ECAL Calibration issues

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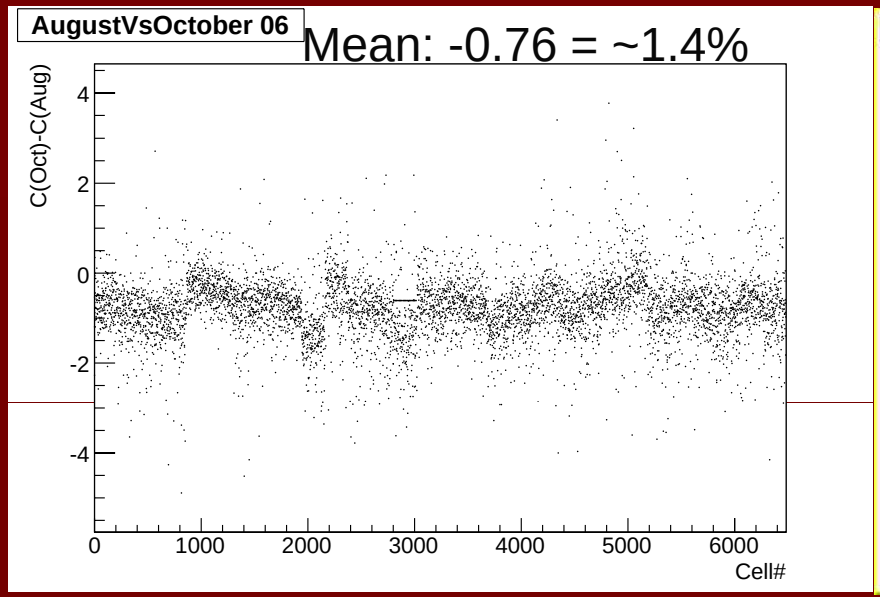
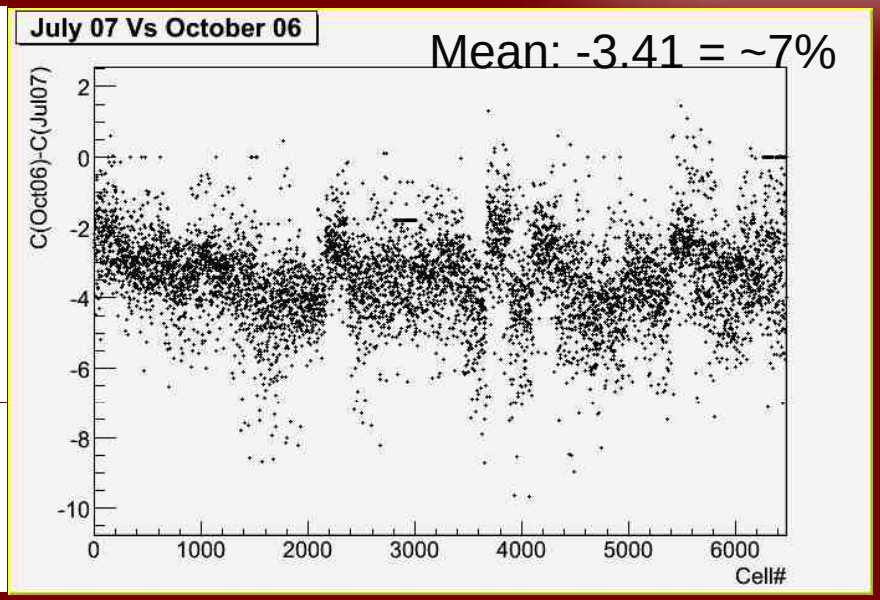
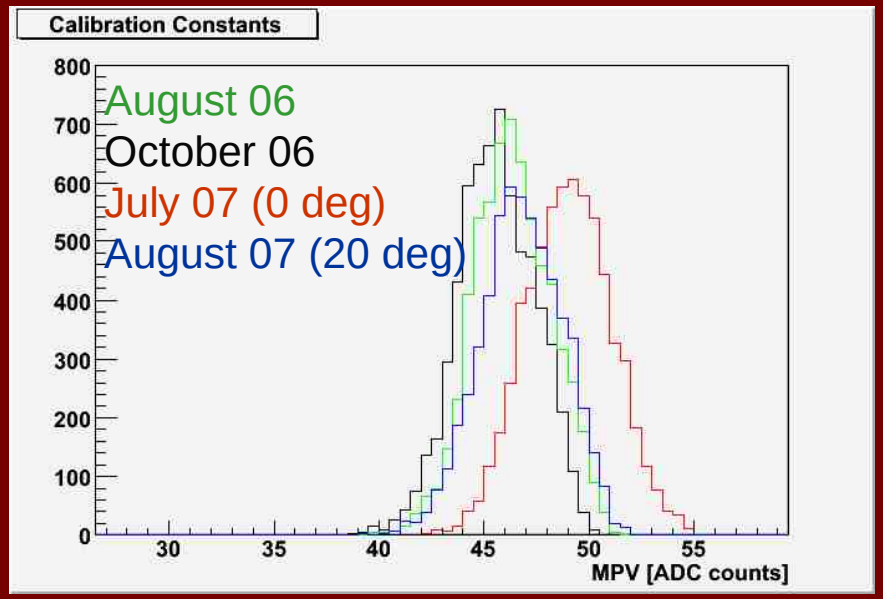
CALICE CALICE SiW Ecal Meeting 03/06/08

Shifts in Calibration Constants

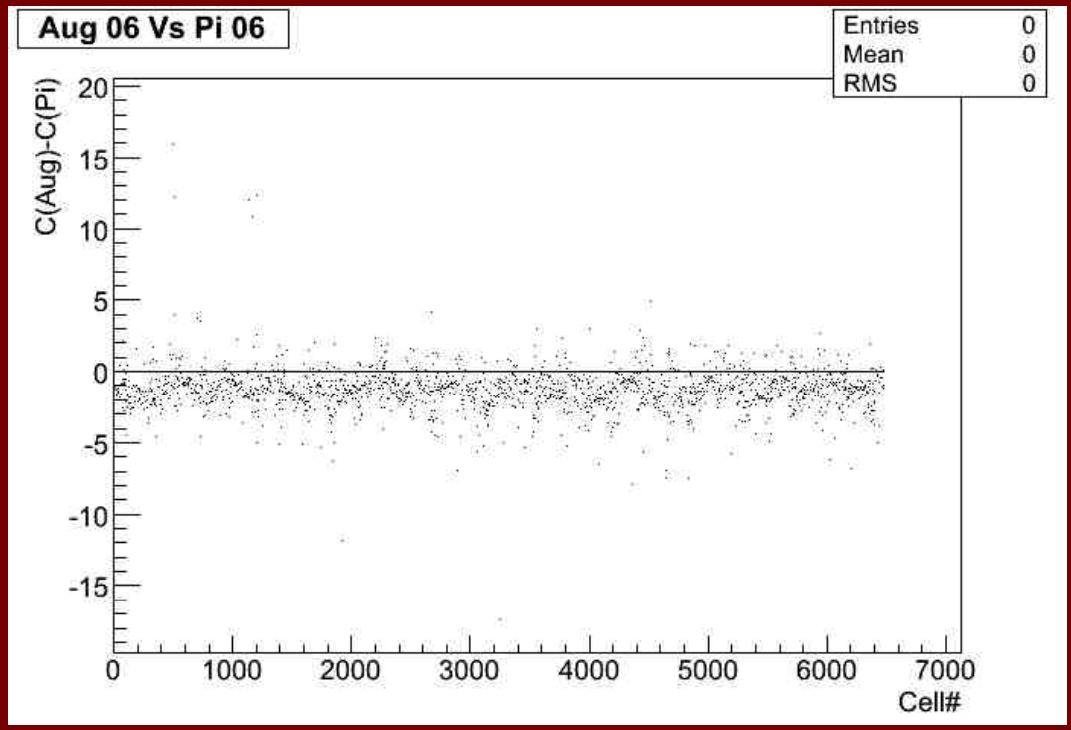






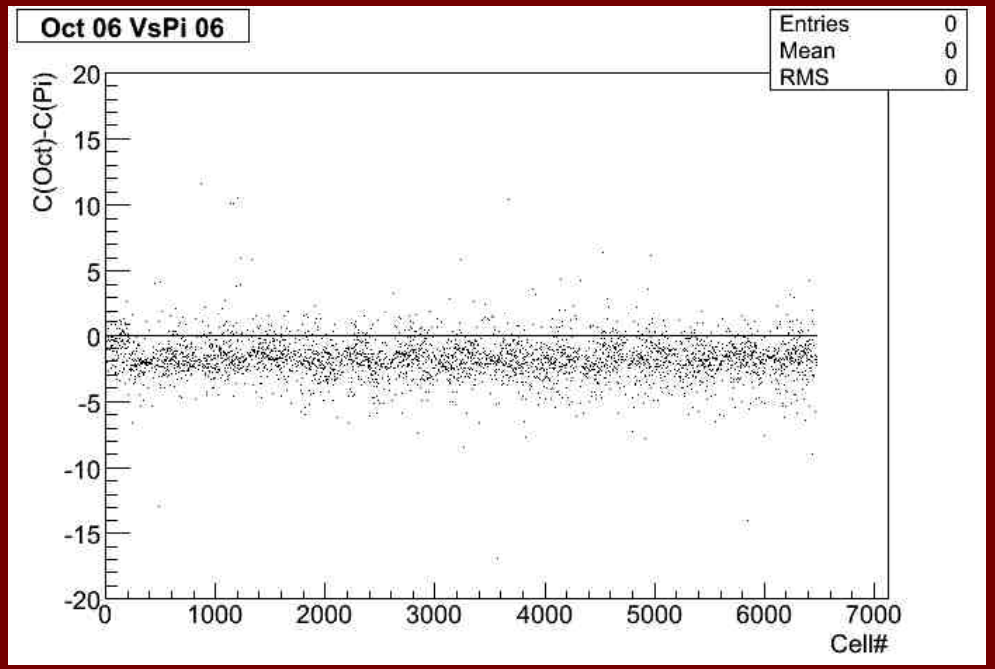
August 06: mu's vs pi's (aug 06)

- Shift of 1 ADC = ~2%
  - > Either calibration or data taken slightly off-peak
- hold values Aug: 100x100: 2 , 10x10: 2



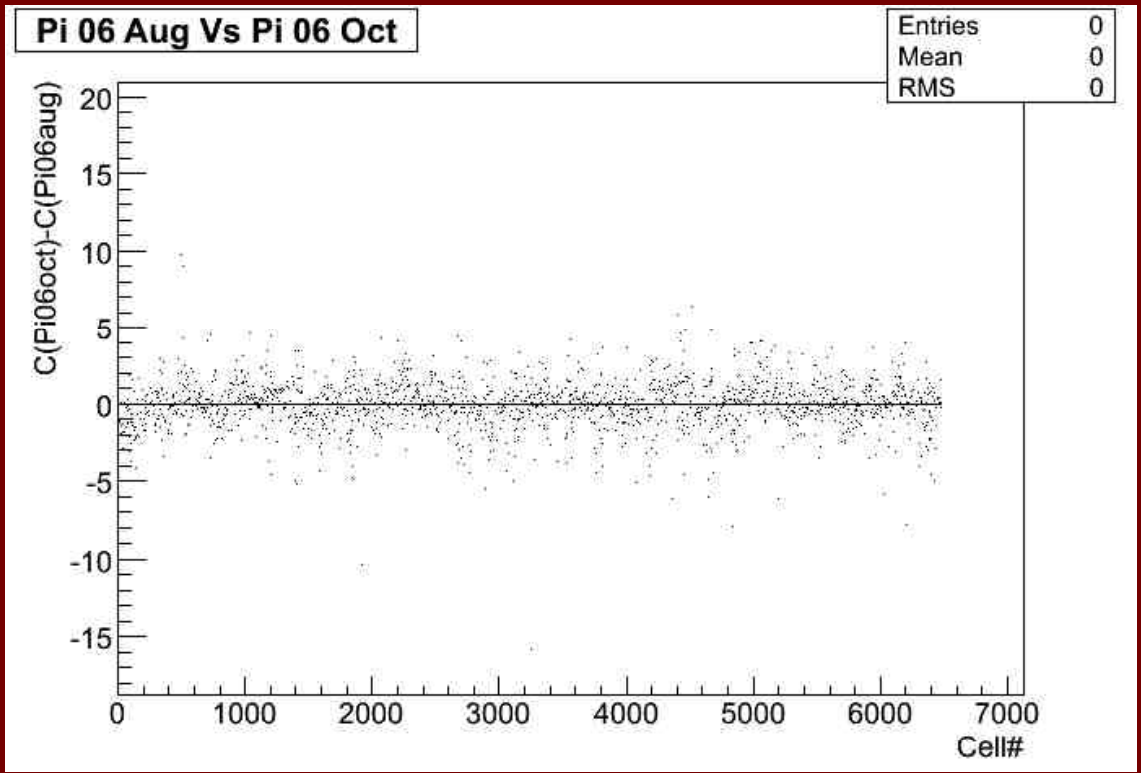
October 06: mu's vs pi's

- Difference Oct/Aug (mu): 0.8 ADC = ~1.5%
  - added 2m cable to 100x100 trigger
- Difference pi/mu: Shift of 2 ADC = ~4%
  - calibration taken off-peak
- hold values Oct: 100x100: 2, 10x10: 4
  - hold in oct 2 ticks later than in aug, w/o changing trigger setup (?)



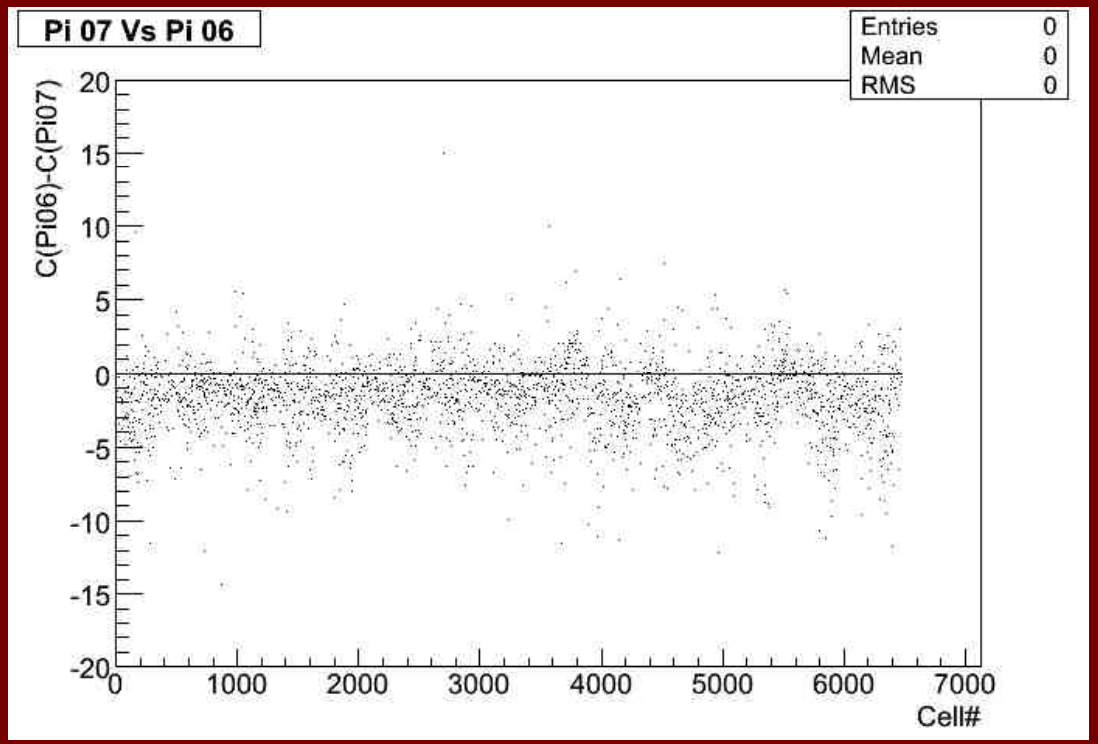
pi's aug 06 vs pi's oct 06

- Slight difference (?)
- Could be explained by change in hold value



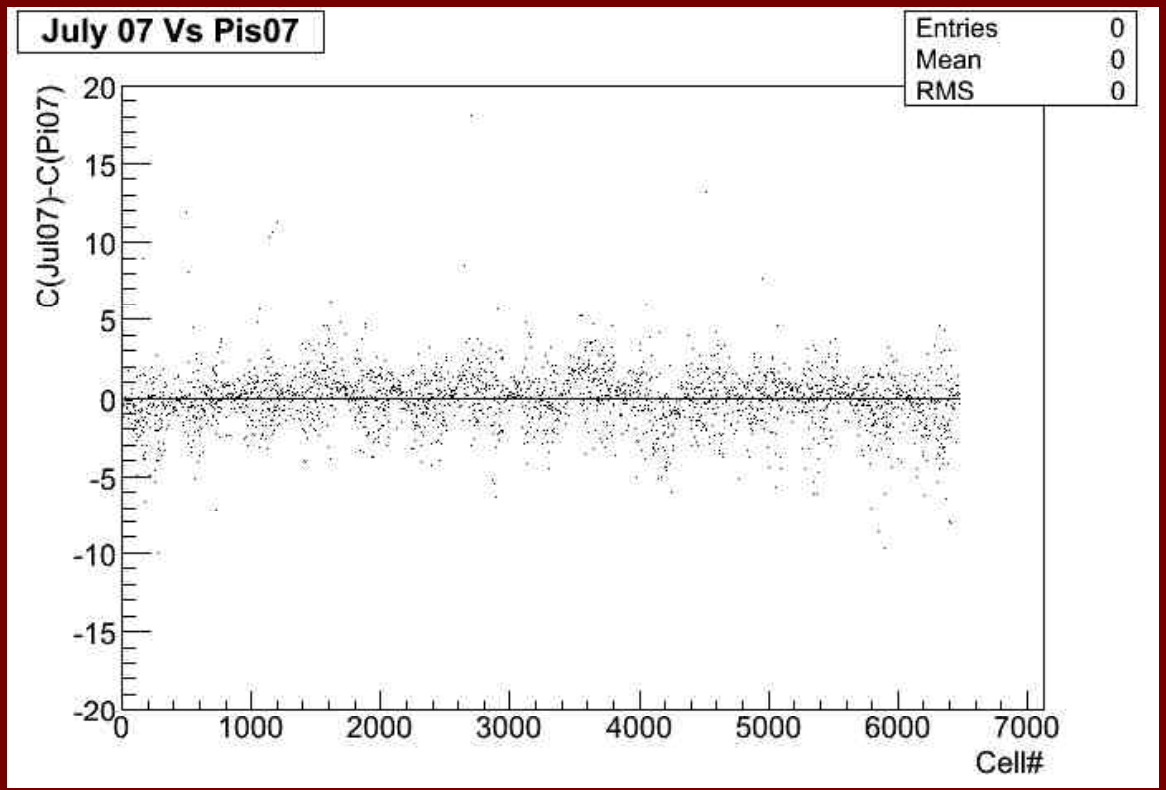
pi's oct 06 vs pi's 07

- Difference 06/07 (pi): 2 ADC = ~4%
- hold values Oct: 100x100: 2, 10x10: 14
- In our current understanding we were further off-hold in 07, but mu as well as pi response is bigger!
- Other effects?



July 07: mu's vs pi's

- in reasonable good agreement



Summary

- Comparison of hold values as read from the database:

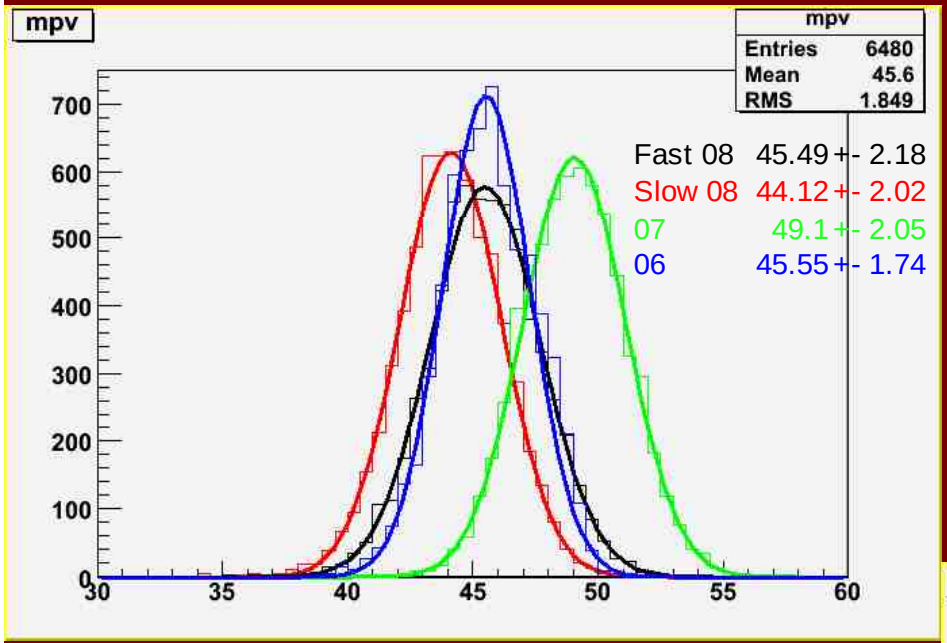
	Oct 2006	2007	2008
ECAL	4	14	6
HCAL	~15	~16	~16

- Holds were not the same in 06/07 (in contrary to what is stated in the eLog)
- 2 tick difference between ECAL and HCAL was basic assumption for 07 data taking, however proved wrong in 06 and 08
- All runs were off-hold for (July) 2007 by ~8 ticks = 50 ns , i.e. 3.2% if assuming that the holds for the HCAL were estimated correctly, thus explaining the good agreement between pi and mu
- If there were no changes in 10x10 set-up between Aug and Oct 06, then one e-/pi data set is off-peak
- Oct 06 mu runs were off-peak
- Response in 07 bigger than in 06, while data should have been take further off-peak, so dominated by other effects (power supplies?)

Solution... (?)

- Need to make sure that e- and pi were taken with the same trigger and the same hold value
- Determine calibration constants from muon runs for each period (done)
- Determine calibration constants from pion runs for all cells with enough statistics
- Compare the two sets to determine a global correction to the calibration constants
- Possible with the big error from pi measurement?

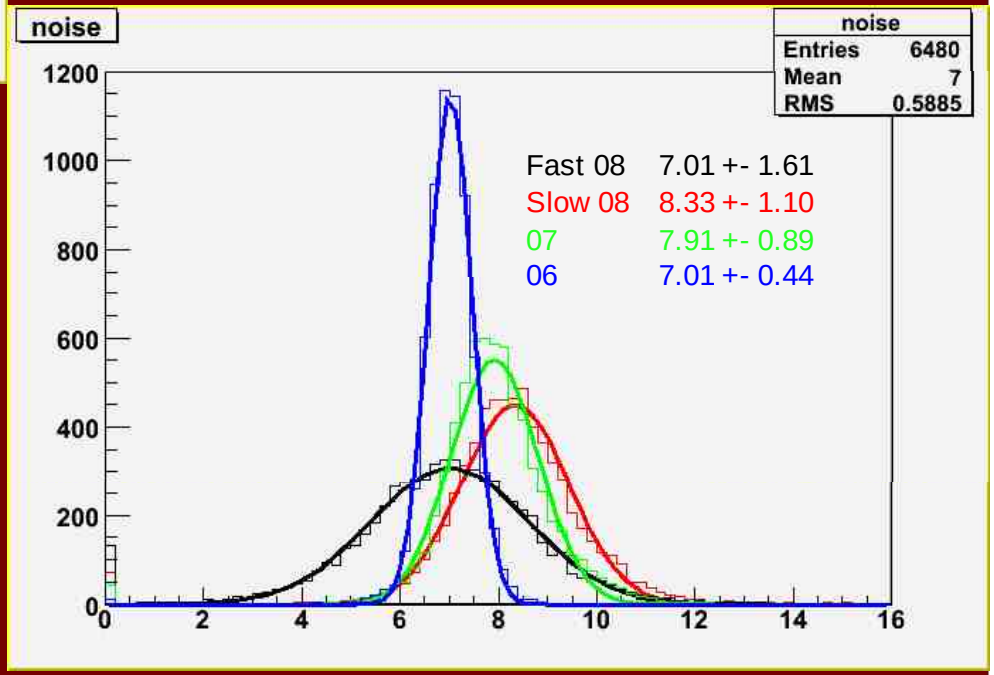
And for '08 ?



- Errors are too large to draw clear conclusions
- Fast 08 agrees perfectly with '06

Is it possible (time,hardware) to change the set-up to run on peak?
Is the effect big enough to take the risk of new errors?

Theoretical impact of running 4 ticks off-peak (P.Dauncey):
- MIP signal reduced by ~0.7%
- Total noise increased by 0.05 ADC (=1%)
- Resolution of a 100GeV shower drops from 15%/sqrt(E) to 16%/sqrt(E)



Backup

Date	Event	Hold Start	Trigger
15/08/06	start of August mu runs		
15/08/06	300135	2	100x100
22/08/06	added 2m cable length to both 100x100 triggers (1m cable = ~5ns)		
22/08/06	300163	2	100x100
26/08/06	300236 e-	2	10x10
28/08/06	300340 e-	2	10x10
10/10/06	100x100 12 ticks less than 10x10 (75ns)		
11/10/06	start of October mu runs		
11/10/06	300486	2	100x100
16/10/06	300520 e-	4	10x10
21/10/06	300704	4	10x10
21/10/06	300705	4	100x100
25/10/06	300770	2	100x100
26/10/06	300808-810	2	20x20
30/10/06	300962	2	100x100
03/07/07	hold scan estimation: 20x20 12ns later than 10x10		
03/07/07	start of July mu runs		
03/07/07	330062 (not included)	2	20x20
05/07/07	330107 (not included)	2	100x100
05/07/07	ECAL hold stayed same as last year, HCAL changed (?)		
06/07/07	330114	2	100x100
09/07/07	330254	2	100x100
09/07/07	330271 pi-	14	10x10
18/07/07	330614	2	100x100
	10 ticks for 20x20		
18/07/07	13 ticks for 10x10		
24/07/07	330929	11	20x20
27/07/07	331005	11	20x20
30/07/07	Runs at 20 deg (August)		
30/07/07	331157	11	20x20

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