HEC General
07 July 1999

HEC Electronics in Test-Beam-99

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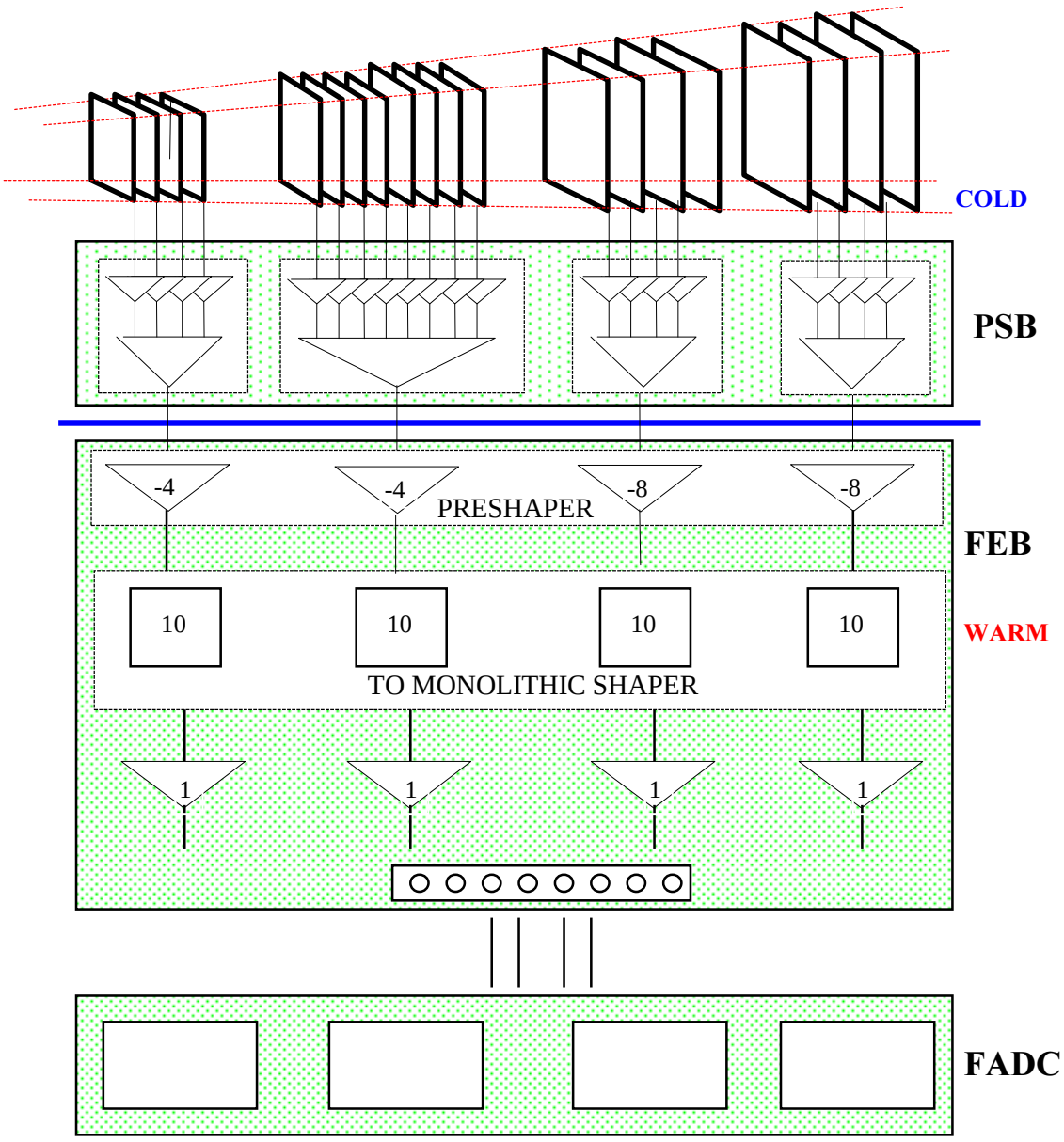
MPI

- HEC readout chain
- Measured shape and gain
- Noise RMS, noisy channels
- Coherent noise
- Bad channels
- Temperature drift
- Analysis

HEC readout chain



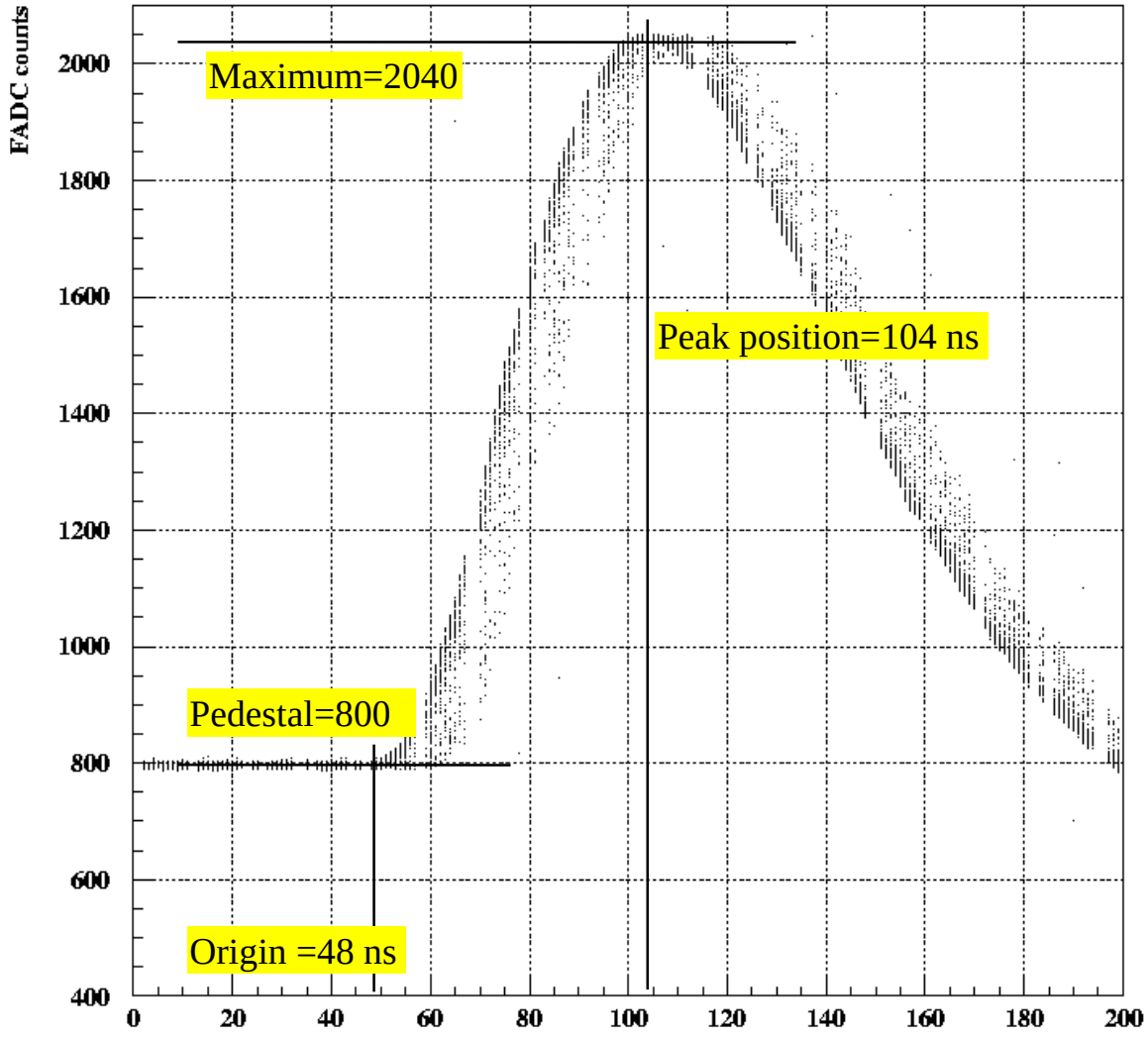
Expected transfer function:

Preamplifier: ***0.75 KΩ***
Preshaper: ***4 (8)***
Shaper: ***10 (really 8.3)***
ADC: ***1 mV/count***

Overall: ***25 KΩ***

Signal parameters

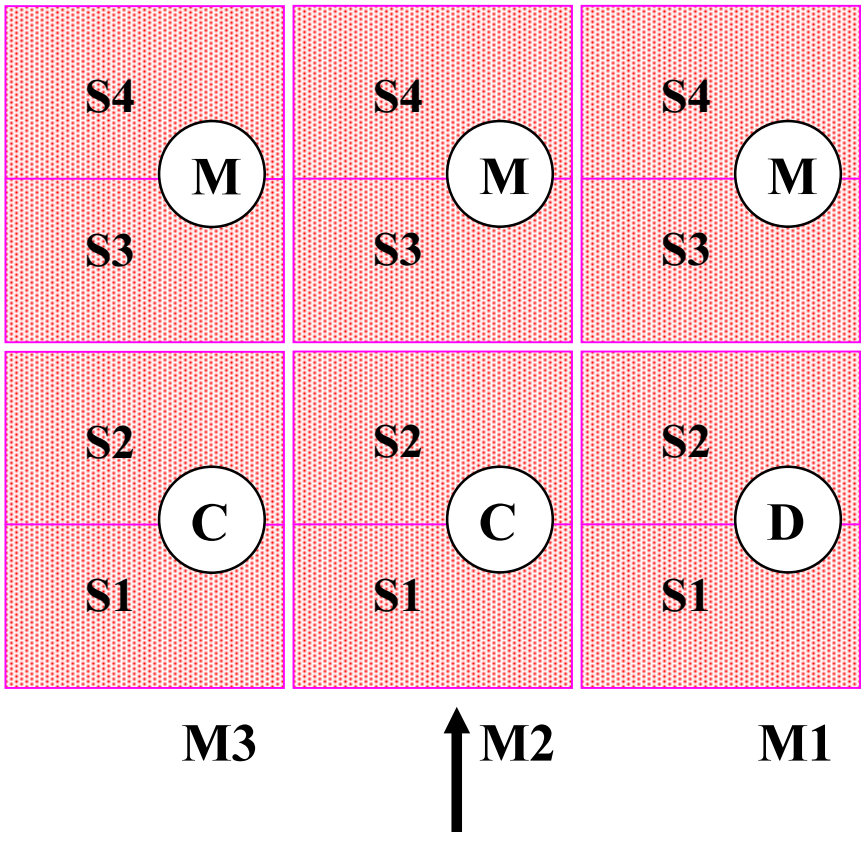
- ADC ch.1 (summing 8 preamplifiers), DAC level 4000



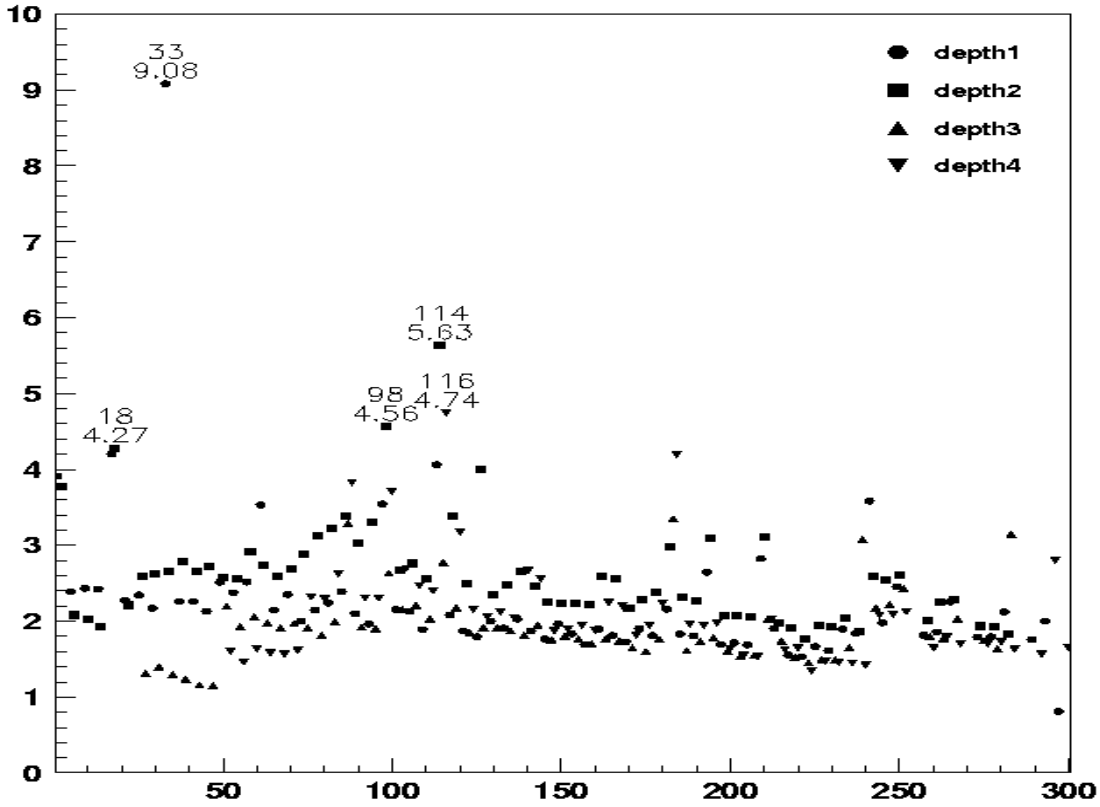
- For this channel peaking time = 56 ns
- Input signal:
  (1.66 nA/DAC)*(4000 DAC)*(8 PA)=53.1 μA
  Amplitude= 1240 mV
  transfer coefficient =1240 mV / 53.1 μA = **23.4 KΩ**

Bad channels

ADC ch.	Position in modules	Comments
56 64 72	M1 S4 P6 M2 S4 P6 M3 S4 P6	something wrong in module's cabling
206 229 230	M2 S2 P18 M2 S1 P20 M2 S2 P20	Calibration line (gen.32) from CDB to SL is broken
246 261 262	M2 S2 P21 M2 S1 P24 M2 S2 P22	Calibration line (gen.24) from CDB to SL is broken
297	M3 S1 P24	Dead shaper

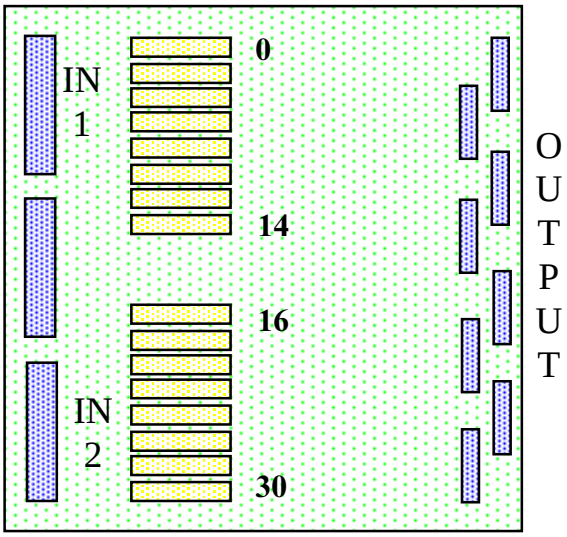


Noise RMS for all channels



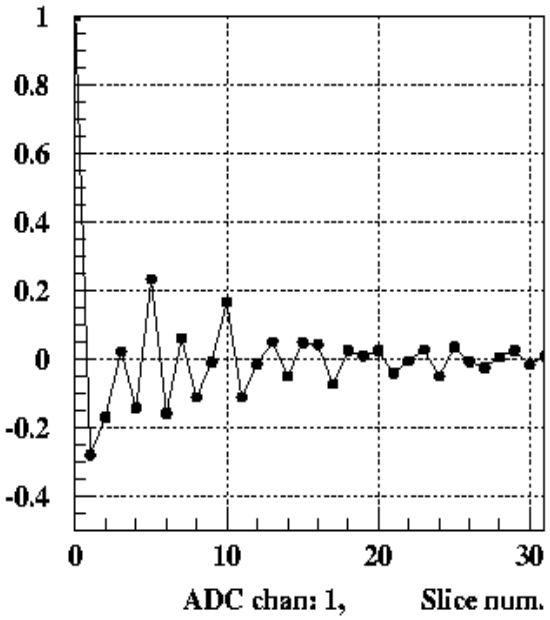
ADC #	FEB	Location in the FEB
1	1	0
2		0
17		16
18		16
87		15
88		15
99	2	0
100		0
116		16
120		17
183		15
184		15
239	3	21
283		28
296		30

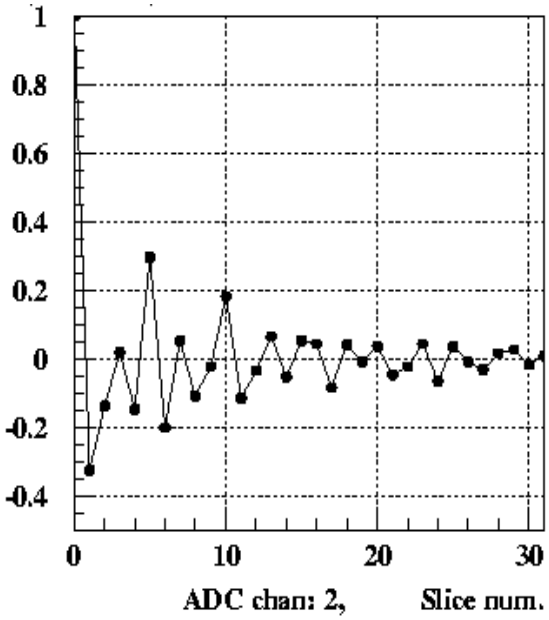
All noisy channels except of 2 are located on the edges of FEB



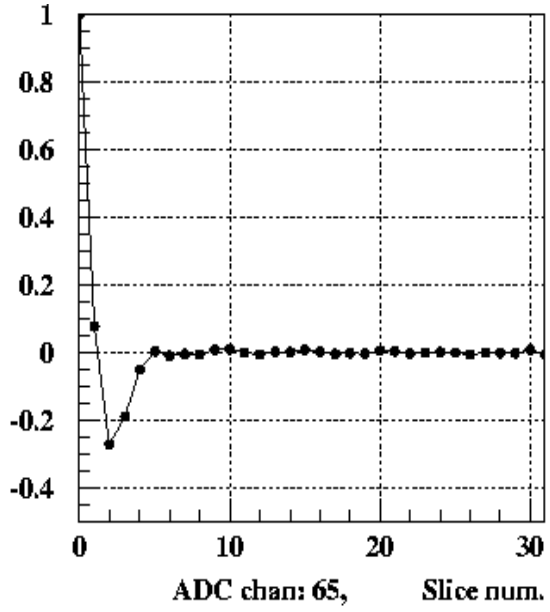
Noise autocorrelation function

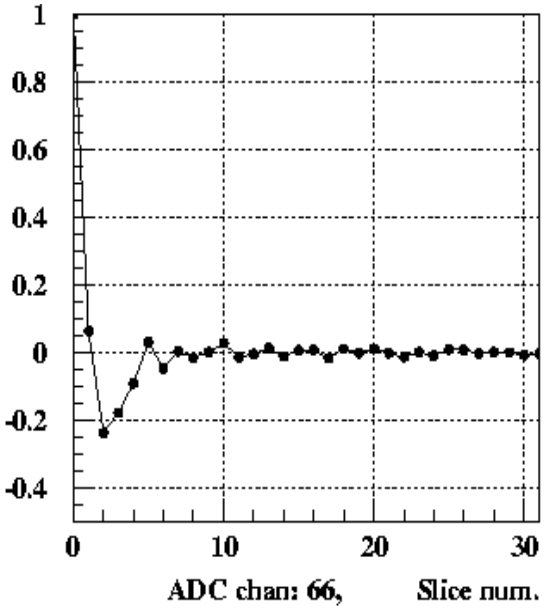
- Noisy channels: ADC 1 and 2. Oscillations can be seen



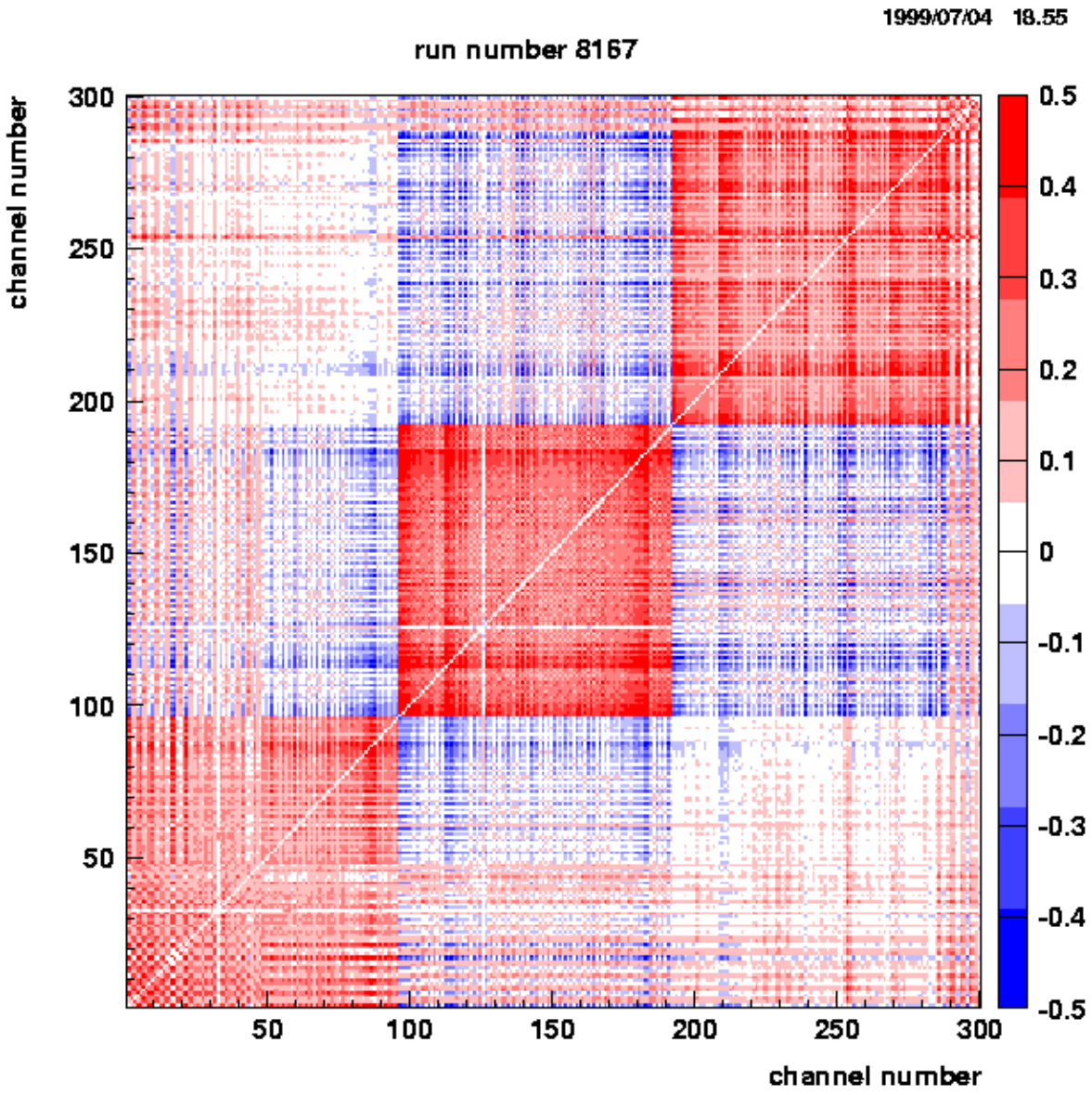


- Good channels: ADC 65 and 66





Correlation coefficients



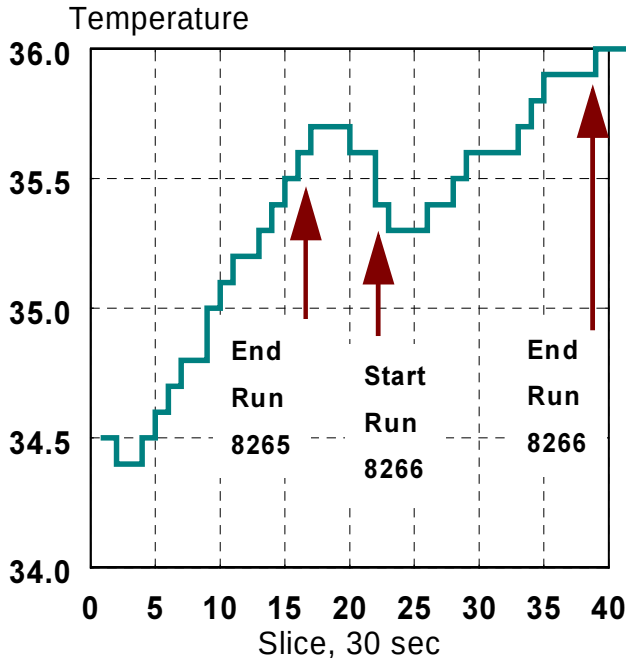
- Very big (up to 0.5) positive correlation inside FEB and negative correlation outside. Reason has to be found

Temperature drift

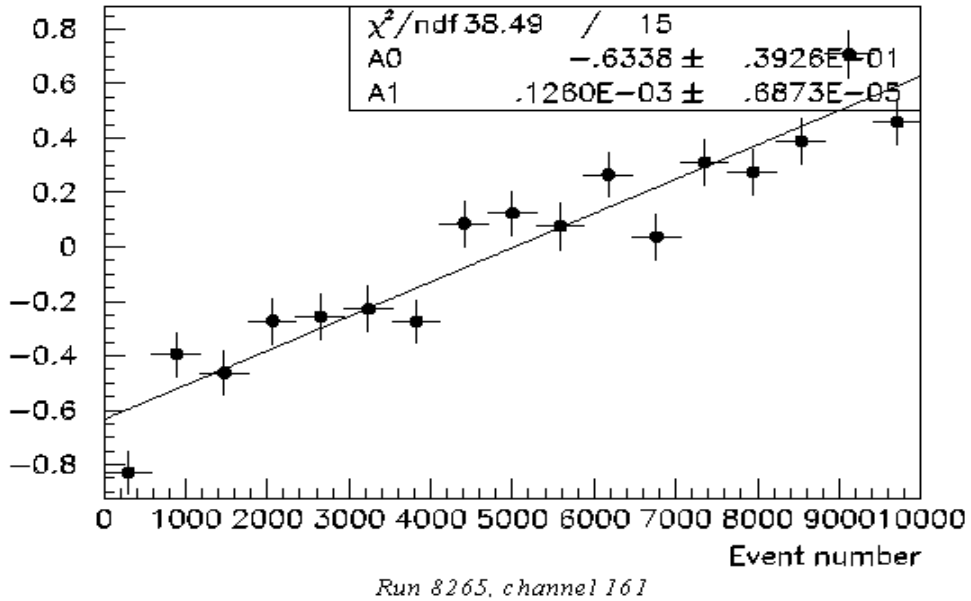
Temperature in the FADC Crate

Run 8265
$\Delta T=1.3\ ^0C$

Run 8266
$\Delta T=0.7\ ^0C$



Pedestal drift for 8 channels during run 8266 looks the same. For one of them:



Run 8265, channel 161

Drift slope: **0.42** ADC/ ^0C ... **0.97** ADC/ ^0C

Analysis

1. Noise

- ENI vs Cd, compare to predictions
- Coherent noise will be studied
- Make special run to study FEB noise

2. Signal timing

- Measured peaking time vs predicted
- Peak time uniformity - are we within specifications?
- Signal delay in different segments

3. Signal gain

- Measured gain vs predicted
- Uniformity, front-rear difference, etc
- Compare calibration signals with ionization to see effect of cold cables