Production and Integration Status

Mercedes Paniccia

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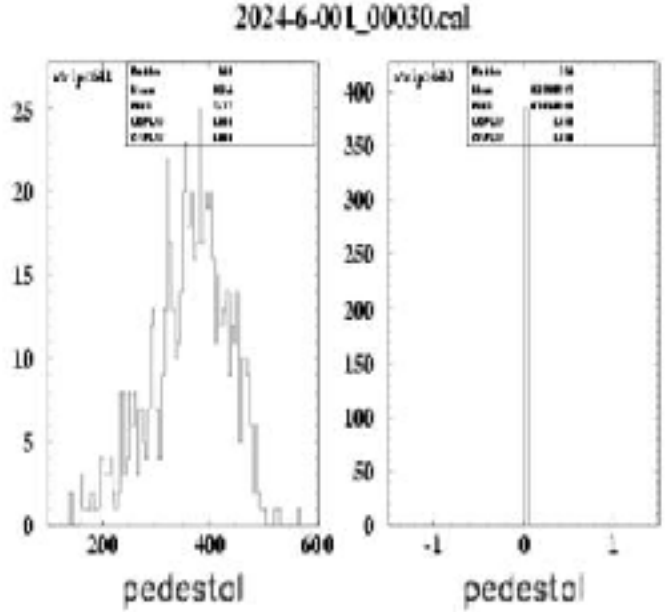
Hybrids production status:

The first S-hybrid 2024-6-001 has been produced in Geneva

Only PCB and VAs have been bonded in order to perform an electrical test before gluing the Capacitors and then check the production method....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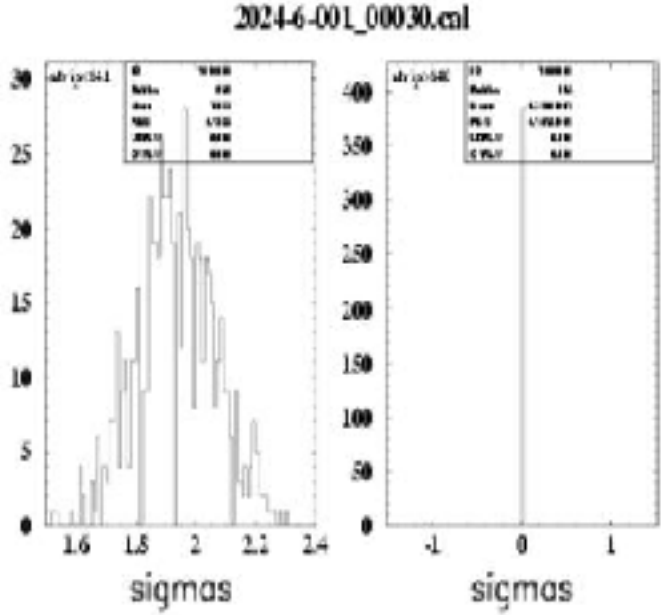
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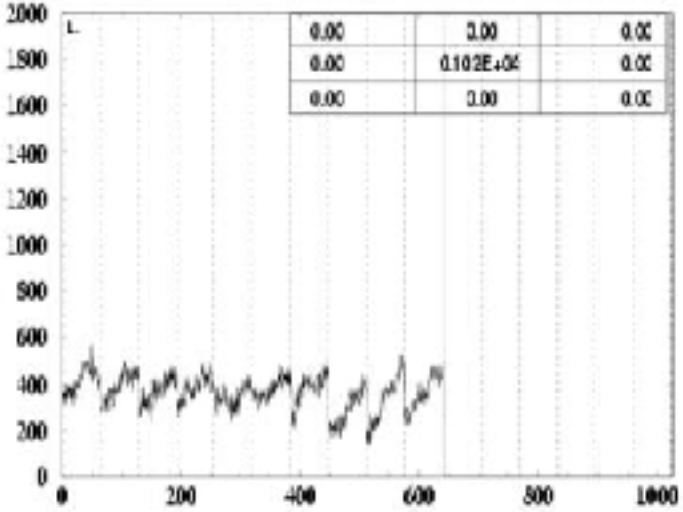

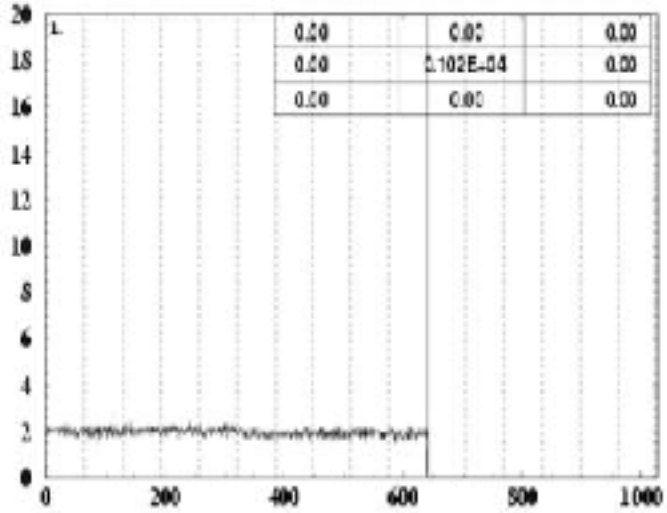

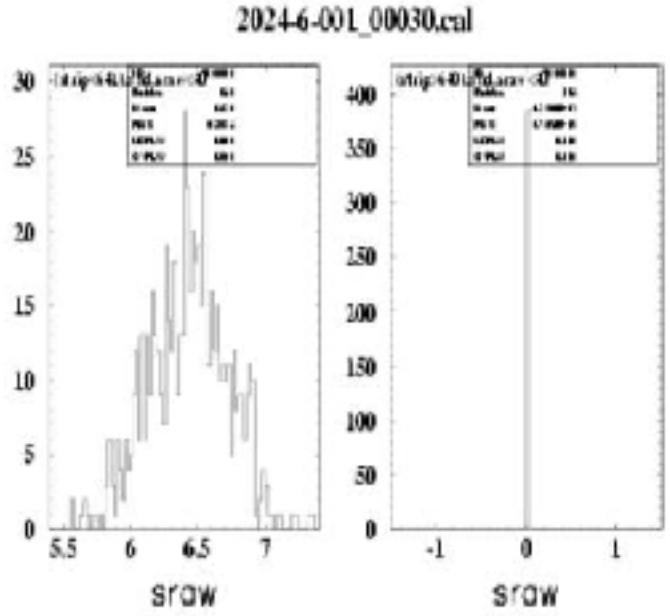
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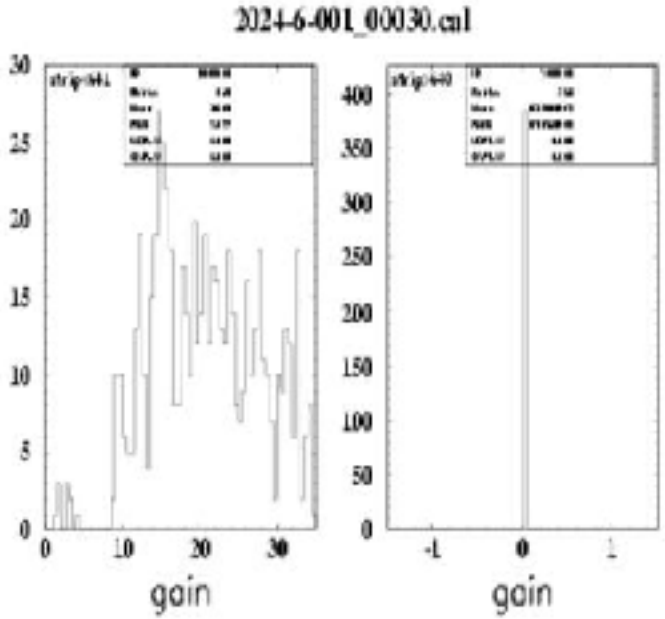
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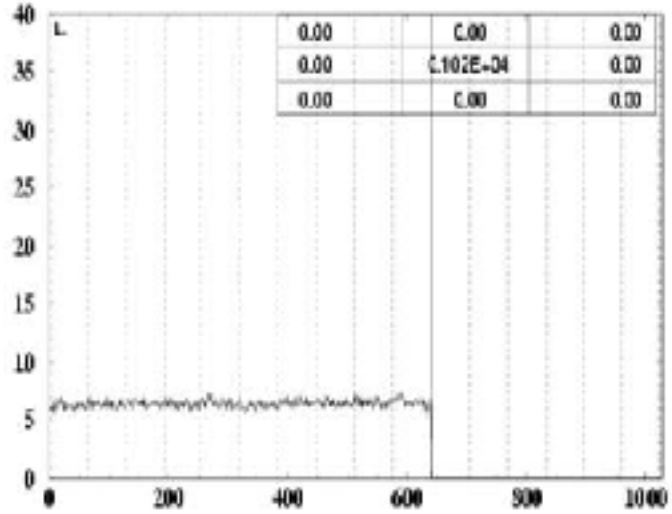
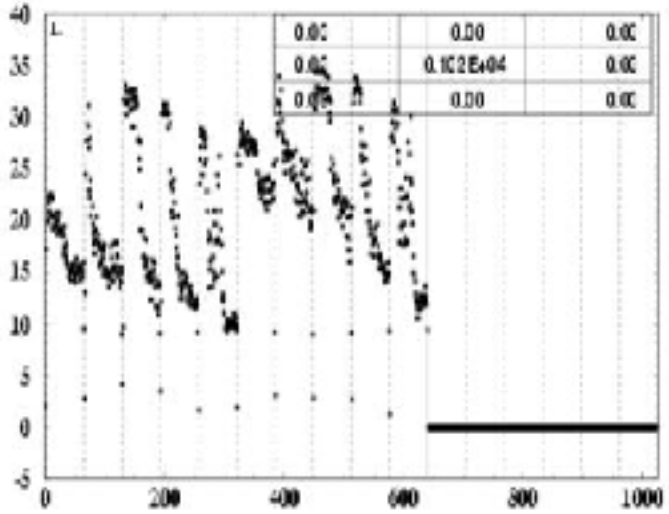




..the test is pretty good:

<pedestal> = 362.4 rms = 72.17

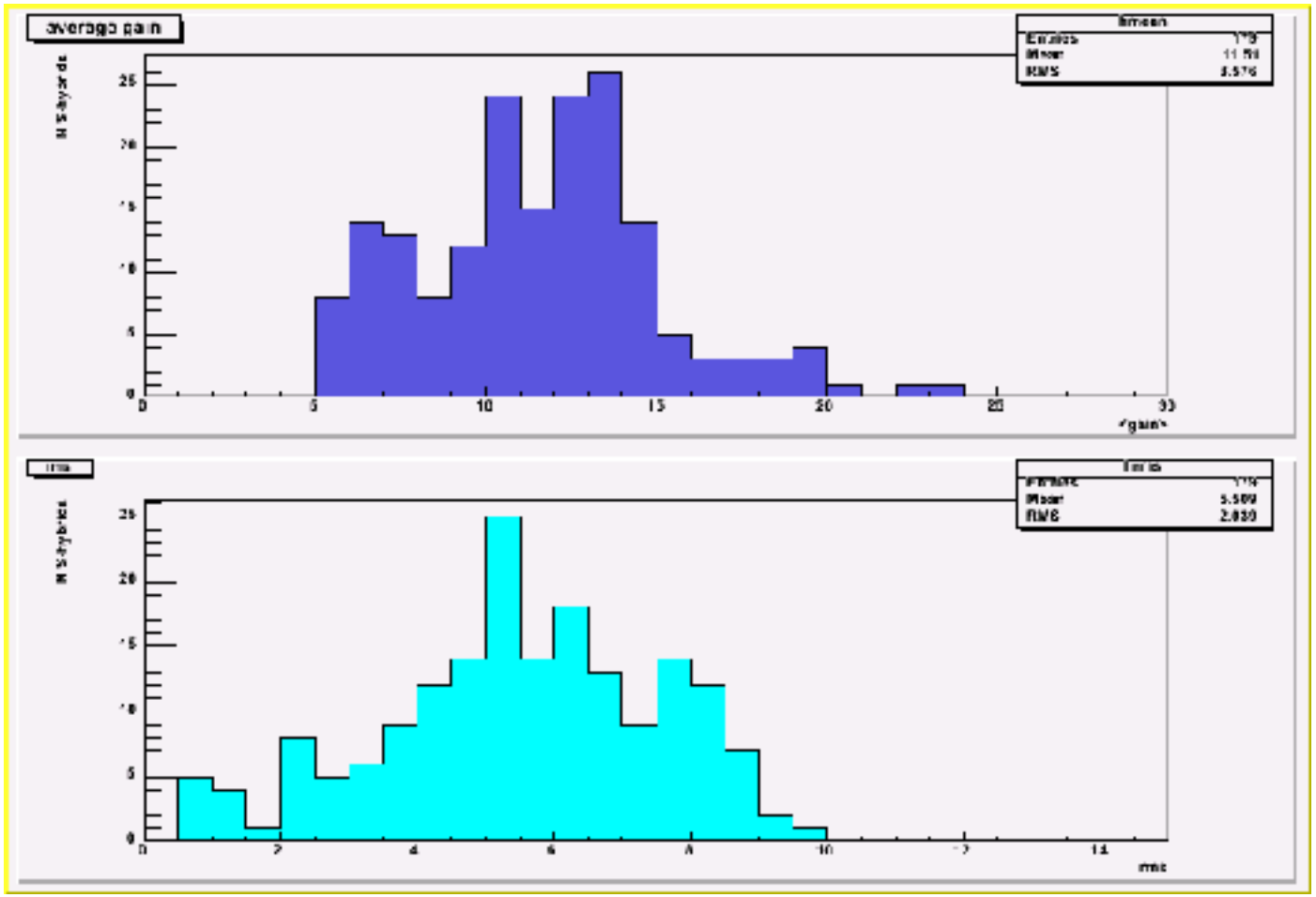
<sigmas> = 1.933 rms = 0.1322

<sraw> = 6.430 rms = 0.2934

<gain> = 20.69 rms = 7.077

That's top ten!!!

A little statistics on S-hybrids Gain :



Work is in progress:

Other three S-hybrids have been produced*:

2024-6-002

2024-6-003

2024-6-004

* VA s and Capacitors glued to PCB,
bonding will be performed in Perugia

Ladders assembly and Planes Integration Status

Mercedes Paniccia

University of Geneva

SHIELDED	READY TO BE SHIELDED	ON PHASE-1	ON REPARATION	STAND-BY	SPARES
L09AI090 (Z.5) (140μm) L10AI078 (Z.5) (70μm) L11AE030 (Z.5) (70μm) L12AE042 (Z.5) (70μm) L12AJ086 (Z.5) L12AJ088 (Z.5) L12AJ080 (Z.5) L12AJ082 (Z.5) L12AJ083 (Z.5) (70μm) L12AJ084 (Z.5) L12AJ081 (Z.5) L14AI041 (Z.5) L07FE003 (P5) (E) (He) L09GI002 (P5) (E) (Ke) L09GI011 (P5) (E) (Ke) L10FE001 (P5) (E) (He) L12AE038 (P5) (E) (Ke) L14AI031 (P5) (E) (He)	L07PE006 (Z.5) (140μm) L09AI089 (Z.5) (140μm) L09AI091 (Z.5) (140μm) L09AI092 (Z.5) (140μm) L09AI152 (Z.5) (140μm) L09AI153 (Z.5) (140μm) L09GI012 (Z.5) (140μm) L09PE010 (Z.5) (140μm) L10AI080 (Z.5) (140μm) L10PE009 (Z.5) (1 ref.) (140μm) L11AI083 (Z.5) (140μm) L11AI086 (Z.5) (140μm) L11AI087 (Z.5) (140μm) L11AI134 (Z.5) (140μm) L12AHC48 (Z.5) (70μm) L12AI017 (Z.5) (140μm) L12AI030 (Z.5) (1 ref.) (140μm) L12AJ034 (Z.5) (2 ref.) (140μm) L12AJ034 (P5) (TB) L12AJ035 (P5) (TB) L12AJ036 (P5) (TB) L14AI029 (Z.5) (140μm) L14AI030 (P5) (140μm) L11GE018 (P5) (E)* (He.k)	L13A0035 (P5) (M) L13A0036 (P5) (M) L13A0073 (P5) L13AF100 (P5) (1 ref.) L13AF102 (P5) L13A0093 (P5) L13A0095 (P5) L13A0097 (P5) L13AF099 (P5) L13AF109 (P5)	L12AE11 (He) L12AE16 (He.k)	L11AE88 (140μm) L12AE60 (Z.5) L12AE067 (1 ref.) (He) L12A0094 (S15)	L12AE030 (He) (still probl.) L11GE007 (E) (elec.) (He.k) L12AE02 (S1.3) L12AE09 (S7.6) L12AE01 (He.k) (S1.8) L12AE013 (He)* (S3.7) NEEDED FROM PG: 1*L07XXXXX (Z.5) (0 ex.) 1*L10XXXXX (Z.5) 3*L11XXXXX (Z.5) (0 ex.) 3*L12XXXXX (Z.5) 1*L13XXXXX (Z.5) LEGENDA: E: elec. prob. M: metrology S: sensor prob. H: hybrid prob. av: available in PG TB: test beam K6: kapton misplaced 1 ref: IFST sensors
18 (12+6)	16 (13+3)	11	2	4	5 (4+1)

Ladders installed and tested on planes

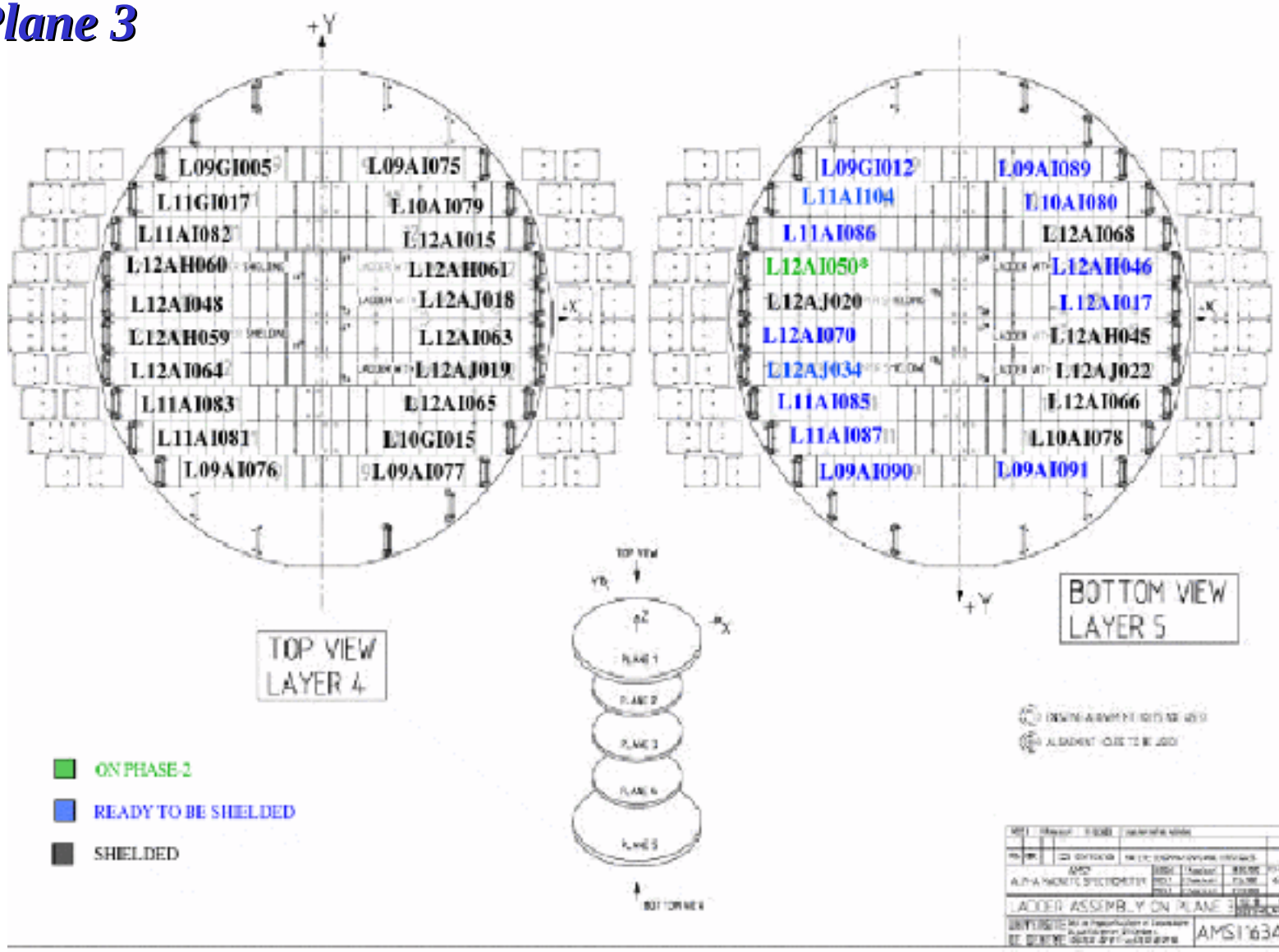
ON LAYER L1	ON LAYER L2	ON LAYER L3	ON LAYER L4	ON LAYER L5	ON LAYER L6	ON LAYER L7	ON LAYER L8
	L07P0002 (Lf) L07P0004 (Lf) L09GI003 (Lf) L09GI006 (Lf) L09GI010 (Lf) L09GI013 (Lf) L10P0005 (Lf) L10GI014 (Lf) L11GI004 (Lf) L11GI008 (Lf) L11GI009 (Lf) L11GI016 (Lf) L12AE024 (Lf) L12AE029 (Lf) L12AE037 (Lf) L12AI001 (Lf) L12AI003 (Lf) L12AI004 (Lf) L12AI005 (Lf) L12AI006 (Lf) L12AJ051 (Lf) L12AJ071 (Lf) L14AI041 (Lf) L14AI042 (Lf)		L09GI005 (Lf) L09AI075 (Lf) (70μm) L09AI076 (Lf) (70μm) L09AI077 (Lf) (70μm) L10GI015 (Lf) L10AI079 (Lf) L11GI017 (Lf) L11AI081 (Lf) (70μm) L11AI082 (Lf) (140μm) L11AI083 (Lf) (140μm) L12AE059 (Lf) (70μm) L12AE060 (Lf) L12AE061 (Lf) L12AI015 (Lf) L12AI048 (Lf) L12AI083 (Lf) L12AI084 (Lf) L12AI085 (Lf) L12AJ018 (Lf) L12AJ019 (Lf)				LEGENDA: E: elec. prob. M: morphology S: sensor prob. H: hybrid prob. av.: available in FG TB: test beam
0-31	24/24	0-22	20/20	0-20	0-22	0-24	0-30

Layer L4

Plane 3 status summary:

- Top layer (L4) successfully tested
- Bottom layer (L5) :
  - 6/20 ladders ready to be installed
  - 13/20 ready to be shielded
  - 1/20 still on phase-2

Plane 3


+Y
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L09AI075
L11GI017
L10AI079
L11AI082
L12AI015
L12AH060
L12AH061
L12AI048
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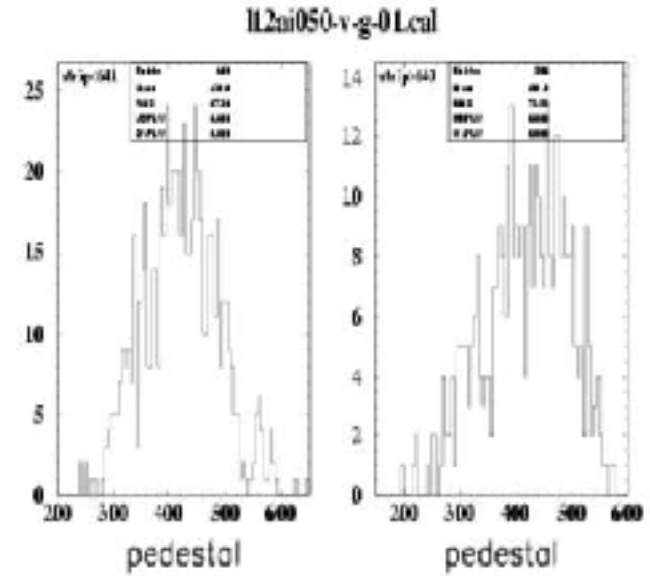
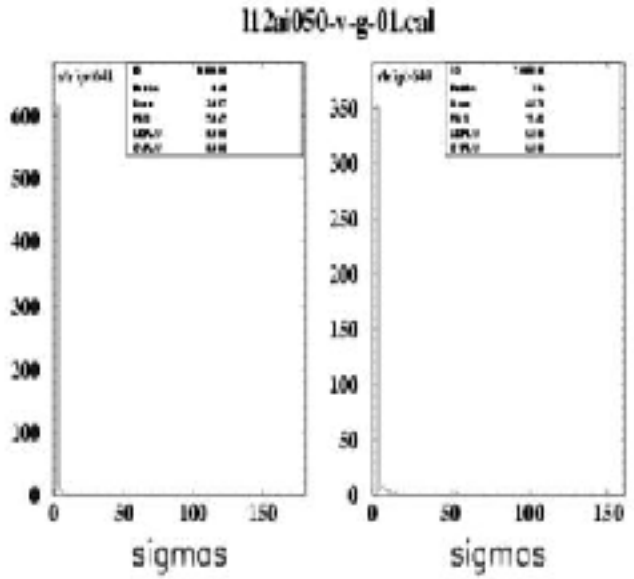
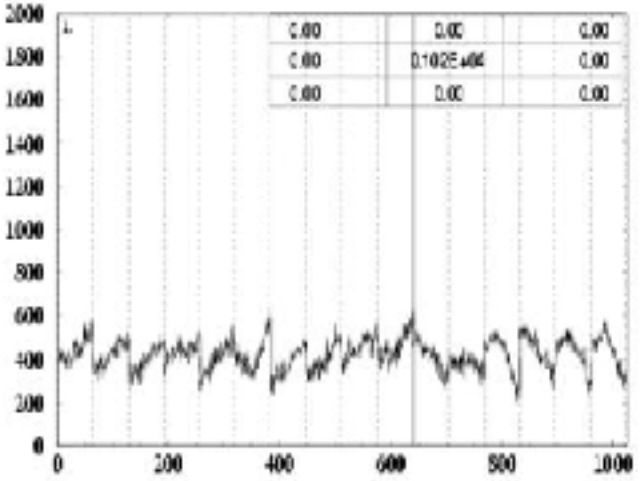
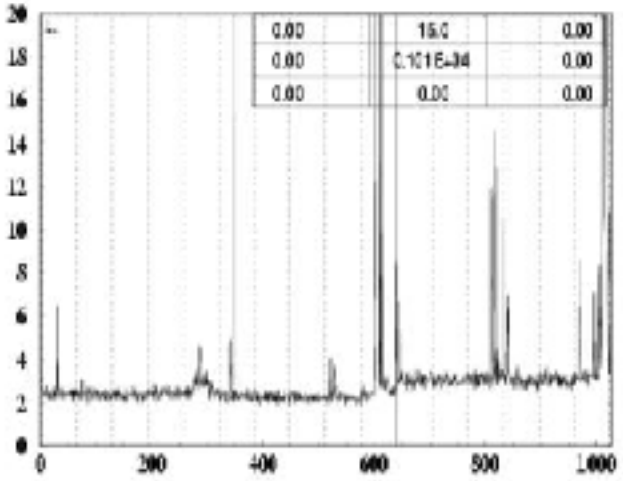
L12AH059
L12AI063
L12AI064
L12AJ019
L11AI083
L12AI065
L11AI081
L10GI015
L09AI076
L09AI077
TOP VIEW
LAYER 4
L09GI012
L09AI089
L11AI104
L10AI080
L11AI086
L12AI068
L12AI050*
L12AH046
L12AJ020
L12AI017
L12AI070
L12AH045
L12AJ034
L12AJ022
L11AI085
L12AI066
L11AI087
L10AI078
L09AI090
L09AI091
BOTTOM VIEW
LAYER 5
ON PHASE 2
READY TO BE SHIELDED
SHIELDED
LADDER ASSEMBLY ON PLANE 3
AMS1634

L12AI050 at reception in Geneva (1)

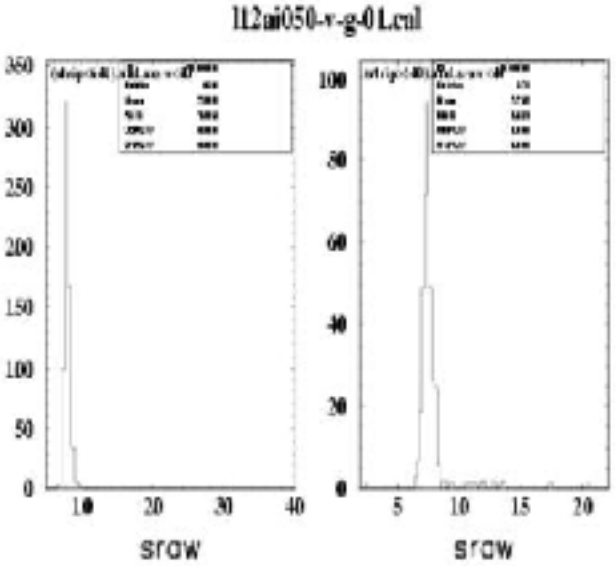


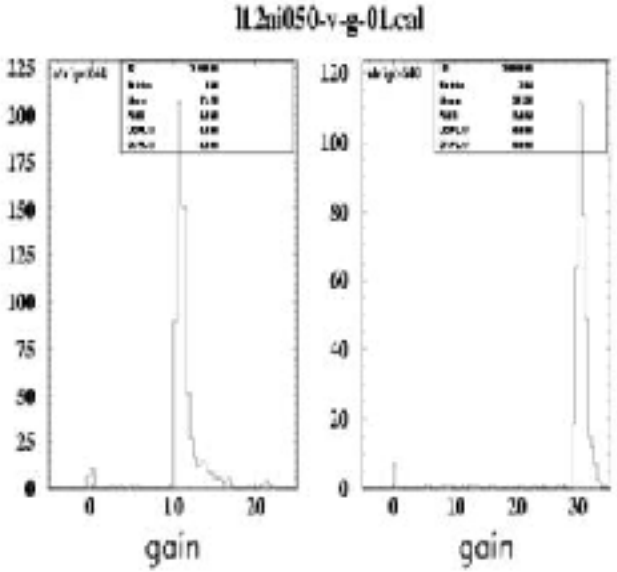


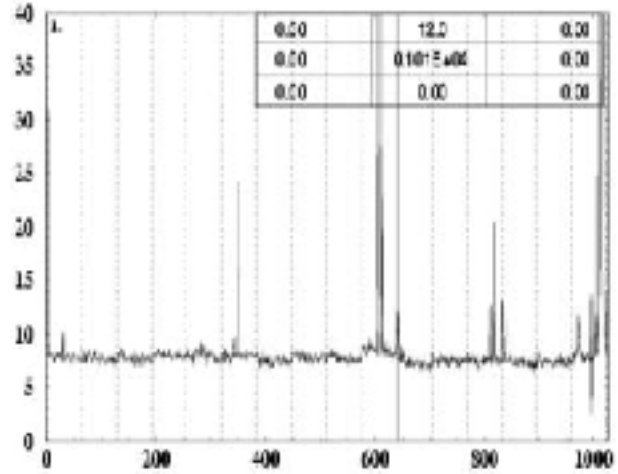


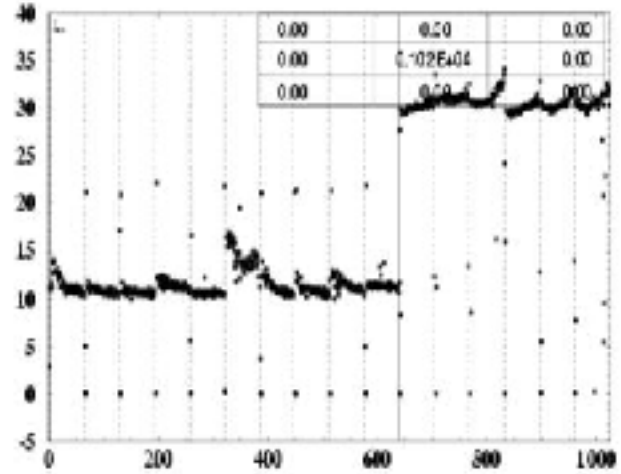


L12AI050 at reception in Geneva (2)

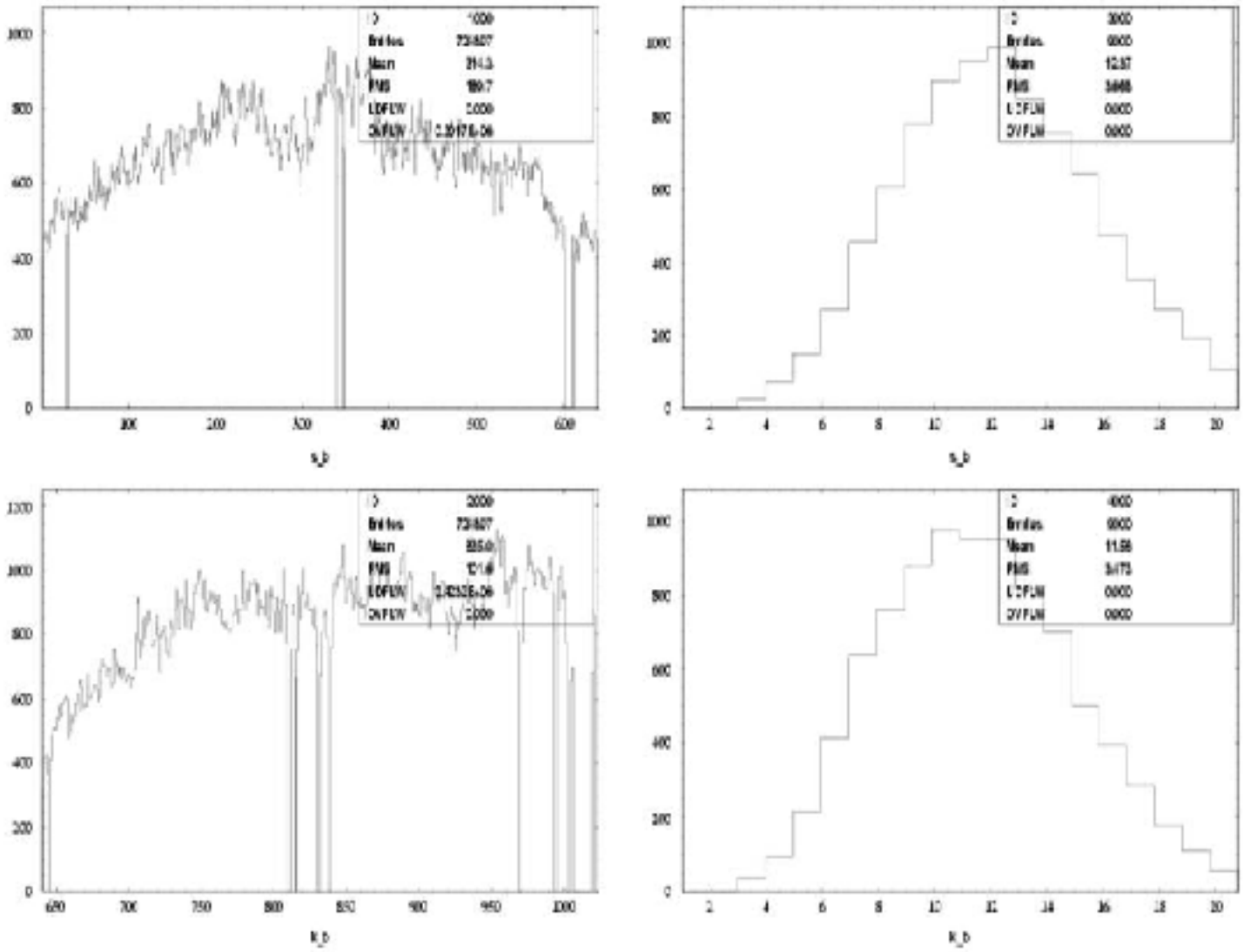








L12AI050 at reception in Geneva (3)



A deeper look into VA 16:

STRIP	VA	VACHA	PEDESTAL	SRAW	SIGMAS	GAIN	STATUS
1000	16	40	455.45	7.71	3.09	30.38	0
1001	16	41	412.77	7.92	3.59	30.79	0
1002	16	42	401.17	7.85	3.02	30.93	0
1003	16	43	449.47	7.95	3.19	30.46	0
1004	16	44	442.23	11.8	7.95	29.83	8
1005	16	45	396.43	11.28	8.32	30.65	8
1006	16	46	402.09	8.05	3.63	30.94	0
1007	16	47	369.26	8.09	3.59	31.17	0
1008	16	48	389.65	9.35	6.22	30.83	8
1009	16	49	332.63	52.24	52.27	31.22	10
1010	16	50	389.33	77.98	72.86	26.6	10
1011	16	51	316.11	13.46	9.91	31.63	8
1012	16	52	324.04	17.48	14.14	31.34	8
1013	16	53	326.91	54.61	58.34	30.38	10
1014	16	54	393.07	135.02	141.05	20.8	26
1015	16	55	312.26	83.19	52.51	5.41	138
1016	16	56	291.87	79.16	52.57	9.42	138
1017	16	57	329.05	119.41	128.97	22.91	26
1018	16	58	259.98	46.57	45.51	32.55	10
1019	16	59	316.81	17.4	14.69	31.65	8
1020	16	60	332.47	11.18	7.08	31.37	8
1021	16	61	318.25	9.53	4.87	31.7	0
1022	16	62	286.5	8.12	3.35	32.27	0
1023	16	63	335.02	8.8	3.28	31.94	0
1024	16	64	311.23	13.79	10.78	30.41	8

VERY NOISY →
REBONDED →
VERY NOISY →

There is an hole of 13 channels on K-side

What happen if we take out the most noisy channel (the 54th)?

After disconnecting channel 54 the problem was still there...

Let's try to take out also the other very noisy channel (the 57th) ...

After disconnecting channel 57 the problem was still there...

And if the cause is in the two rebonded channels (55th & 56th)?

The noise did not decrease but it just spread on the neighbour channels!

Then the problem is due to the silicon.

Can we use L12AI050 as it is?

(Don't worry about L5 : L12AI049 will replace it)

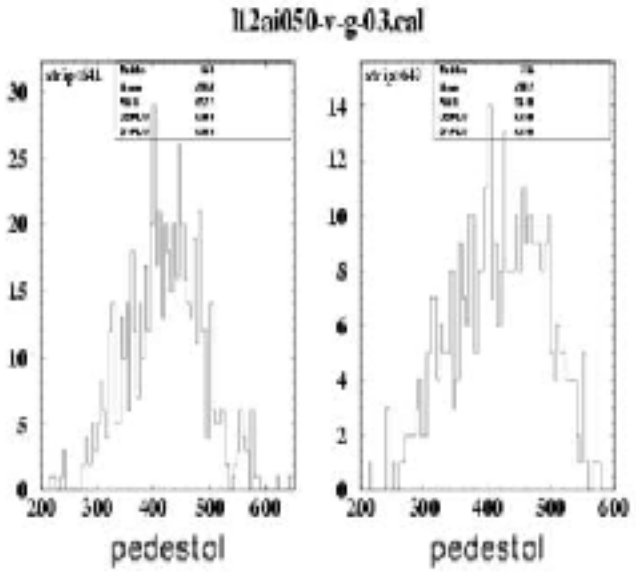
VA 16 now:

STRIP	VA	VACHA	PEDESTAL	SRAW	SIGMAS	GAIN	STATUS
1000	16	40	454.75	8.61	2.77	30.4	0
1001	16	41	412.54	8.56	3.11	30.82	0
1002	16	42	402.16	8.56	2.91	31.17	0
1003	16	43	449.47	8.52	3.09	30.7	0
1004	16	44	443.66	11.33	9.76	30.17	8
1005	16	45	396.74	11.76	9.61	31.25	8
1006	16	46	403.54	8.8	3.48	30.99	0
1007	16	47	371.14	8.87	3.95	31.56	0
1008	16	48	392.46	9.07	5.43	31.03	8
1009	16	49	336.24	30.5	33.34	31.79	10
1010	16	50	386.16	42.26	51.02	29.6	10
1011	16	51	320.46	12.05	9.1	31.92	8
1012	16	52	331.01	22.97	20.67	31.8	8
1013	16	53	335.05	91.87	90.51	28.38	10
1014	16	54	397.94	5.84	6.33	25.19	8
1015	16	55	315.27	5.73	6.61	25.25	8
1016	16	56	313.34	6.15	6.83	25.34	8
1017	16	57	343.21	6.41	6.88	25.05	8
1018	16	58	268.3	79.97	77.26	32.24	10
1019	16	59	326.45	22.59	19.04	31.79	8
1020	16	60	341.07	12.63	8.76	31.44	8
1021	16	61	326.9	10.38	6.54	31.67	8
1022	16	62	293.31	8.83	3.9	32.2	0
1023	16	63	340.98	9.67	3.19	31.83	0
1024	16	64	315.37	13.04	9.96	29.88	8

DISCONNECTED

There is an hole of 14 channels on K-side !

L12AI050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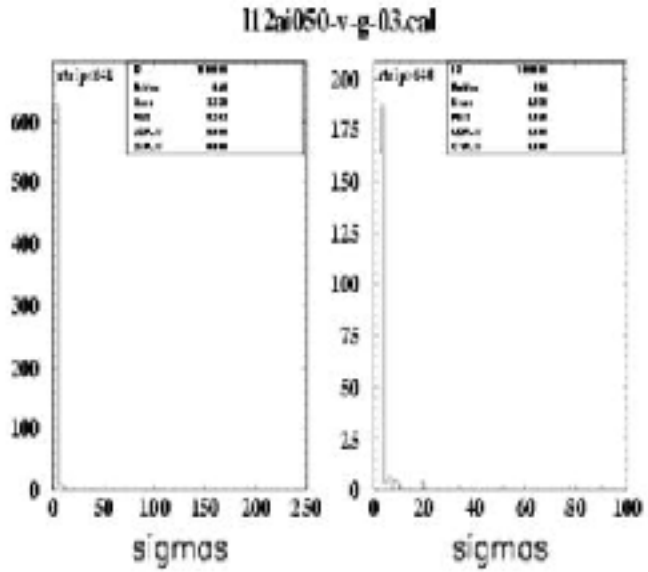
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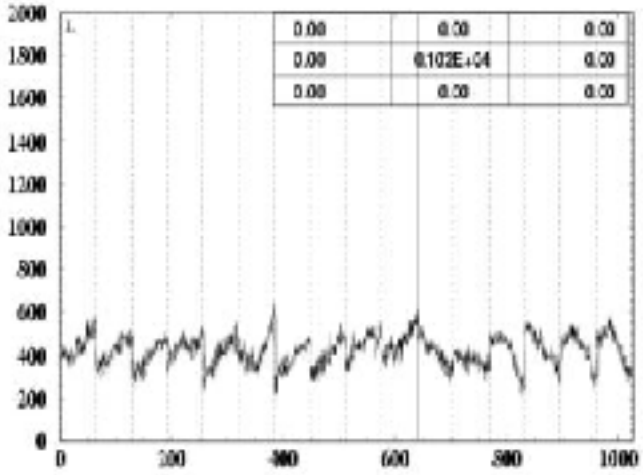
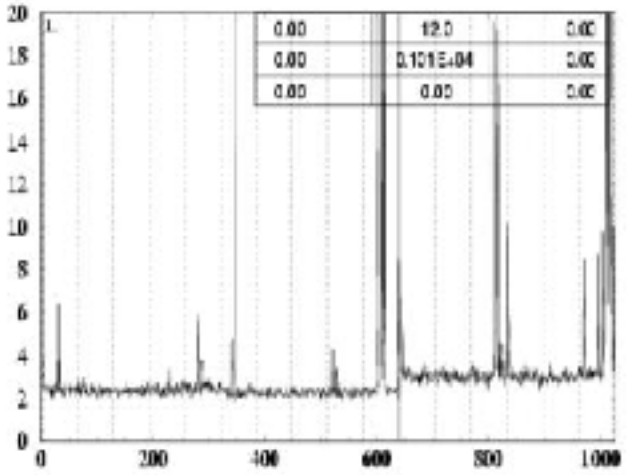
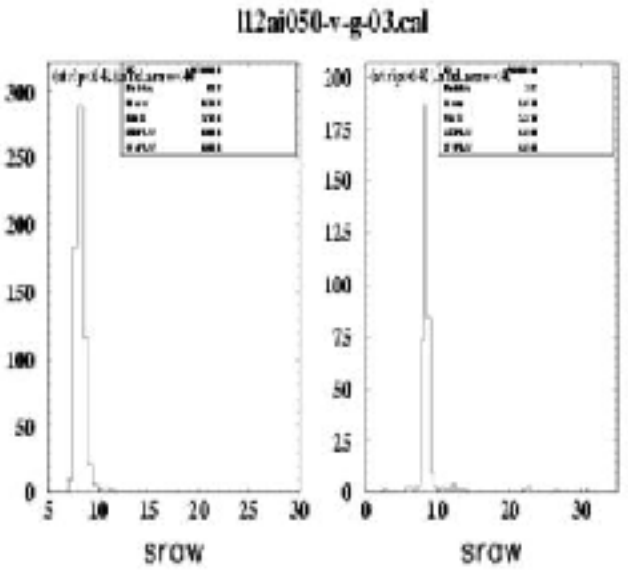
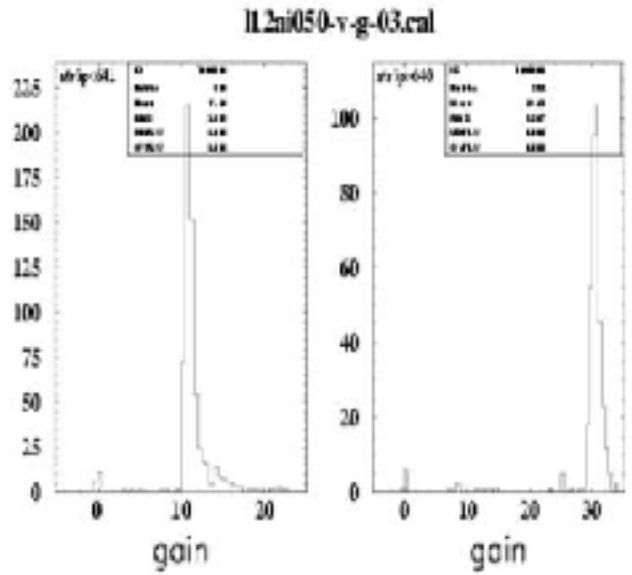
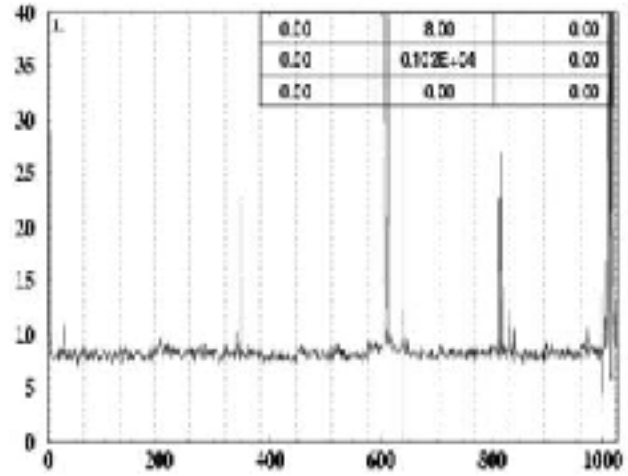


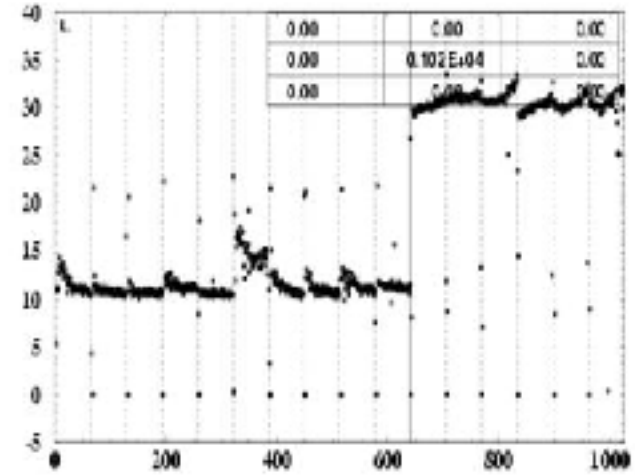


L12AI050

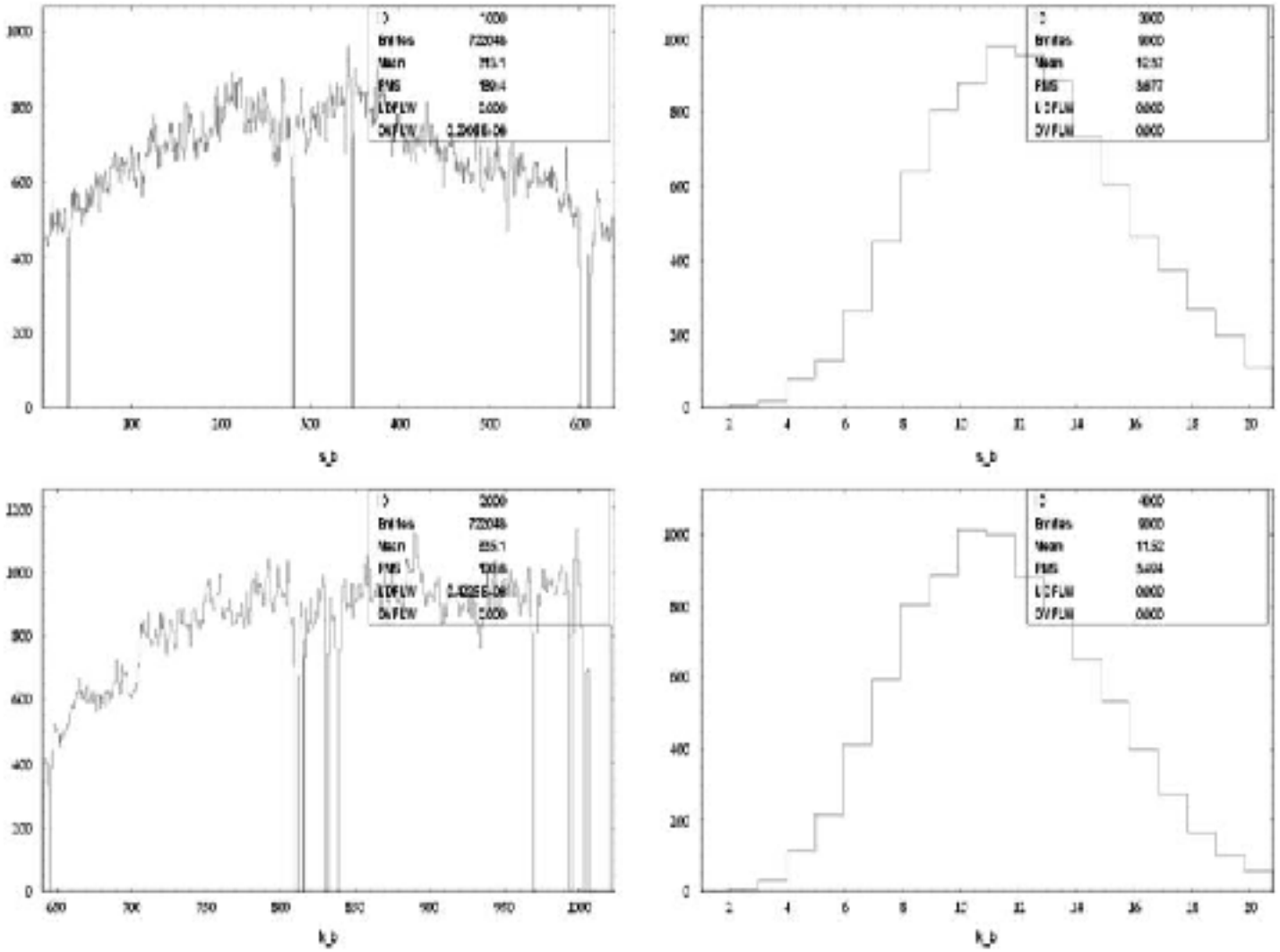








L12AI050



There are other two cases to be discussed:

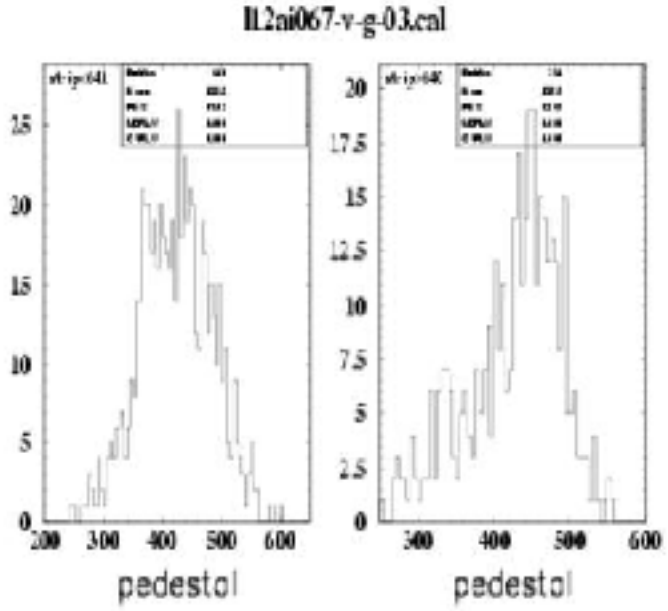
- L12AI067

  VA 10 (S-side) have high noise
  (in particular the last 25 channels).

- L11AI088

  After phase-2 two peaks of noisy channels
  have appeared in K-side (VA 14 and 16).
  (L09AI089-like)

L12AI067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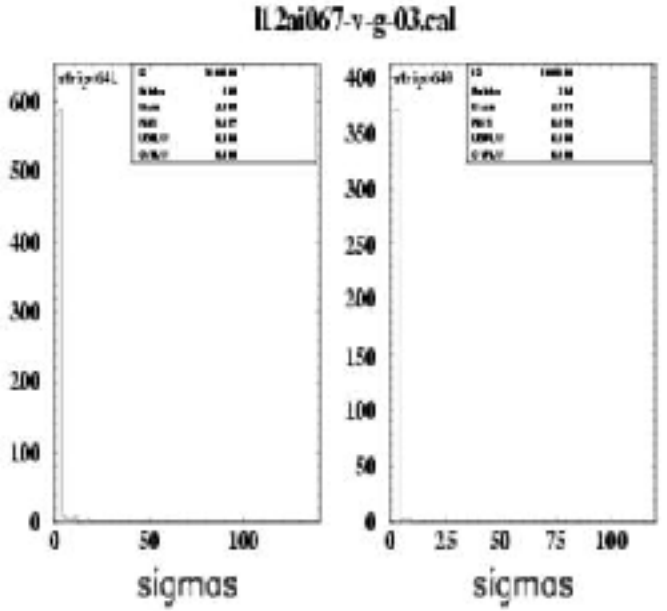
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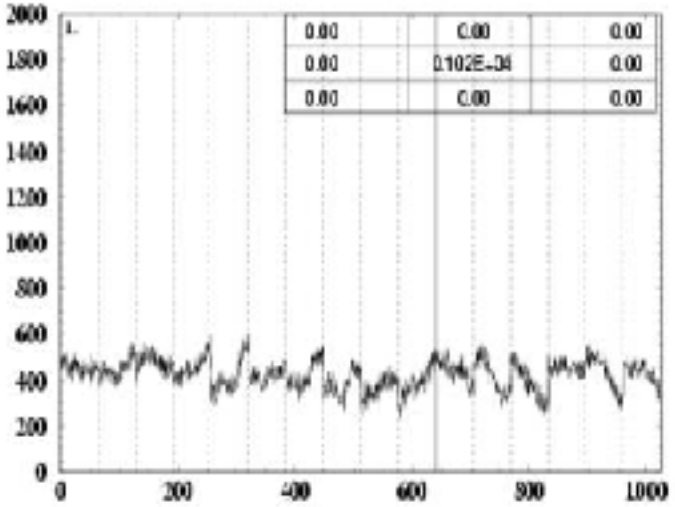
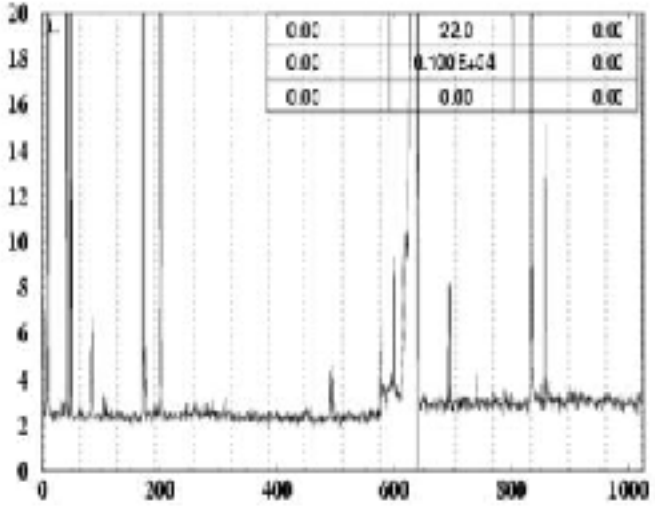
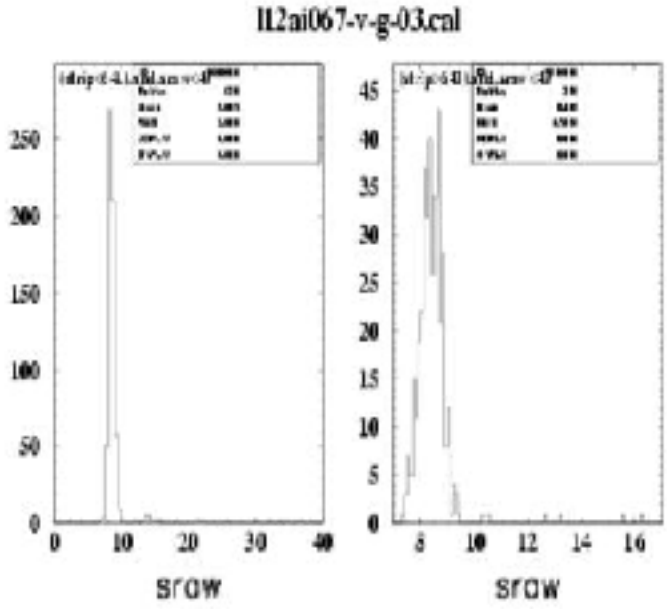
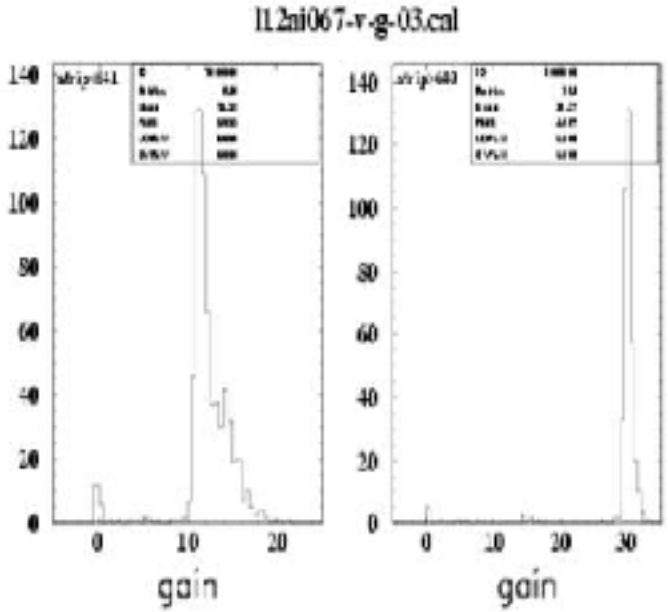
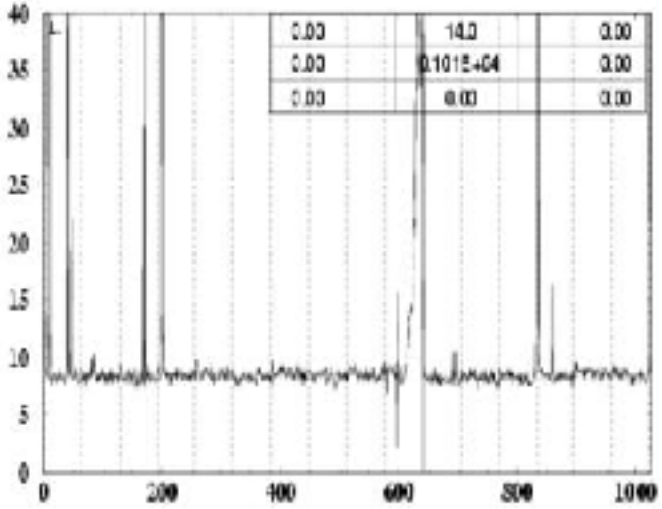


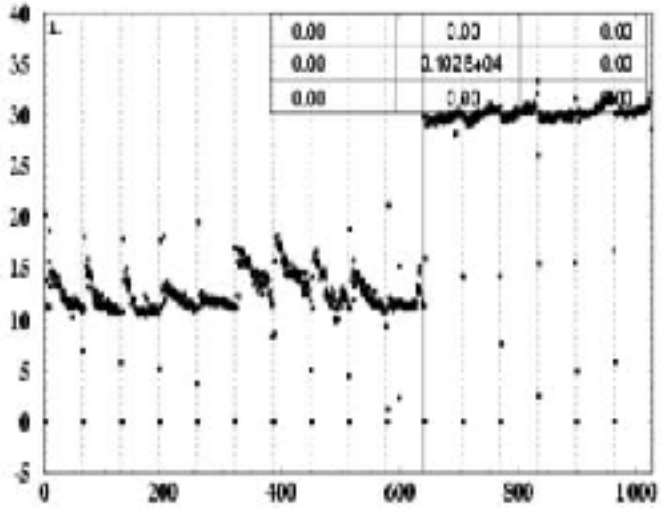


L12AI067

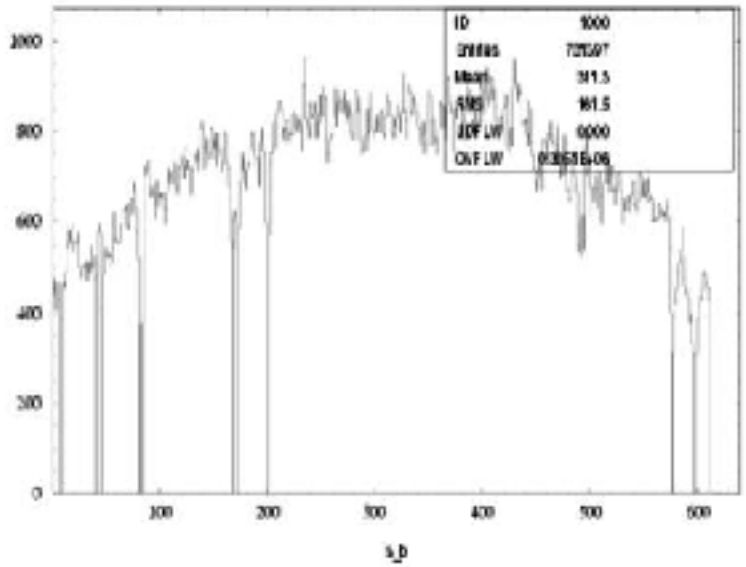


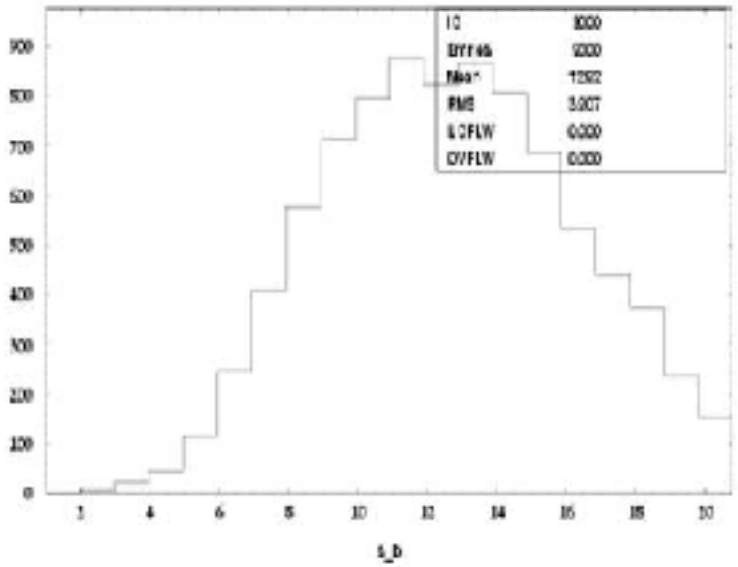


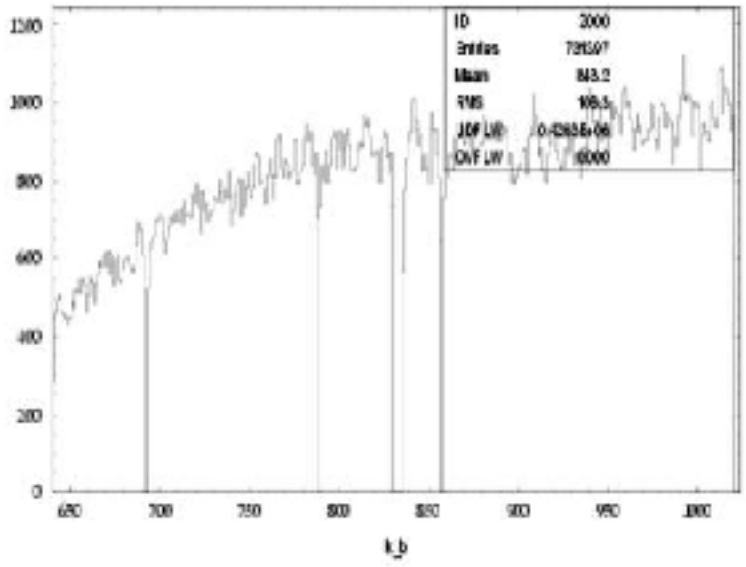


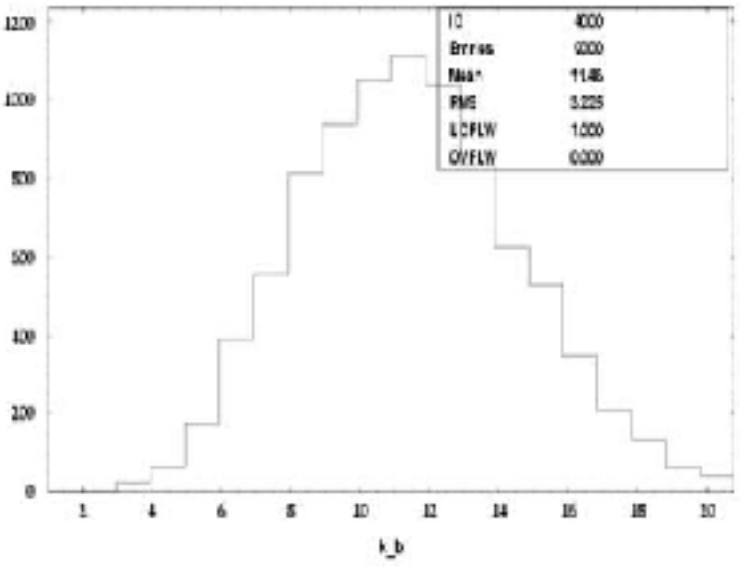


L12AI067


ID 1000
Entries 725597
Mean 311.5
RMS 161.5
UDF LW 0000
OVF LW
s_b

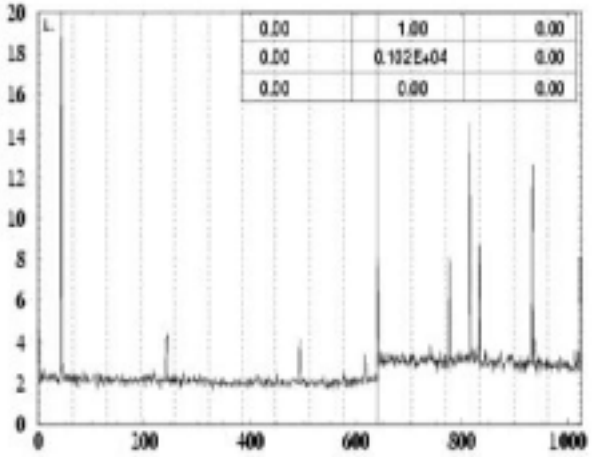

ID 1000
Entries 1000
Mean 7292
RMS 3.007
UDFLW 0.000
OVFLW 0.000
s_b


ID 2000
Entries 725597
Mean 843.2
RMS 169.5
UDF LW
OVF LW 0000
k_b

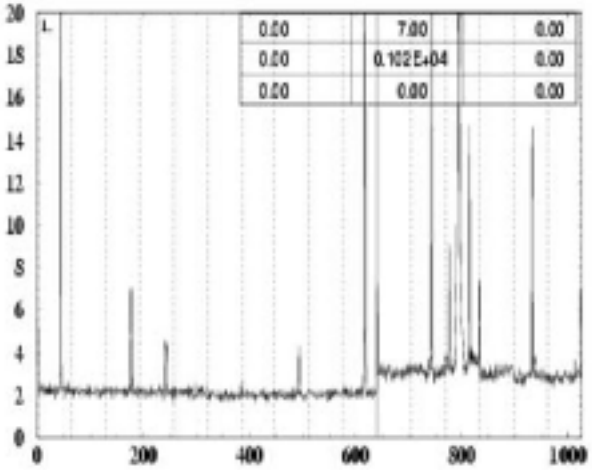

ID 1000
Entries 1000
Mean 11.46
RMS 3.225
UDFLW 1.000
OVFLW 0.000
k_b

The L09AI089 affair:

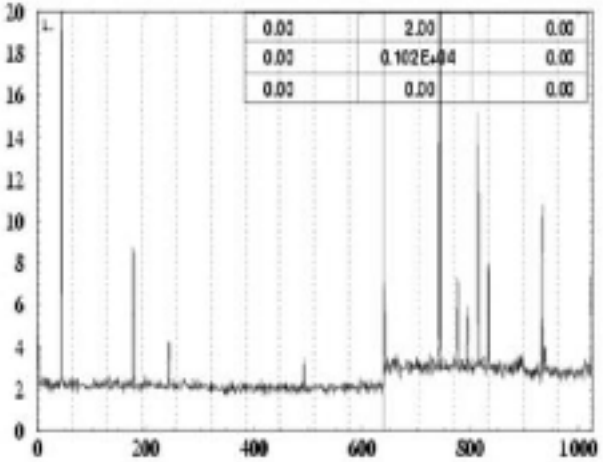
L09AI089 at reception in Geneva...



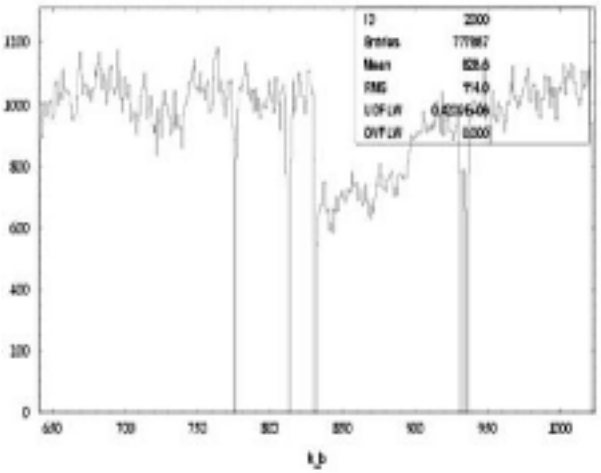
..after Phase-2...

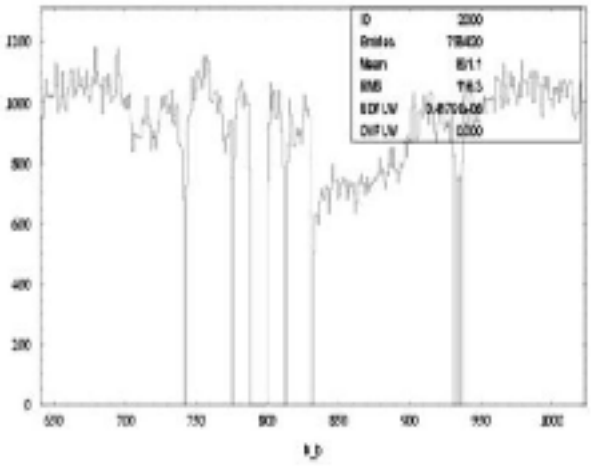


..after disconnecting the most noisy channel..

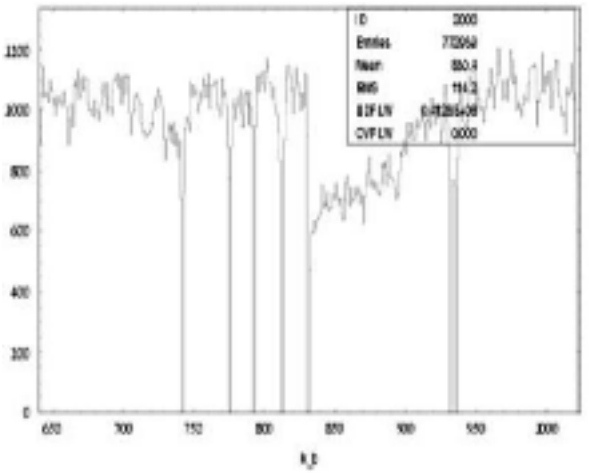


..a peak of 10 noisy channels appeared..



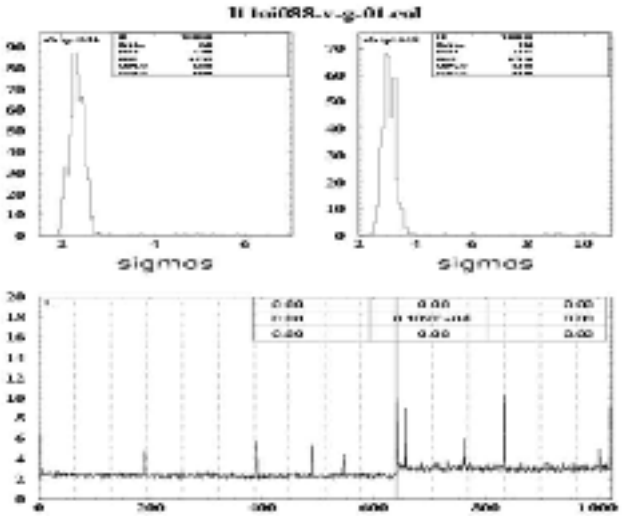


..the problem is solved!

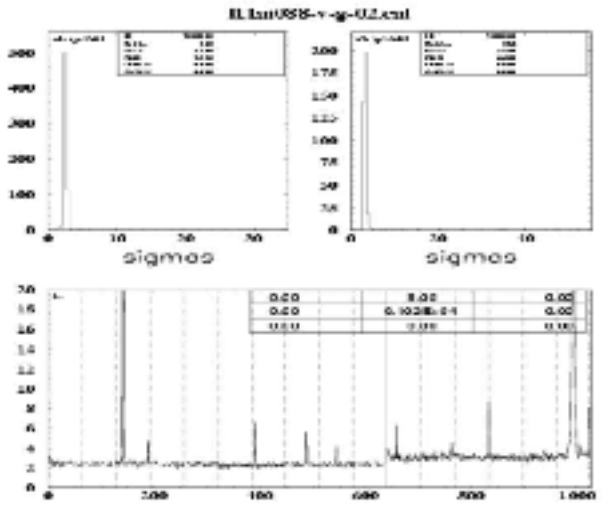


L11AI088

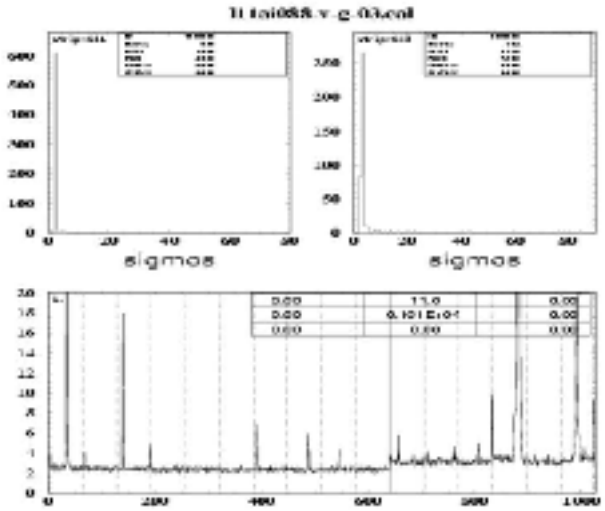
L11AI088 at reception in Geneva...



..after Phase-2 a peak of noise, about 10 channels broad has appeared on K-side ..



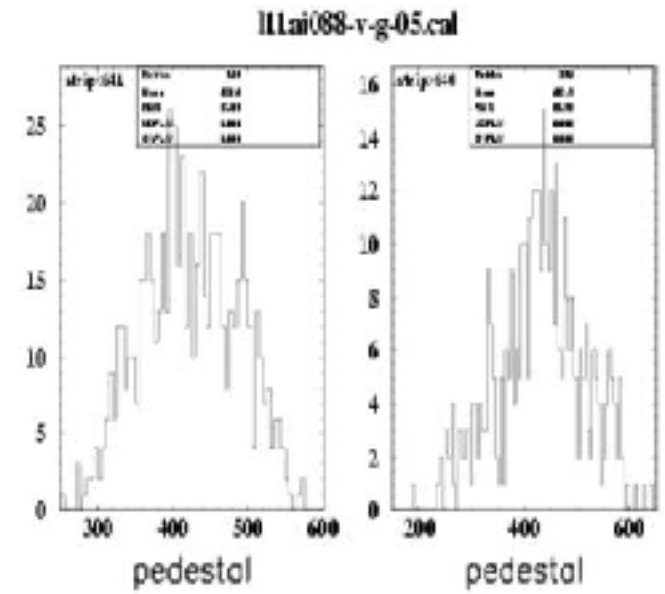
..we made an accurate visual inspection to the ladder, even taking it out from the box and putting it on the jig we use to glue legs, to have access to K-side.
We did not find anything which could be related to these noisy channels, so we put the ladder back on his box and tested it again: another peak appeared on K-side!

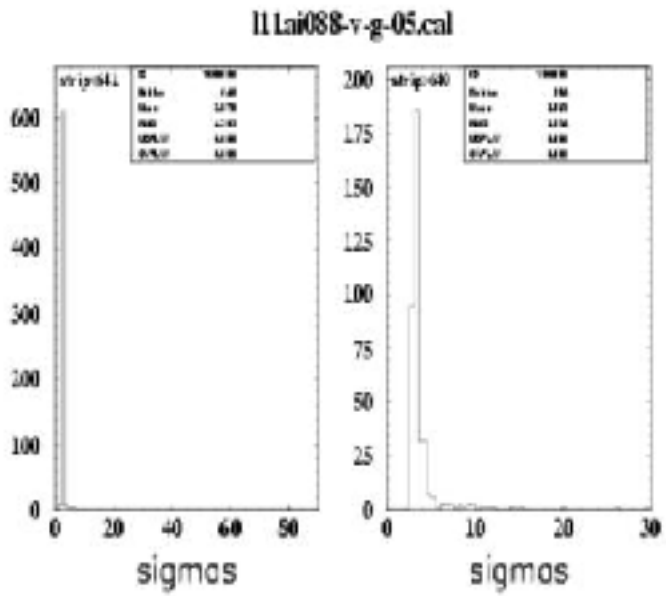


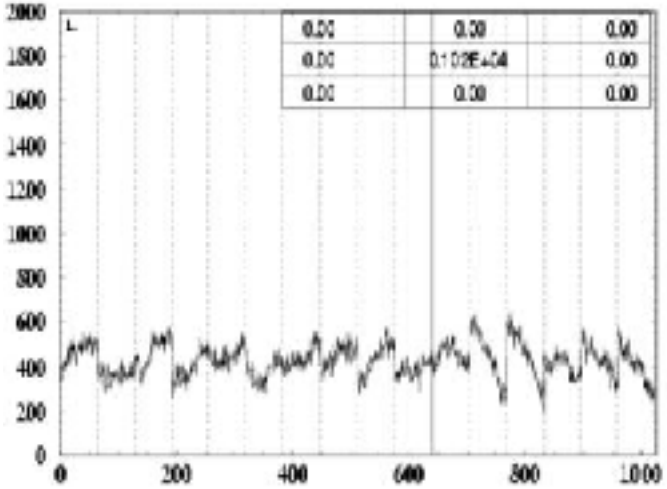
We tried to treat the problem as we did for L09AI089..

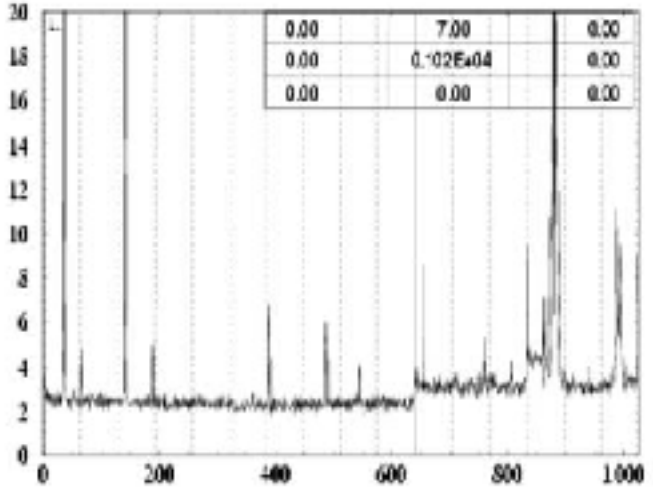
..it has not worked!

L11AI088

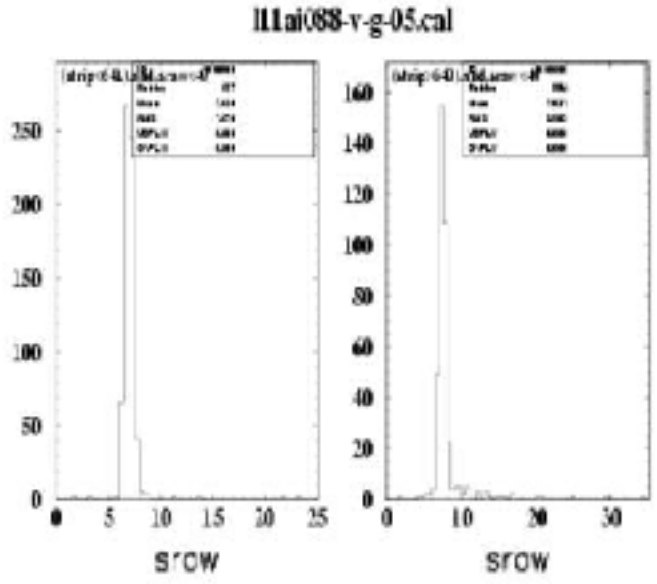

l11ai088-v-g-05.cal
pedestal
pedestal

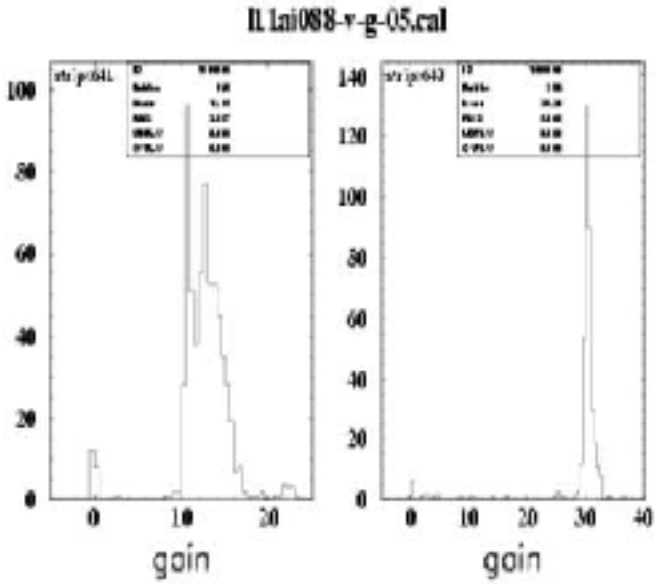

l11ai088-v-g-05.cal
sigmas
sigmas

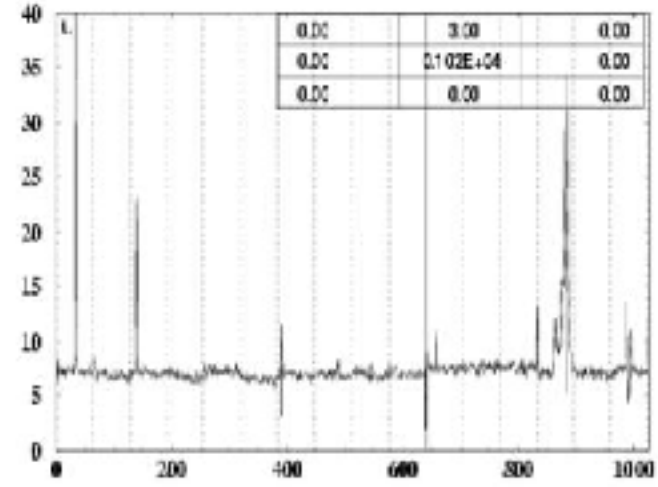


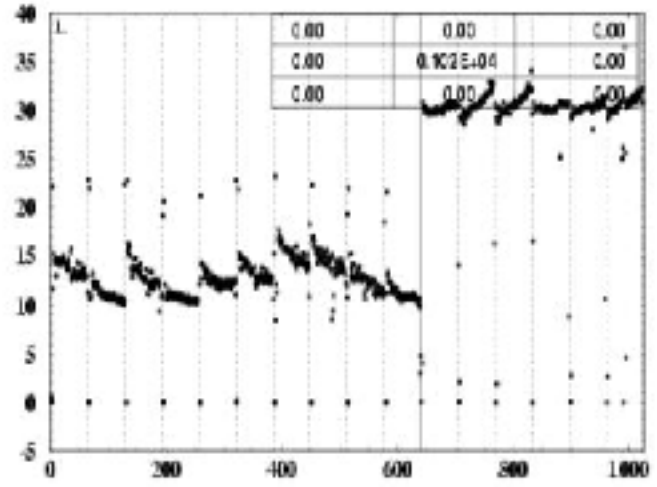


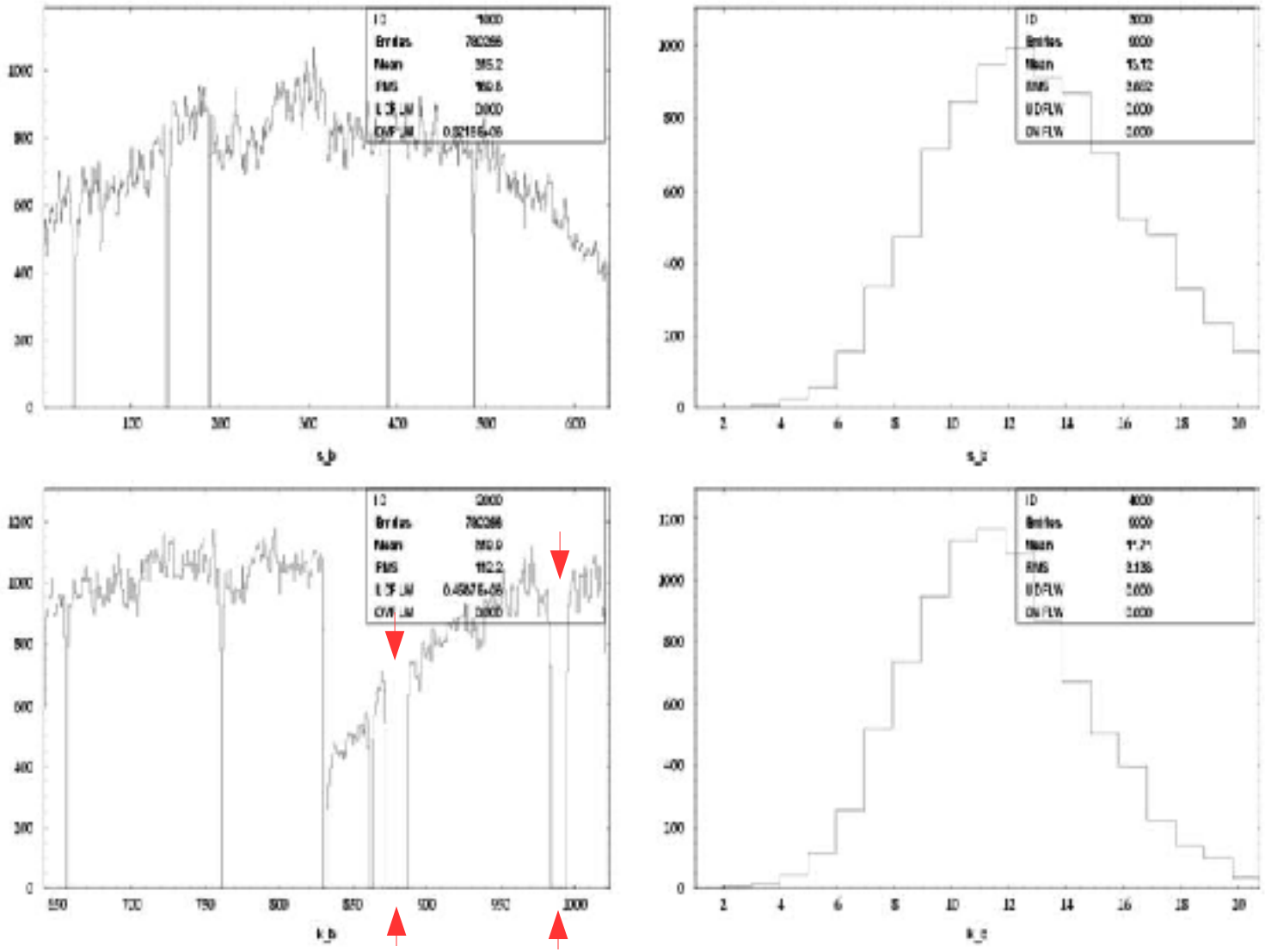
L11AI088










15 channels
11 channels

Evolution of Integration flow will depend on:

- Good ladders already assembled
  - How many for each type are available in Perugia?
- Next Test Beam needs
  - 11 L09XIYYY + 6 others will be frozen until October 2004 (L3, L6 and L7 cannot be fully equipped until then)
- Hybrids availability for ladders reparations
  - 8 S-hybrids needed to repair bad ladders located in Geneva

...you can find this presentation and other material concerning the AMS-02 Tracker Production and Integration status on my web page:

http://paniccia.home.cern.ch/paniccia/AMS.html