Calibration System (WBS 1.2.1.5)

Gregorio Bernardi

on behalf of

LAL-Orsay/LPNHE-Paris

- Reminder: from Run I to Run II
- Simulations $\rightarrow$ new proposed Setup
- Prototyping and First Test Results
- Schedule/Conclusions

General Upgrade Meeting

Fermilab, 5th of February 1999

On-Line Calibration Activities in France

- Concentrated on hardware up to now
  (LAL-Paris)

- Starting on calibration software ($*$)
  (Paris-Stony Brook)

LAL-ORSAY:	Pierre IMBERT
	Yves JACQUIER
	Gisèle MARTIN
	Pierre PETROFF
	Christophe de la TAILLE
	Nathalie SEGUIN
LPNHE-PARIS:	Philippe BAILLY
	Ursula BASSLER ($*$)
	Gregorio BERNARDI
	Jean-Francois HUPPERT ($*$)
	Hervé LEBBOLO
	Bob OLIVIER ($*$)
	Alain VALLEREAU

Calibration Setup for Run I

- 12 high Voltage pulsers (135 V)
- 32 position switch box

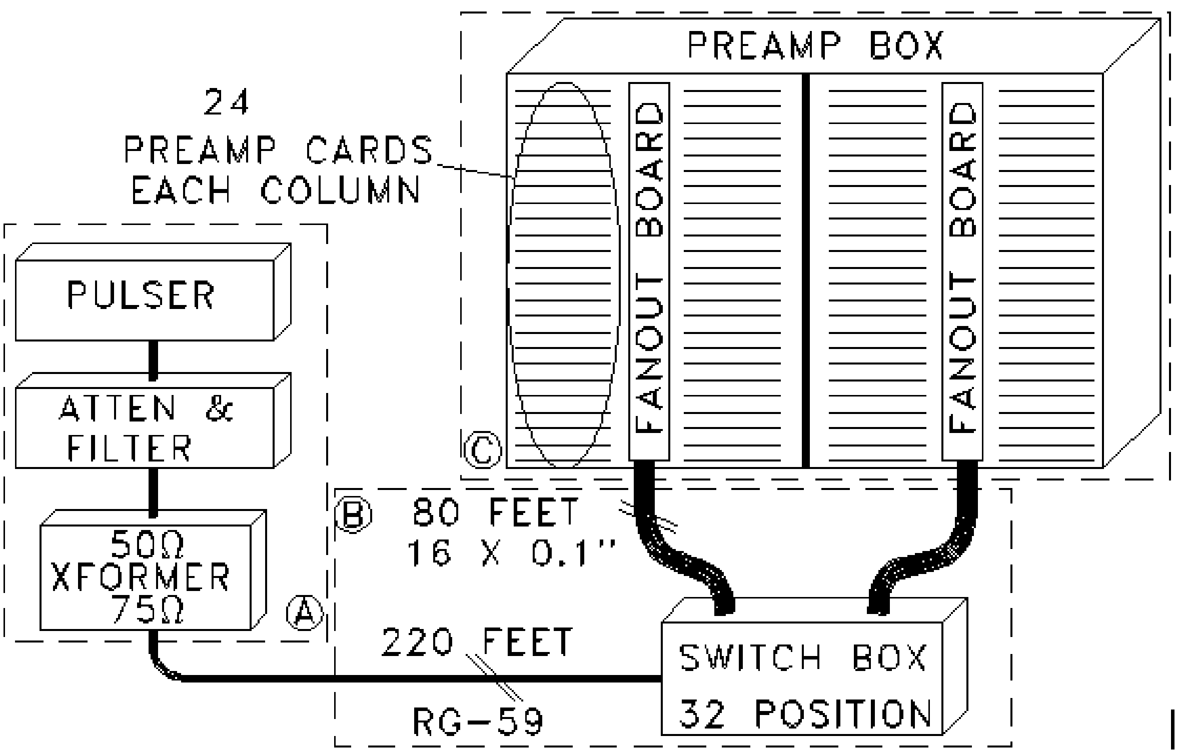
⇒ pulse 144 channels simultaneously

- rectangular pulser signal of 400 ns
- slow shapers (2.2 μs)

⇒ propagation/reflection in cables were not an issue

- pulsing at 1 kHz

Calibration Run I:

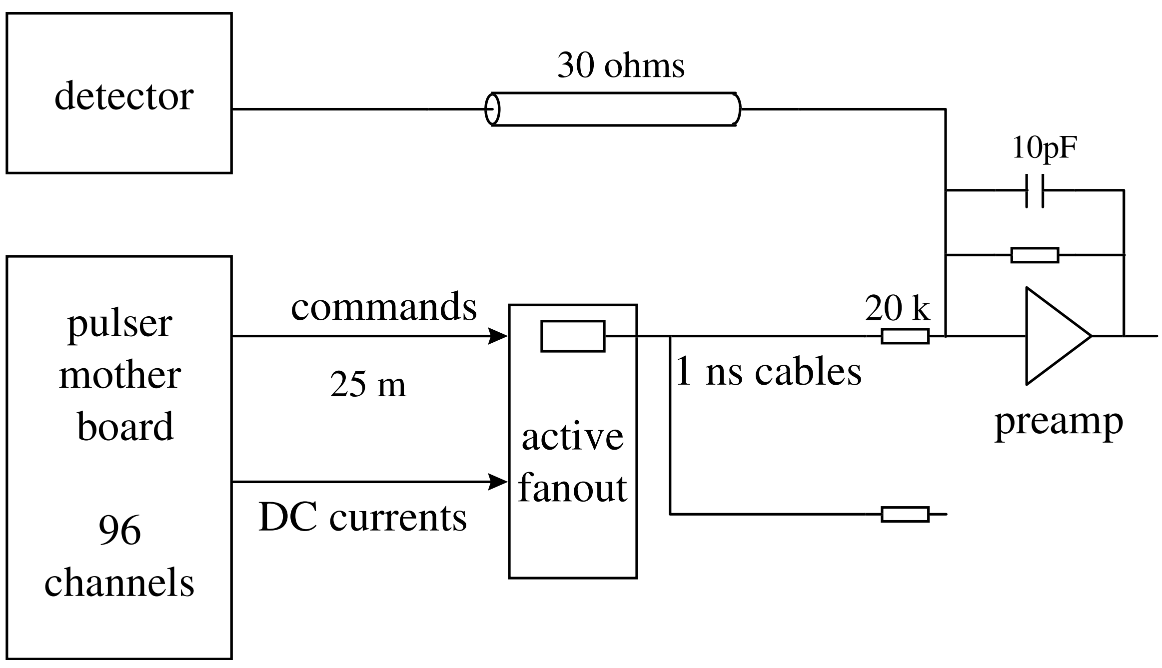


From Run I to Run II

faster shaping time: 2.2 μs $\rightarrow$ 300 ns
lower injection resistor: 250/500 kΩ $\rightarrow$ 10/20 kΩ

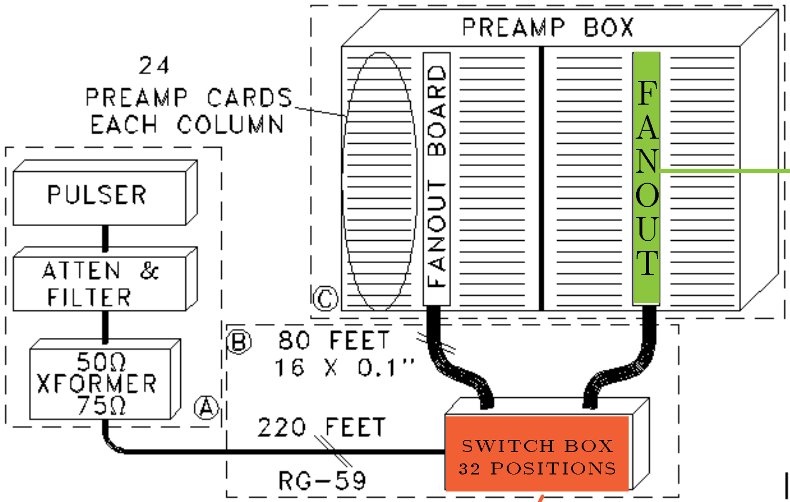
- reduce cable length (90m $\rightarrow$ 25m $\rightarrow$ 0.3m)
- optimize signal distribution
- optimize signal shape $\rightarrow$ sensitivity to: Z_P, Z_C, t_C, C_D

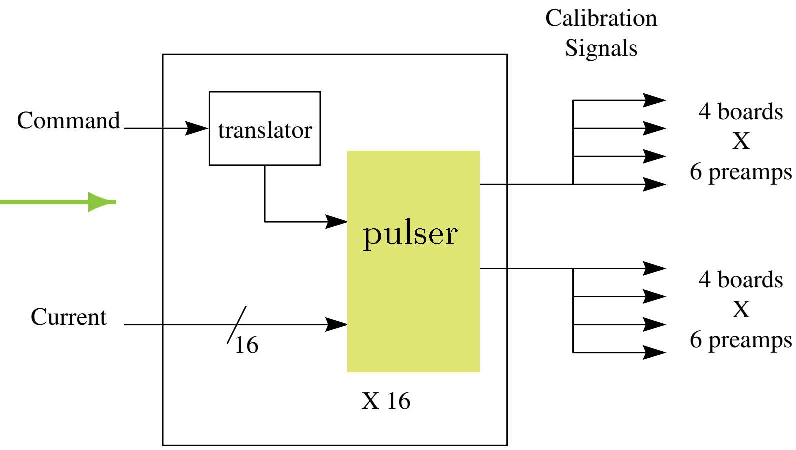
- increase the flexibility on the pulsing patterns, reduce the minimum number of pulsed channels



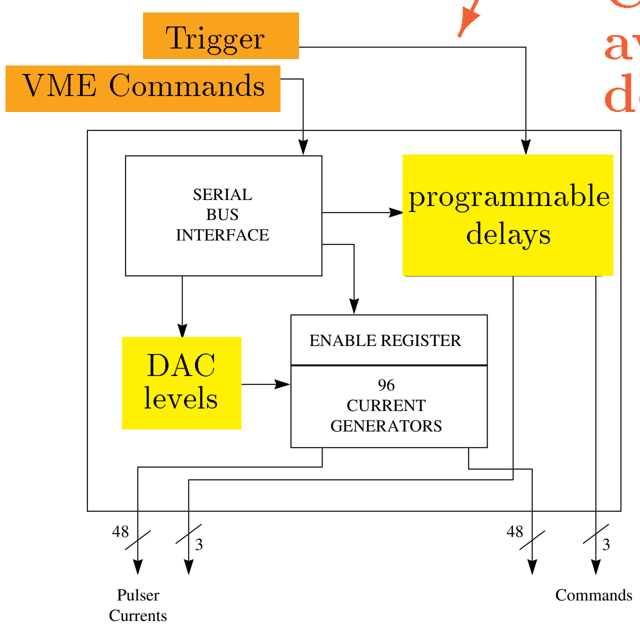
La calibration en ligne Run I → Run II

Calibration Run I:





FANOUT ACTIF
avec les pulsers



CONTROLEUR
avec les unités
de commande

→ Adaptation au nouveau “timing”

→ Amélioration de l’intercalibration:

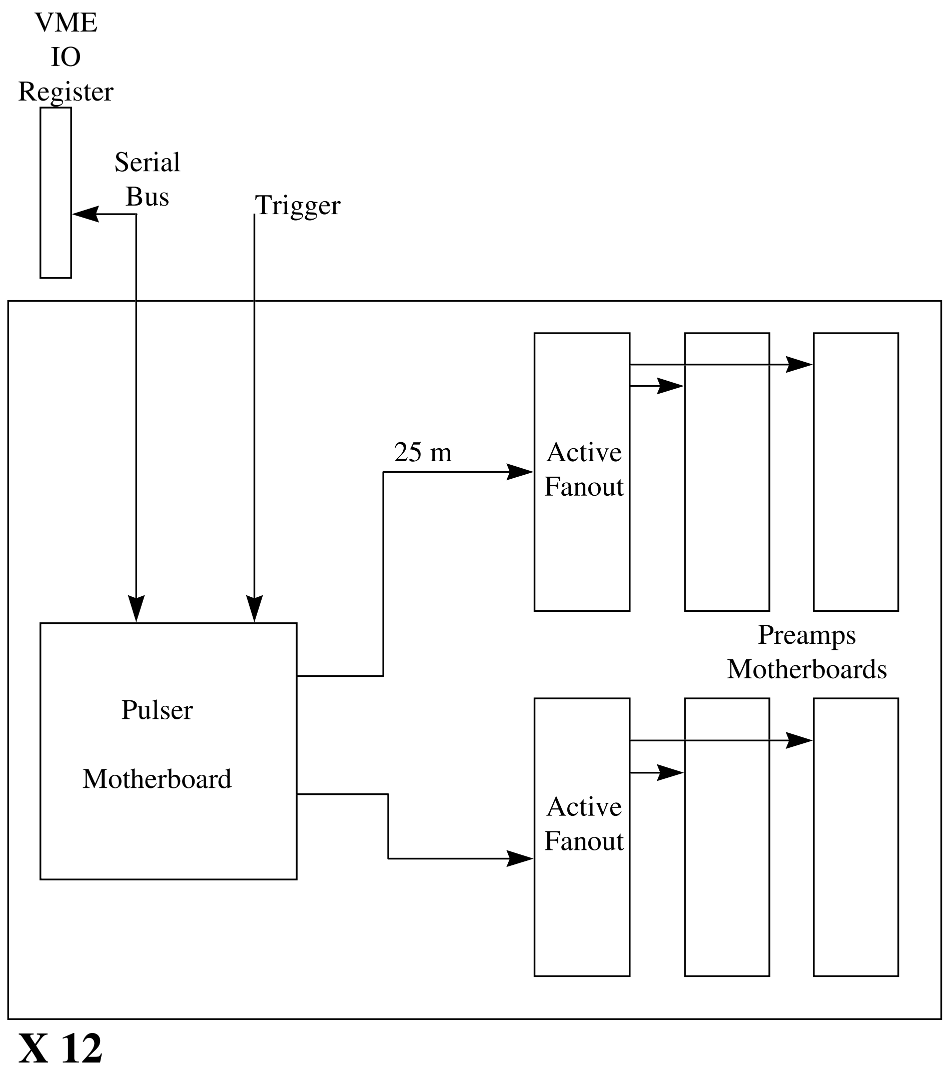
Run I : < 1.5 %

Run II: < 1.0 %

→ Calibration absolue

→ Plus de flexibilité

Calorimeter Calibration System for Run II

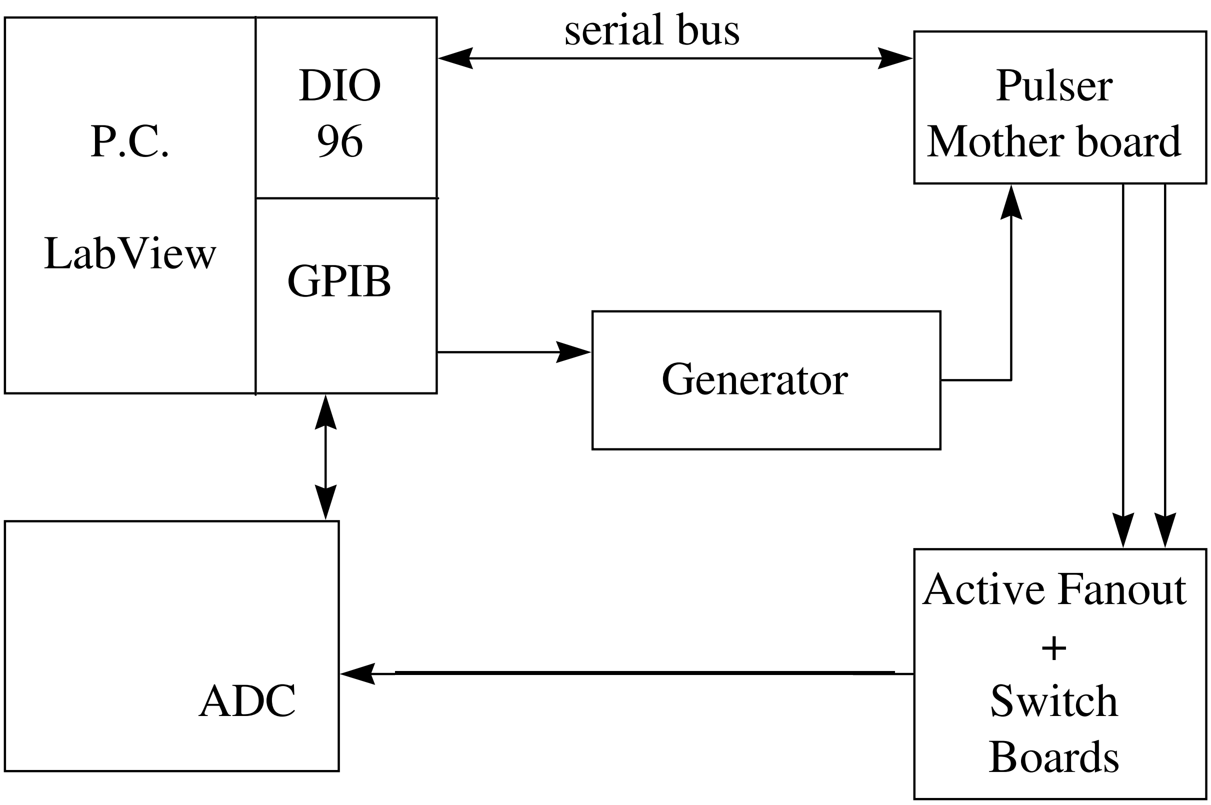


12 units:

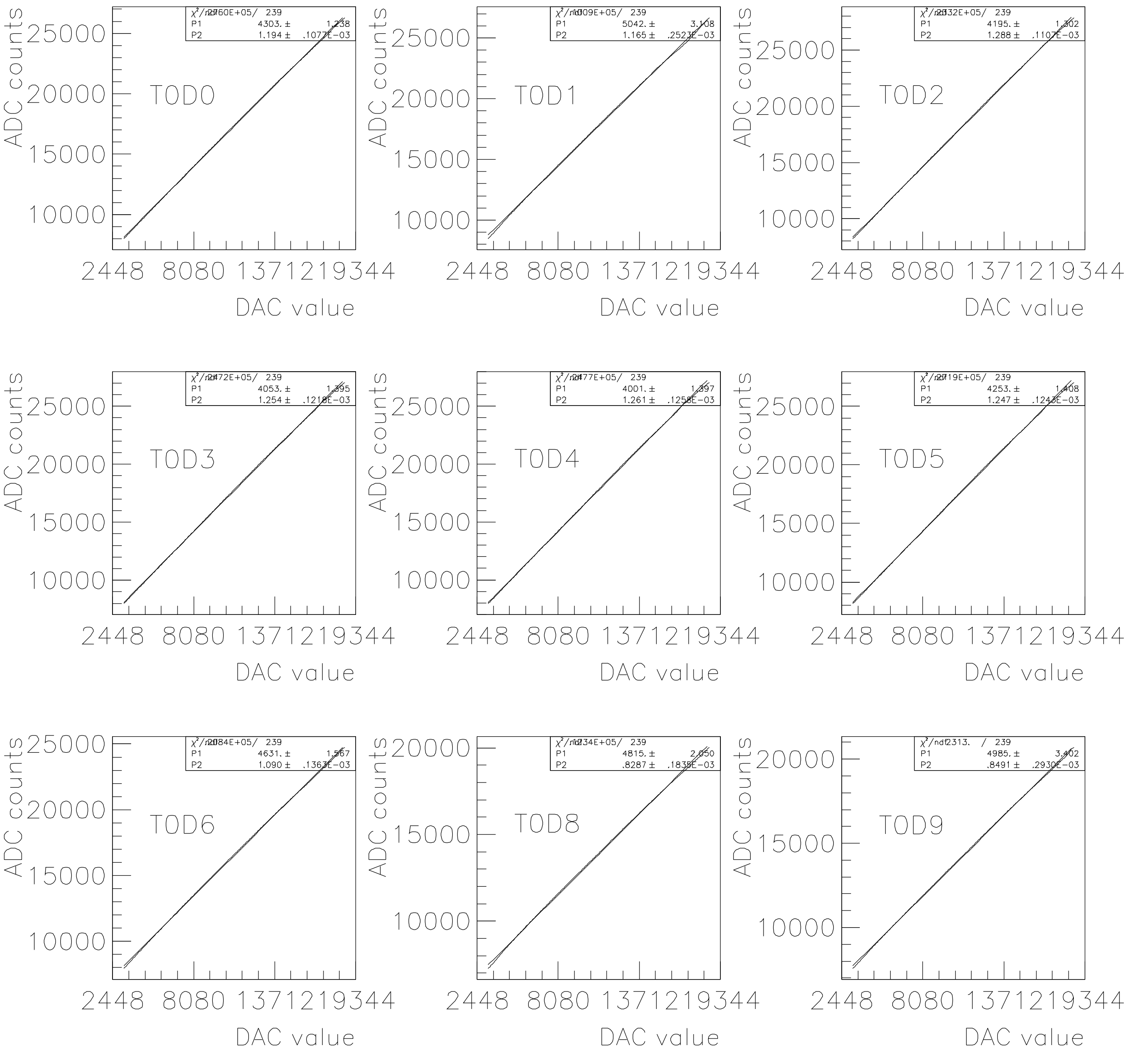
- 1 pulser mother board
- 2 active fanouts
- 96 pulsers
- 4608 preamps

Full Size Prototype

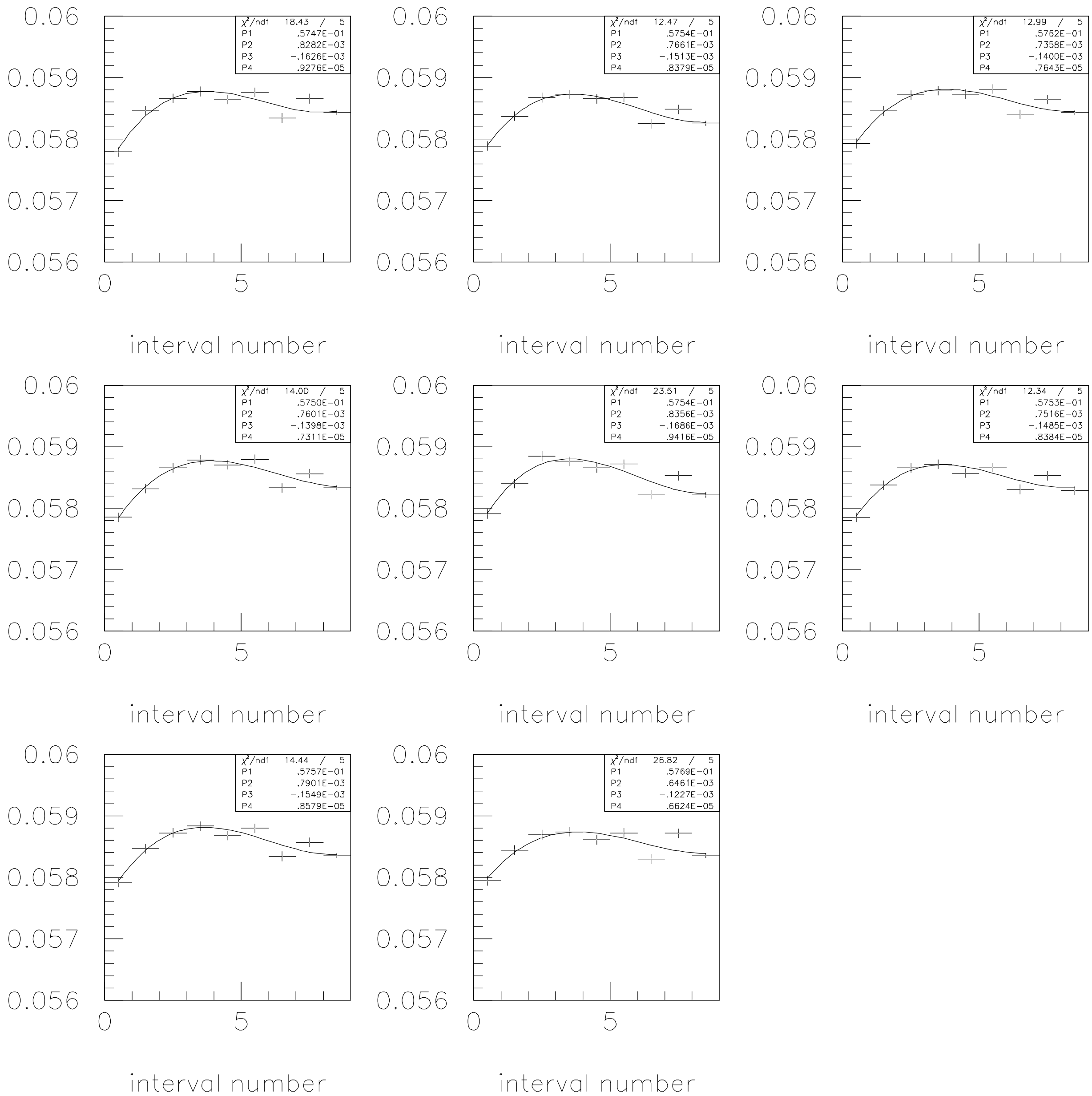
Mother Board :	96 channels
	2 – 18- bit DAC
	6 programmable delays
	96 enable register
	one serial bus interface
Active Fanout :	3/3
	48 switch boards



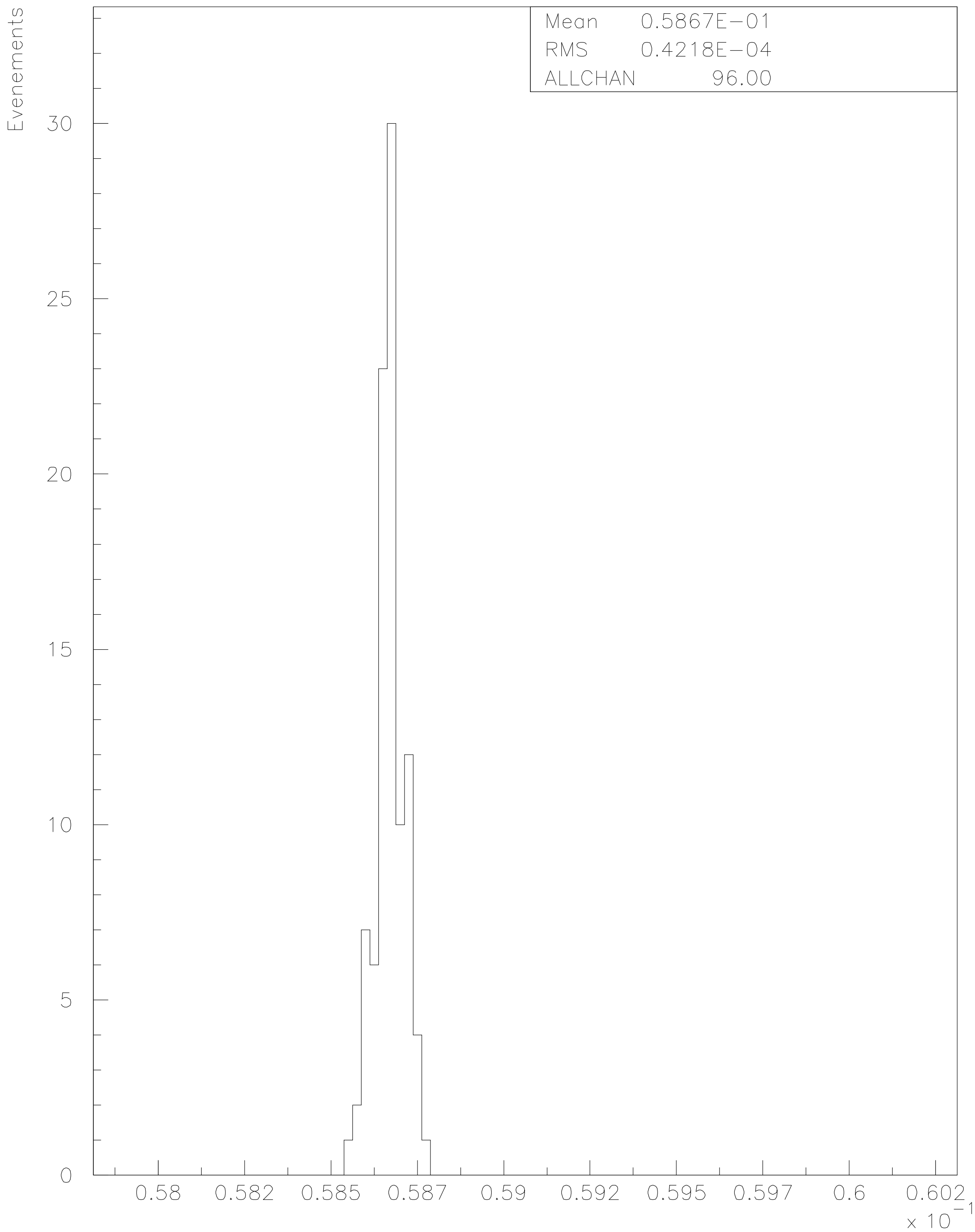
Response vs. Pulse Height



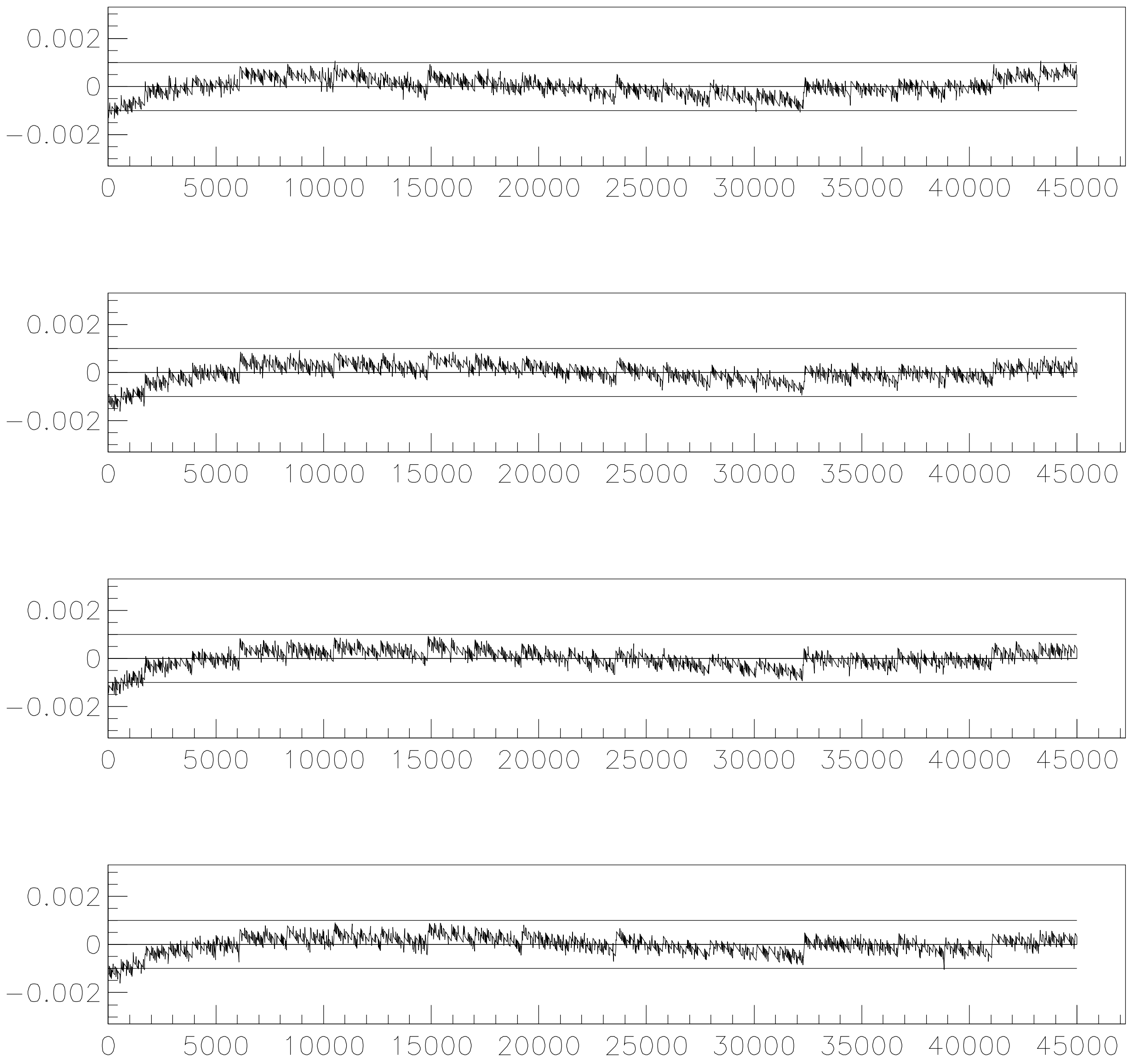
Pulser Linearity



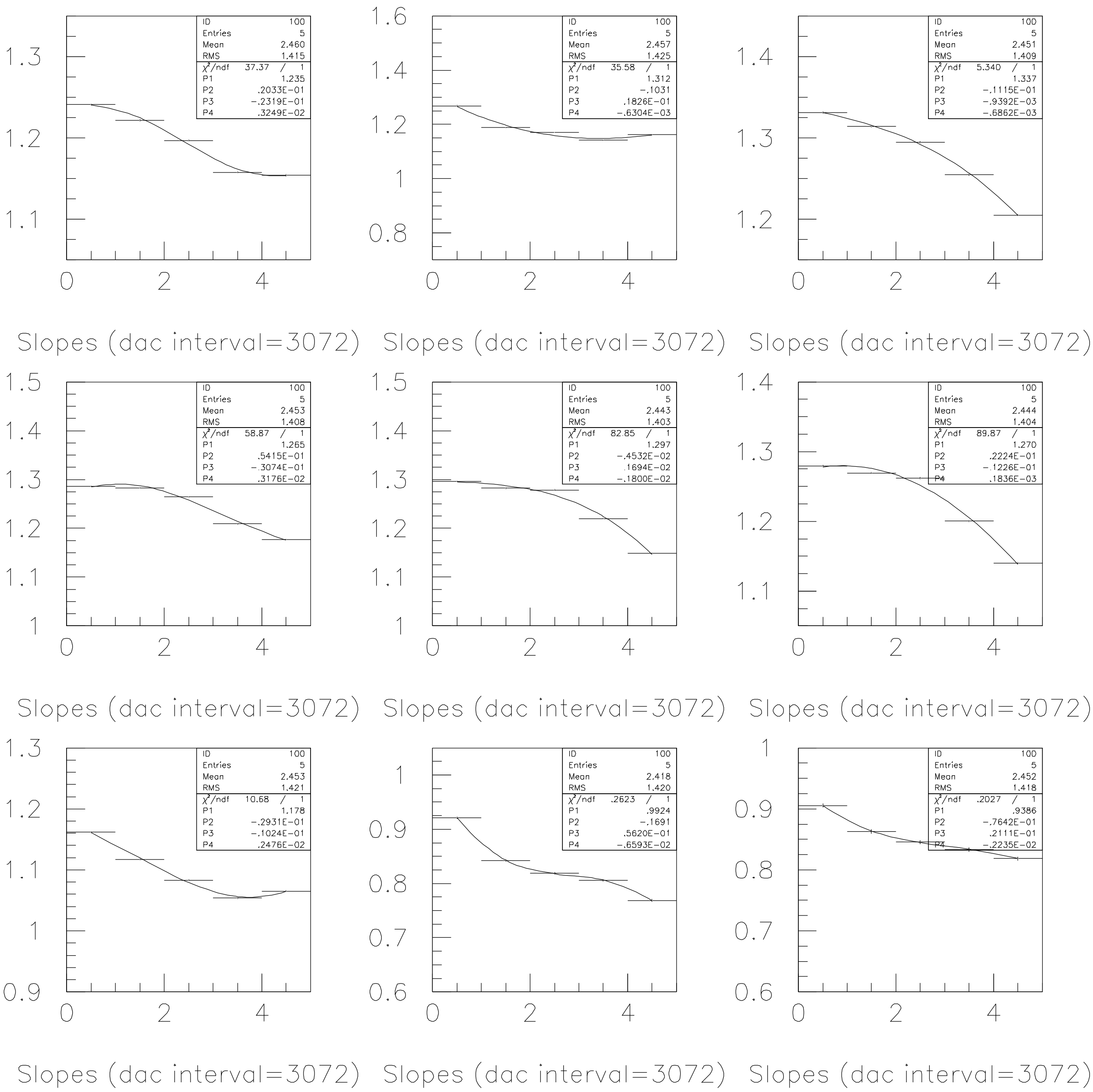
Pulser Uniformity



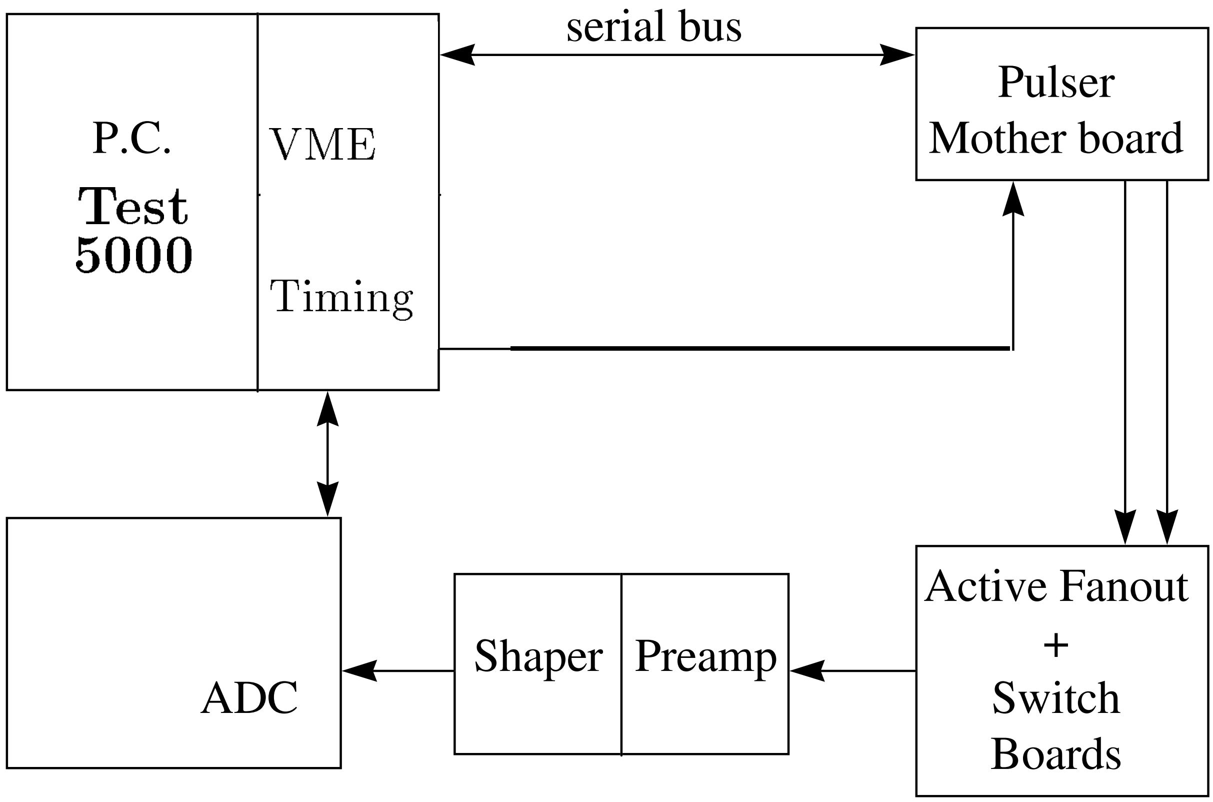
Pulser Linearity



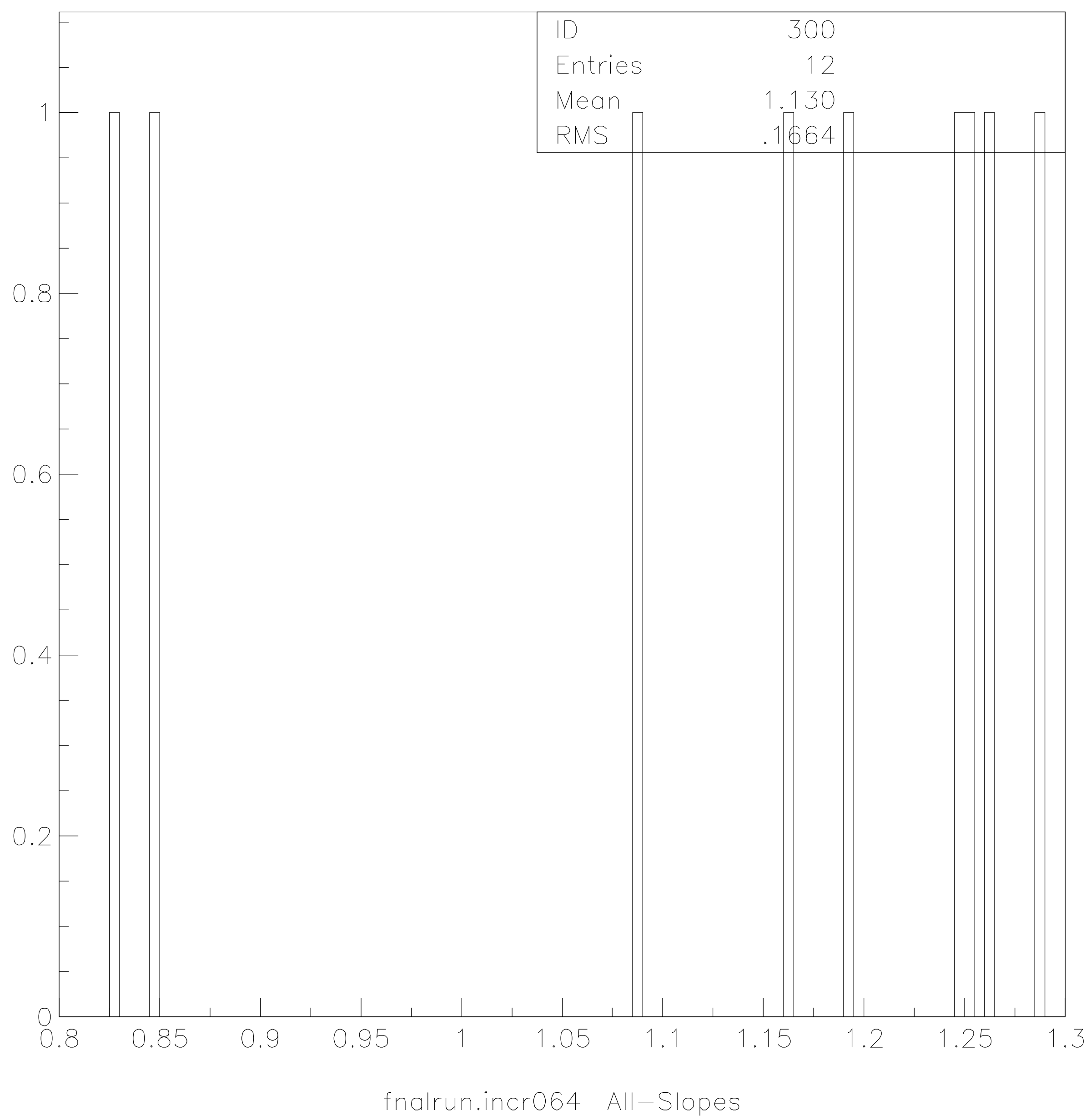
Full Chain Linearity



Fermilab Test Setup



Uniformity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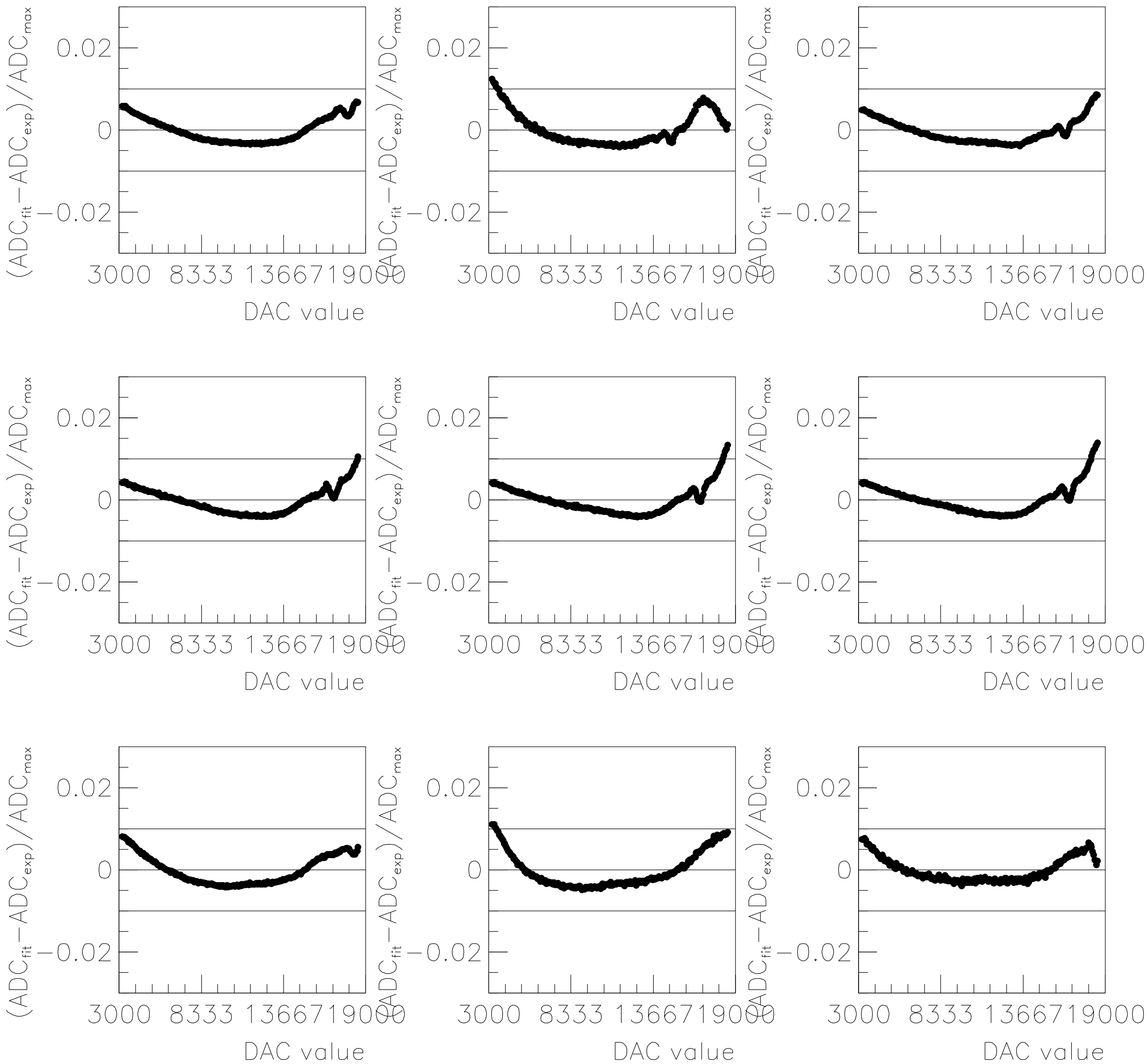
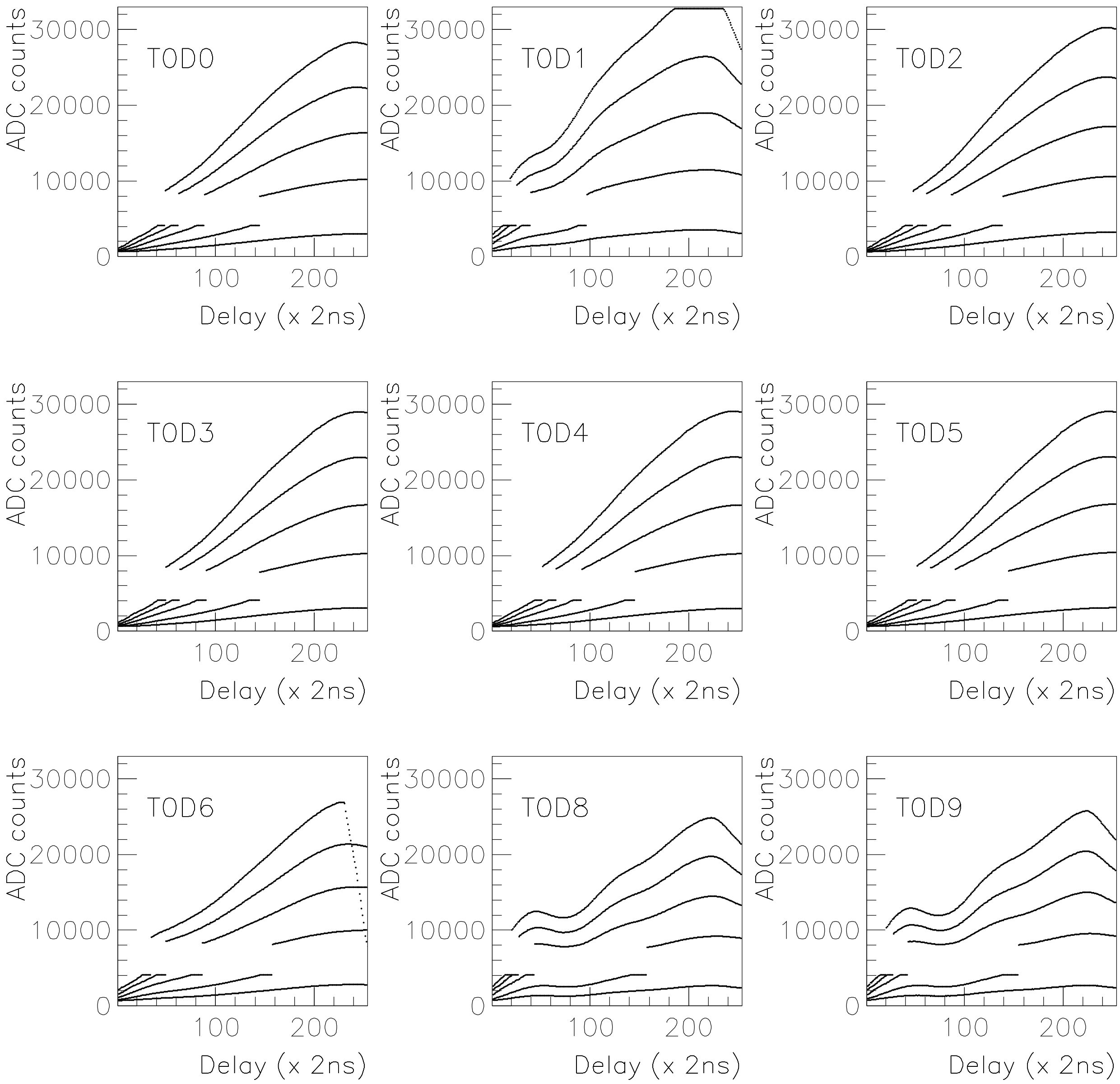
Entries 12
Mean 1.130
RMS .1664
1
0.8
0.6
0.4
0.2
0
0.8
0.85
0.9
0.95
1
1.05
1.1
1.15
1.2
1.25
1.3
fnalrun.incr064 All−Slopes

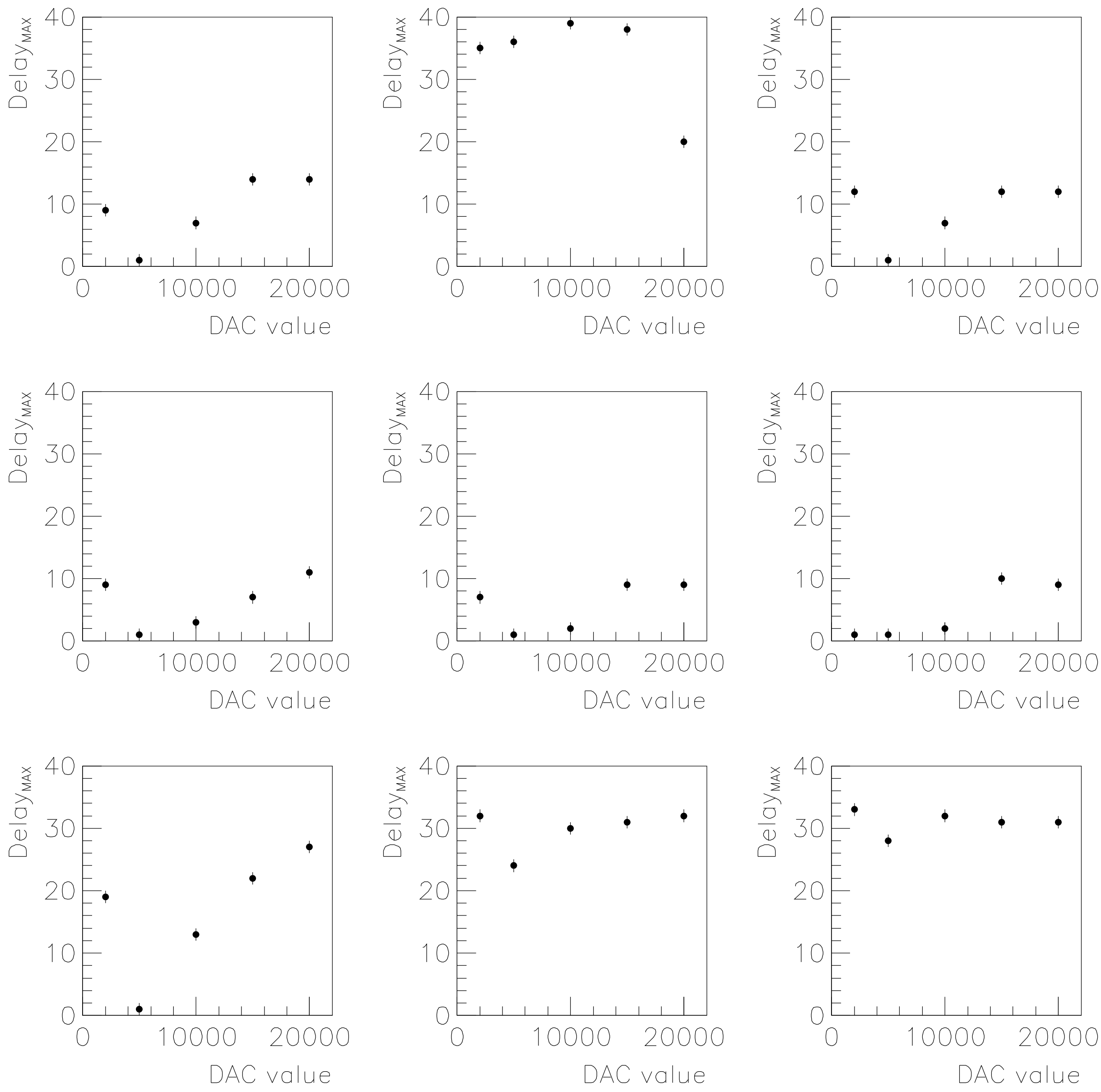
Full Chain Linearity



Response vs. Pulse Delay



Pulse Height vs. Delay for Maximal Response



Schedule

Step of the Project	begin	end
Finalize calibration prototype design		6/98
Prototyping	5/98	10/98
Prototype test at Fermilab (3 weeks)	10/98	12/98
Finalize calibration system design		2/99
Production phase (external manufacturers)	3/99	8/99
Installation/debugging at Fermilab	9/99	12/99

February Test at FNAL

- Test modified pulsers:
  optimized signal shape with the simulation
- Tests with varying Z_{preamp}
- Cross-talk measurements
- Coherent noise measurements with larger number of shapers

Conclusion

- Hardware Project well underway
- No Timing/Manpower/Financing Problems
- Possibility to integrate the ICD
- On-Line-Software-project is underway with SUNY
- Should be ready by fall 99