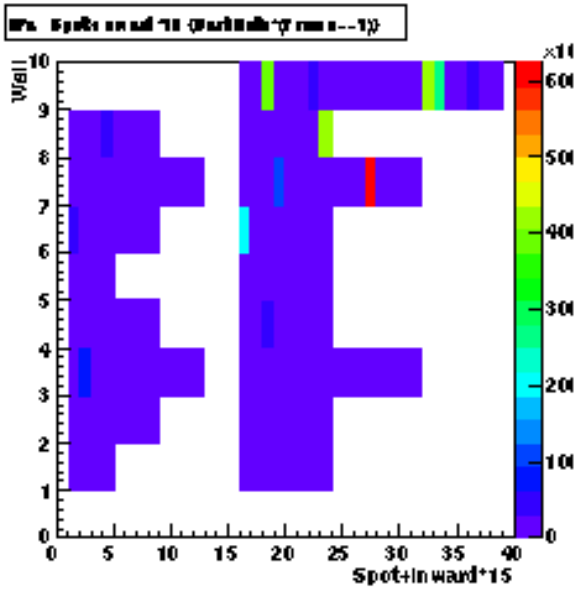
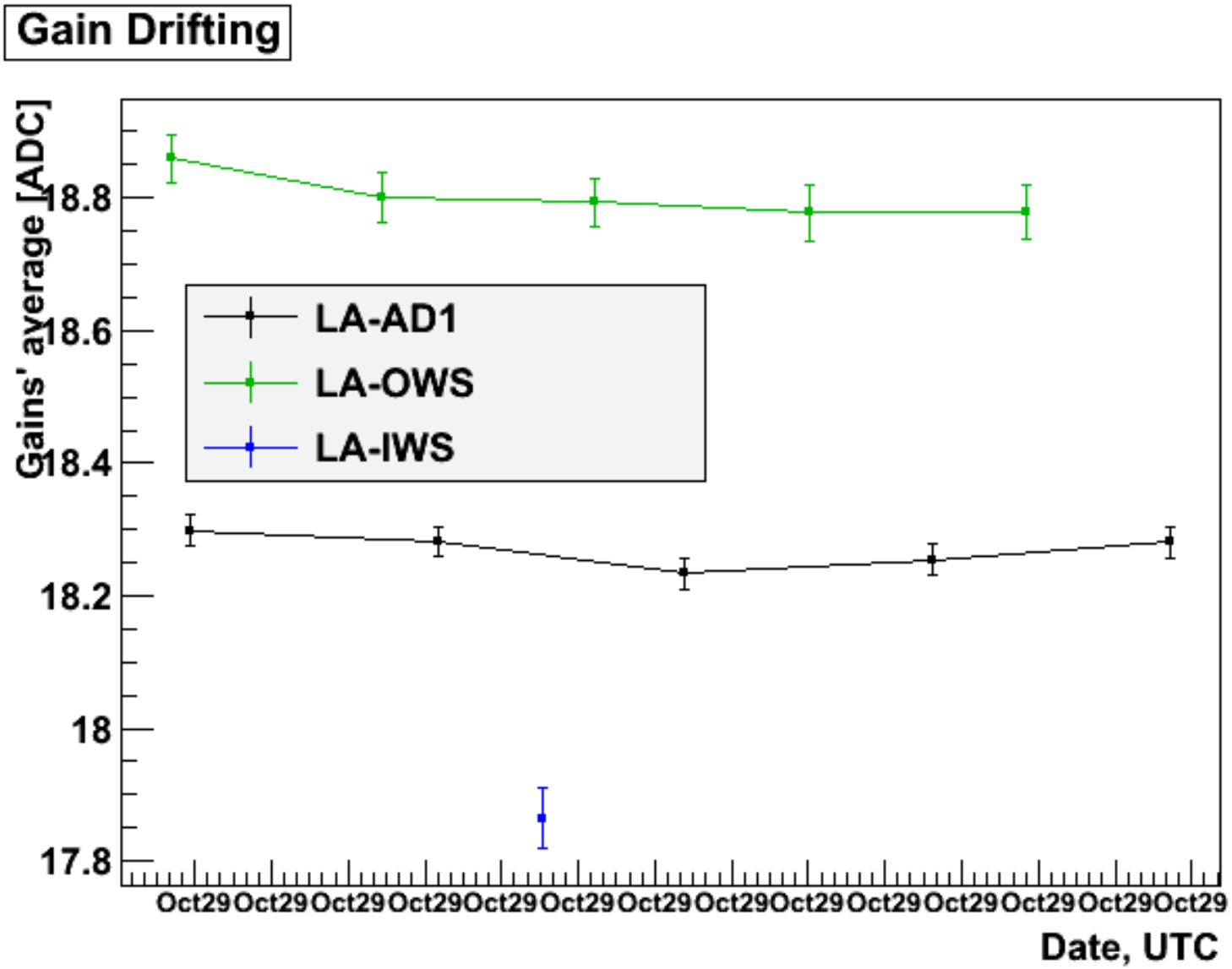
Channel
Board


Wall
Spot+Inward*15

| EH2 summary | |
|---|---|
| AD1 Board 10 Channel 1 | High rate |
| AD1 Board 15 Channel 10 | High rate |
| IWS Board 11 Channel 4 | Extra noise<br>Detected is not SPE spectrum |
| IWS Board 7 Channel 15 | High rate |
| OWS Board 14 Channel 3 | No HV? |
| OWS Board 10 Channel 4 | High rate |

# For a long run on Oct. 29:



# 6. New development on the software

1. Now there are two versions of RG
2. One is run with hundreds of files including hits' accumulation and gain fitting
3. The other has the these two main functions separated. Hits' accumulation is in KUP. In principle this will accelerate the update.