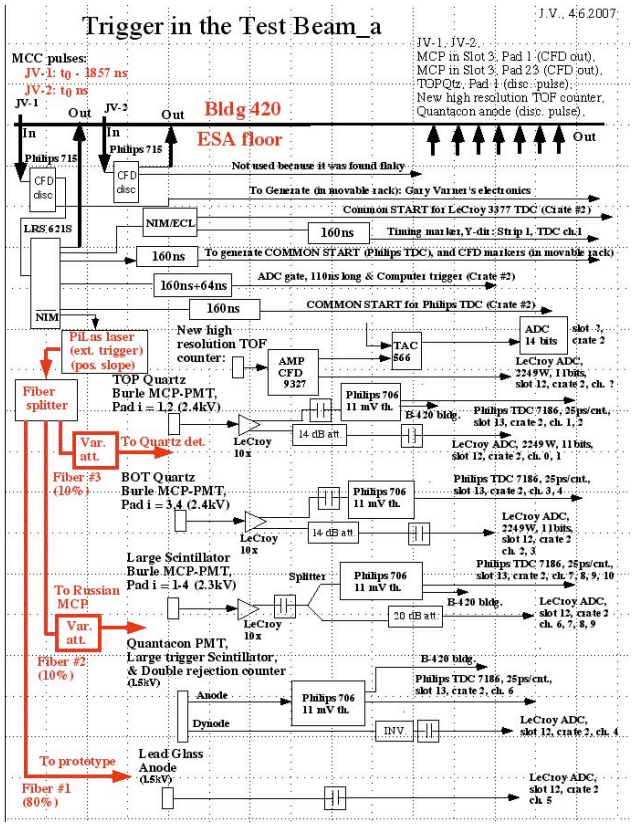
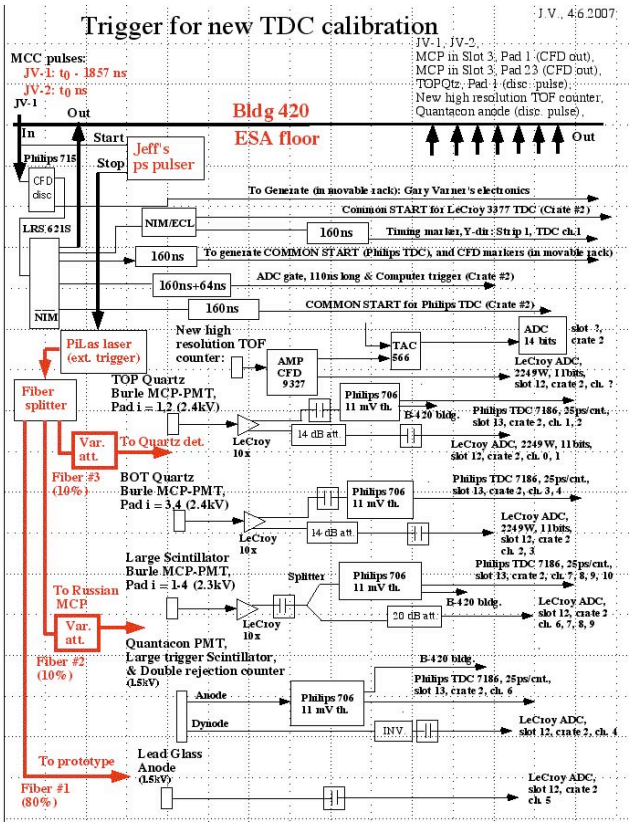
TDC calibration using a new pulser:

- **Principle:** Have a new pulser, which produces randomly stops exactly 5ns apart.
- **Aim:** To calibrate all TDC differentially by providing external starts for the PiLas laser diode.
- **Implement the pulser hardware in the prototype setup** in ESA.
- Debug the software on the data already taken.
- Modify already existing Jose's software developed for previous calibrations.
- Check the stability of the new calibration constants.

Usual test beam electronics setup:

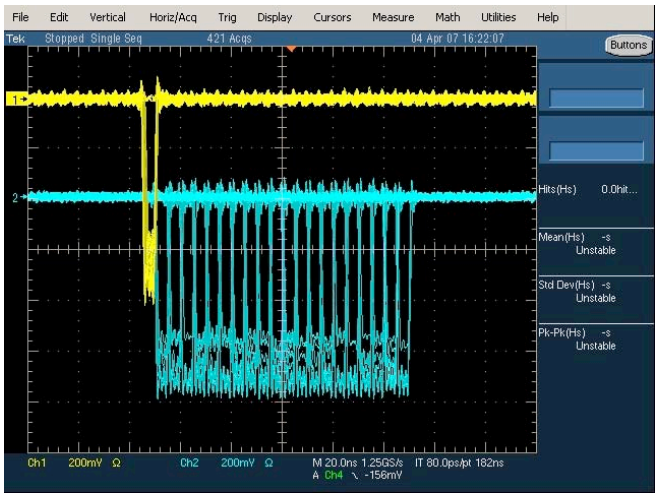


Setup during a TDC calibration:



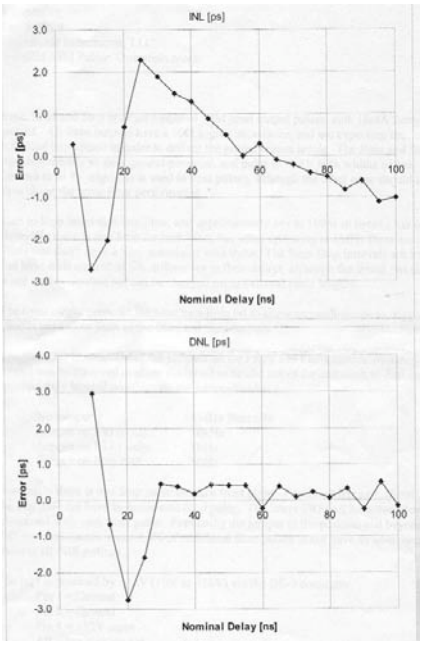
Analyze again the calibration of the TAC/ADC system using a new Jeff's pulser (Run 198):

- Jeff's pulser provides START & STOP pulses to Ortec TAC 566.
- Pulser running at 1kHz.
- A new pulser (makes 20 pulses every 5ns, covering as range of 100ns:



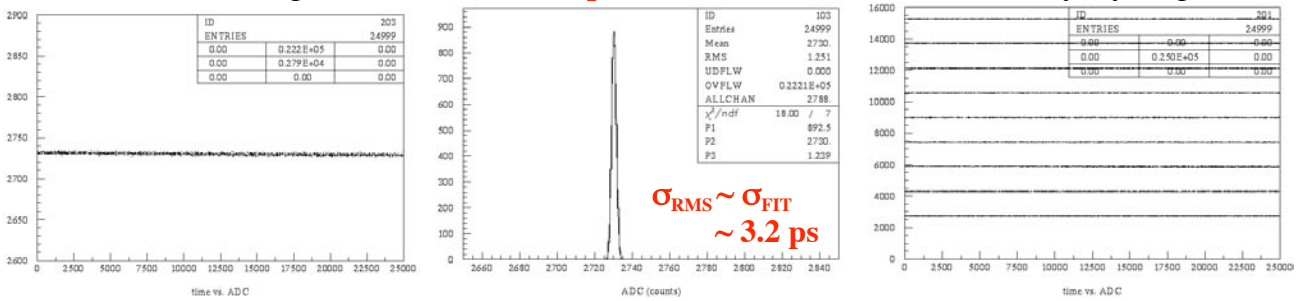
- **A departure from an ideal time** (calibration done by Jeff using his Ortec 9308 TAC system):

Ideal Delay [ns]	Acualt Delay [ns]	Relative Delay [ps]	Delta Delay [ps]	INL [ps]	DNL [ps]
5	76.0698	-94998.782		0.2850	
10	81.0668	-90001.734	4997.048	-2.7150	2.952
15	86.0675	-85001.074	5000.660	-2.0150	-0.660
20	91.0702	-79998.320	5002.754	0.6850	-2.754
25	96.0718	-74996.743	5001.576	2.2850	-1.576
30	101.0714	-69997.190	4999.553	1.8850	0.447
35	106.0710	-64997.578	4999.612	1.4850	0.388
40	111.0708	-59997.762	4999.816	1.2850	0.184
45	116.0704	-54998.196	4999.565	0.8850	0.435
50	121.0700	-49998.595	4999.601	0.4850	0.399
55	126.0695	-44999.005	4999.590	-0.0150	0.410
60	131.0698	-39998.783	5000.222	0.2850	-0.222
65	136.0694	-34999.161	4999.622	-0.1150	0.378
70	141.0693	-29999.264	4999.896	-0.2150	0.104
75	146.0691	-24999.494	4999.770	-0.4150	0.230
80	151.0690	-19999.569	4999.925	-0.5150	0.075
85	156.0687	-14999.894	4999.675	-0.8150	0.325
90	161.0689	-9999.650	5000.244	-0.6150	-0.244
95	166.0684	-5000.147	4999.503	-1.1150	0.497
100	171.0685	0.000	5000.147	-1.0150	-0.147
	71.0695	Avg offset [ns]			

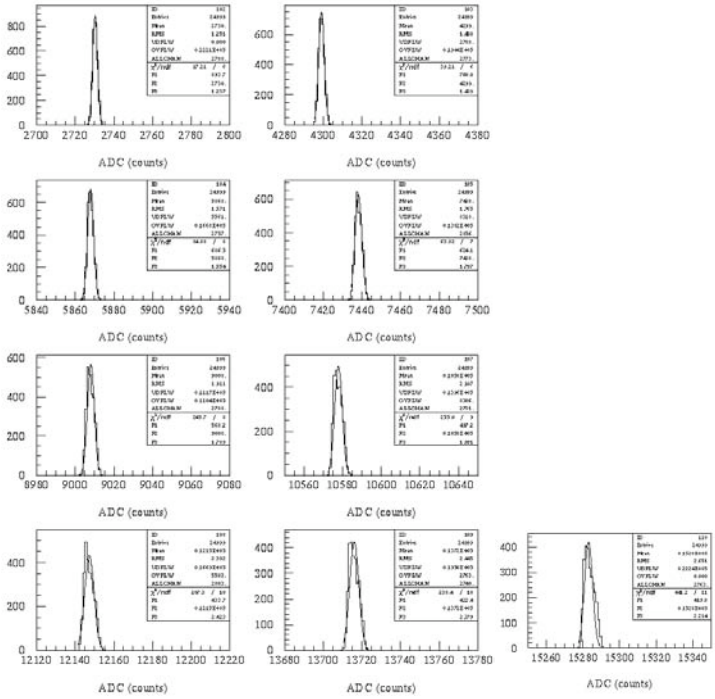


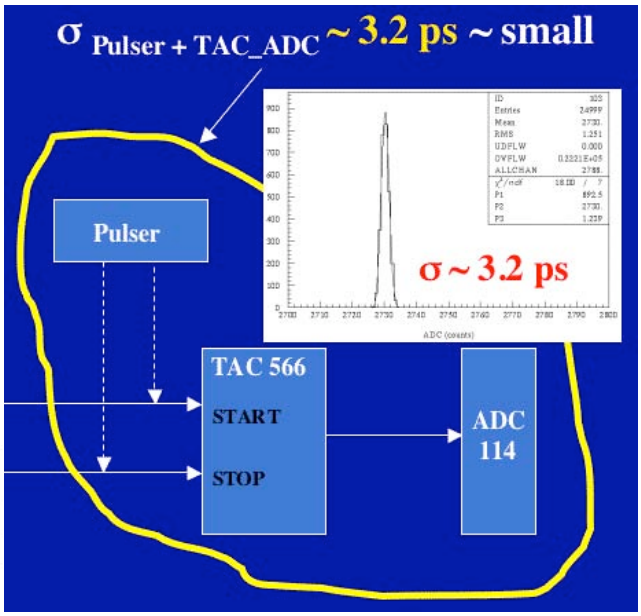
- **The pulser delay is known to a few ps.**

- **Run 198** results using a calibration of **2.604ps/counts** (from a cable calibration by my scope):

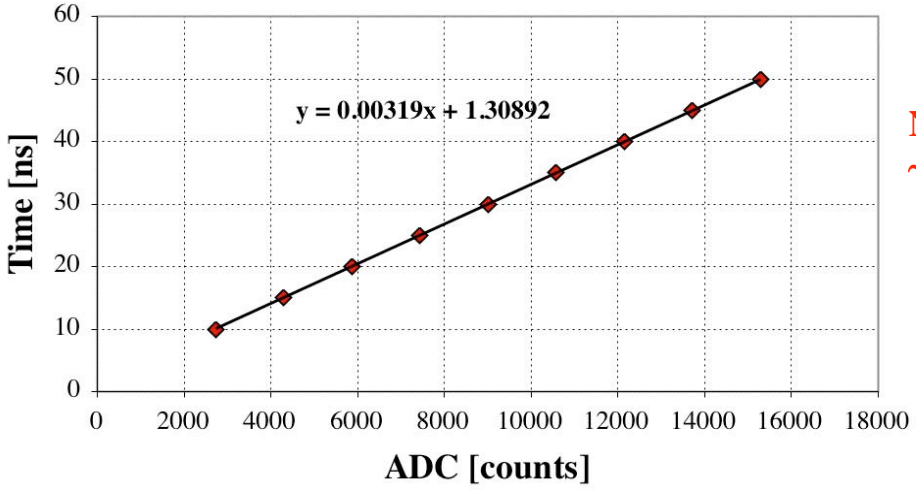


- **Additional new results** from analysis of data from run 198; the new analysis done on 4.4.2007:
- Time interval between pulses: 5 ns; TAC 566 full scale range: 50ns => **expect 9 peaks** in TDC spectrum.





1-st calibration of TAC566 & ADC114



New calibration result:
~3.19 ps/count (preliminary)