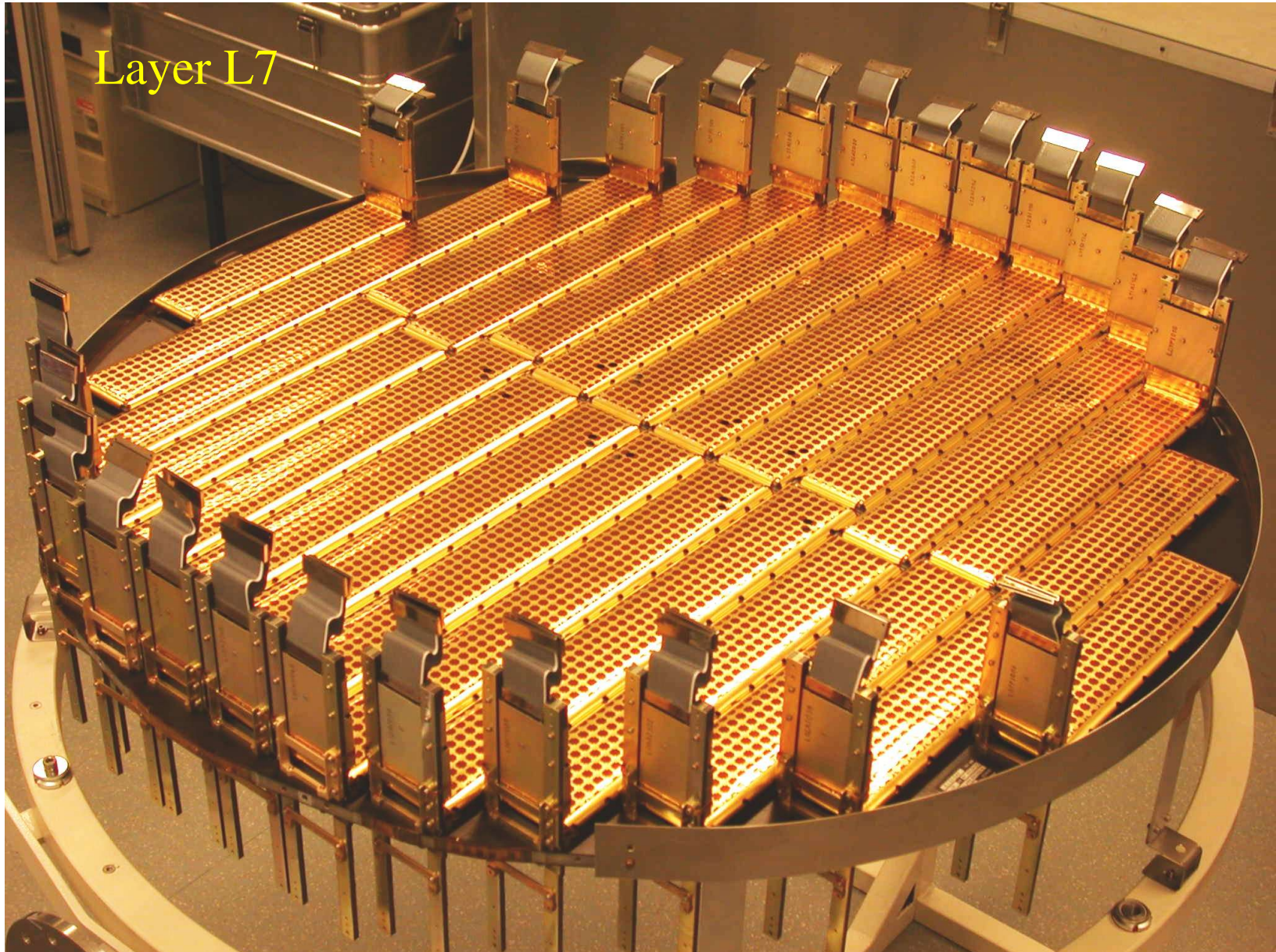




# **Tracker Integration Status at UNIGE**

***Ladders installed on planes (88/175) :***

ON LAYER L1	ON LAYER L2	ON LAYER L3	ON LAYER L4	ON LAYER L5	ON LAYER L6	ON LAYER L7	ON LAYER L8
	L07P1002		L09G1005	L09A1090 (140 $\mu$ m)		L07P1003	
	L07P1004		L09A1075 (70 $\mu$ m)	L09A1092 (140 $\mu$ m)		L07P1006 (140 $\mu$ m)	
	L09G1003		L09A1076 (70 $\mu$ m)	L09A1136 (140 $\mu$ m)		L09A1091 (140 $\mu$ m)	
	L09G1006		L09A1077 (70 $\mu$ m)	L09A1138 (140 $\mu$ m)		L09P1010 (140 $\mu$ m)	
	L09G1010		L10G1015	L10P1009 (140 $\mu$ m)		L09A1102 (140 $\mu$ m)	
	L09G1013		L10A1079	L10P1013 (140 $\mu$ m)		L09A1103 (140 $\mu$ m)	
	L10P1005		L11G1017	L11A1085 (140 $\mu$ m)		L10P1007 (140 $\mu$ m)	
	L10G1014		L11A1081 (70 $\mu$ m)	L11A1086 (140 $\mu$ m)		L10P1011 (140 $\mu$ m)	
	L11G1004		L11A1082 (140 $\mu$ m)	L11A1087 (140 $\mu$ m)		L11A1088 (140 $\mu$ m)	
	L11G1008		L11A1083 (140 $\mu$ m)	L11A1143 (140 $\mu$ m)		L11A1128 (140 $\mu$ m)	
	L11G1009		L12AH059 (70 $\mu$ m)	L12AH035 (140 $\mu$ m)		L11A1142 (140 $\mu$ m)	
	L11G1016		L12AH060	L12AH036 (140 $\mu$ m)		L11S1134 (140 $\mu$ m)	
	L12AH024		L12AH061	L12A1017 (140 $\mu$ m)		L12AH045 (70 $\mu$ m)	
	L12AH029		L12A1015	L12A1049 (140 $\mu$ m)		L12AH046 (70 $\mu$ m)	
	L12AH057		L12A1048	L12A1066		L12A1007 (140 $\mu$ m)	
	L12A1001		L12A1063	L12S1131 (140 $\mu$ m)		L12A1050 (140 $\mu$ m)	
	L12A1003		L12A1064	L12S1132 (140 $\mu$ m)		L12A1068	
	L12A1004		L12A1065	L12AJ022		L12S1130 (140 $\mu$ m)	
	L12A1005		L12AJ018	L12AJ034 (140 $\mu$ m)		L12S1133 (140 $\mu$ m)	
	L12A1006		L12AJ019	L12AJ053		L12AJ020	
	L12AJ051					L12AJ047	
	L12AJ021					L12AJ056	
	L14A1031					L14A1039 (140 $\mu$ m)	
	L14A1042					L14A1040 (140 $\mu$ m)	
0/30	24/24	0/22	20/20	20/20	0/22	24/24	0/30





## Ladders in the production chain (87/175) :

SHIELDED	TO BE SHIELDED	ON PHASE-2	ON REPAIRATION	REJECTED
L09A1089 (140µm) (L6) L09A1135 (140µm) (L6) L09G10129 (140µm) (L6) L09P1012 (140µm) (L6) L10A1078 (70µm) (L6) L10A1080 (140µm) (L6) L10P1008 (140µm) (L3) L10P1001 (L3) L11A1084 (140µm) (L6) L11A1104 (140µm) (L6) L11A1141 (140µm) (L6) L11G1001 (140µm) (L6)  L12AH030 (70µm) (L6) L12AH037 (140µm) (L6) L12A1023 (70µm) (L6) L12A1052 (140µm) (L6) L12A1054 (L3) L12A1055 (L3) L14A1041 (L6) L14A1043 (140µm) (L6) L14A1044 (140µm) (L3)	L12A0105 (140µm) (L1) L12A0106 (140µm) (L1) L12A0107 (140µm) (L3) L13A0326 (M) (140µm) (L1) L13A0072 (140µm) (L1) L13A0073 (140µm) (L1) L14A0119 (140µm) (L1) L15AP098 (140µm) (L1) L15AP110 (140µm) (L1)	L11A1126 (140µm) L10A0144 (140µm) L10A0147 (140µm) L10A0148 (140µm) L11A0155 (140µm) L13A0025 (M) (140µm) L13A0111 (140µm) L13A0114 (140µm) L14A0120 (140µm) L14A0121 (140µm) L14A0122 (140µm) (L1) L14A0124 (140µm) L15AN100 (140µm) L15AN101 (140µm) L15AN113 (140µm) L15AN117 (140µm) L15AN118 (140µm) L15A0093 (140µm)  L15A0097 (140µm) L15A0116 (140µm) L15AP099 (140µm) L15AP109 (140µm) L15AP112 (140µm)	L15A0095 (140µm) L09A1139 L11A1140 L10A0145 L10A0146 L10A0150 L13A0074 L14A0157 L14A0158 (c.c.) L14A0160 (c.c.) L15A0096 (c.c.) L15A0115 L15A0162 (c.c.)  L12A1016 (87 Noisy Chs) L15A0161 (c.c.) (many BChs)  L12A1028 (S) (63 BChs) (L6)  L12A1058 (Bad VA 7?) L12A1033 (c.c.) (Bad VA 15?) L14A0125 (140µm) (VA 13 lower gain)	L09G1002 (L3) (S) (Hs) L09G1011 (L3) (S) (Hs) L12A1012 (140µm) (CAPA 16) L14A1032 (S) (Hs) L10A0149 (Hs) L11A0153 (CAPA 10) L14A0123 (140µm) (Hk) L14A0156 (Hs)  L11G1007 (E) (vibr.) (Hs,k) TDSP L12A1002 (S2,3) TDSP L12A1009 (S7,8) TDSP L12A1010 (Hk) (still probl.) (LOW GAIN) L12A1070 (140µm) (80 BChs) L15A0094 (S15)
				5
			STAND-BY	
				7
			L12A1067 TDSP	
30 (21 inner + 9 outer)		23	14 (13+1)	7
6 (1 x L11 + 4 x L121 + 1 x L150)				

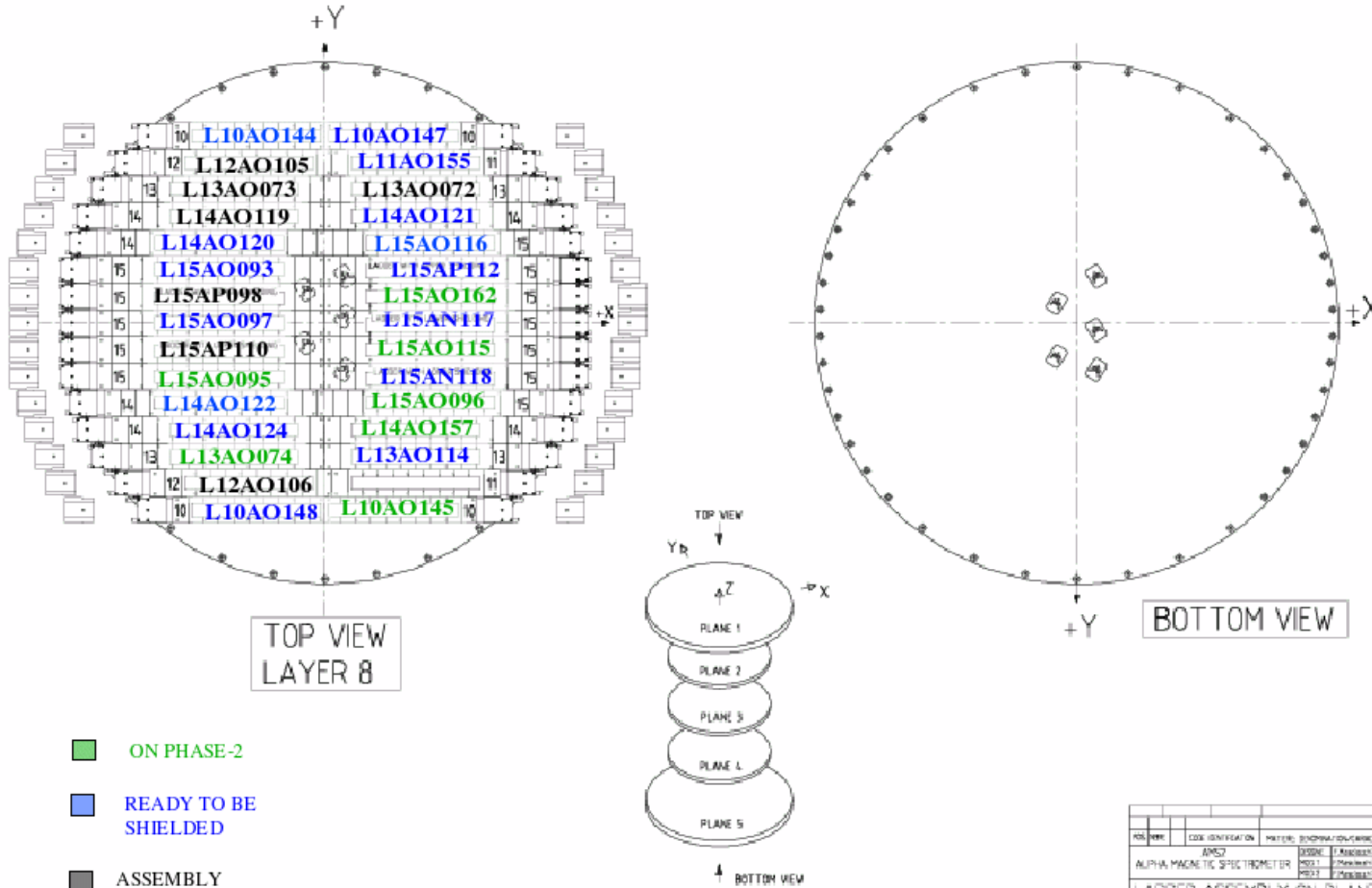
**LEGENDA:**  
 TDSP: test code DSP  
 F: feet glued  
 S: shielded  
 M: metrology  
 Sp: sensor prob.  
 H: hybrid prob.  
 K6: kapton misplaced  
 TW: test Waltraff  
 FChs: faible channels  
 BChs: bad channels  
 (c.c.) needs conf. cost.





AMS-02 Tracker - Plane 5

May 10, 2005



- ON PHASE-2
- READY TO BE SHIELDED
- ASSEMBLY COMPLETED

REV.	NO.	DATE	DESCRIPTION	BY	CHKD.
1	1	25.05.2005	AMS-02 ALPHA MAGNETIC SPECTROMETER TRACKER LADDER ASSEMBLY ON PLANE 5		
2	1	25.05.2005			
3	1	25.05.2005			

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 DE GENÈVE

AMS1166A1



## ***Next layer to be equipped with ladders will be L6:***

- ***Still missing 4 L12I and 1 L12H***  
*3 L12I just shipped from Perugia,  
the other 2 from stand-by ladders? see later on*

## ***Next in queue L8 (Plane 5):***

- ***Plane under preparation***
- ***Additional work to be done on outer ladders*** *see later on*
- ***Still missing 1 L110***



## ***Ladders in Geneva : 175***

- ***installed on planes : 88 (all successfully tested )***
- ***assembly completed : 30 ( 21 inner + 9 outer)\****
- ***on shielding phase : 23 (1 inner + 22 outer)\****
- ***on phase-2 : 14 ((2+1) inner + (10 +1) outer)\****
- ***to be repaired : 8 (4 inner + 4 outer)***
- ***stand-by : 7 (4 inner + 3 outer)***
- ***rejected : 6 (1xL11Inner + 4xL12Inner + 1xL15Outer)***

*\* See later on **L12AI067** and **L15A0095** dedicated slides*

*\* See later on additional work to be done on outer ladders*

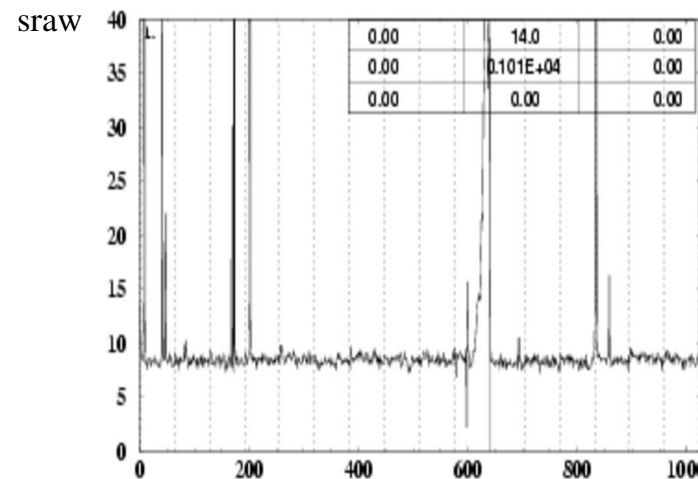
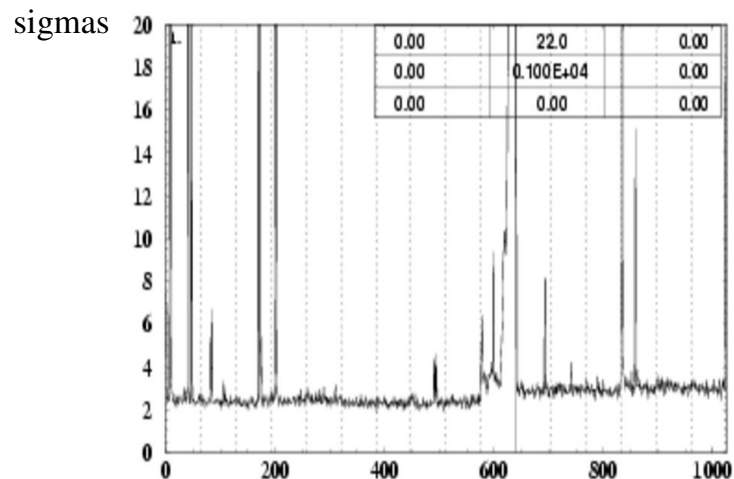
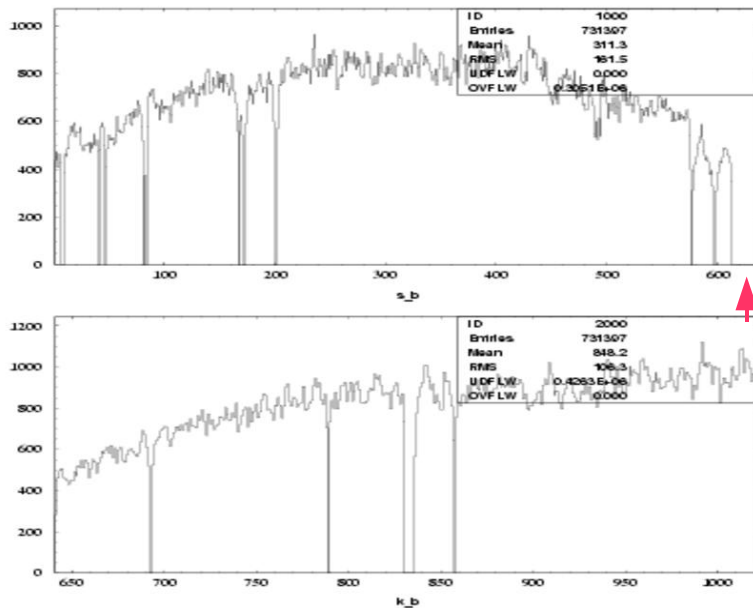




# L12AI067: noisy peak on VA10

Accepted in previous Tracker meeting

Source test



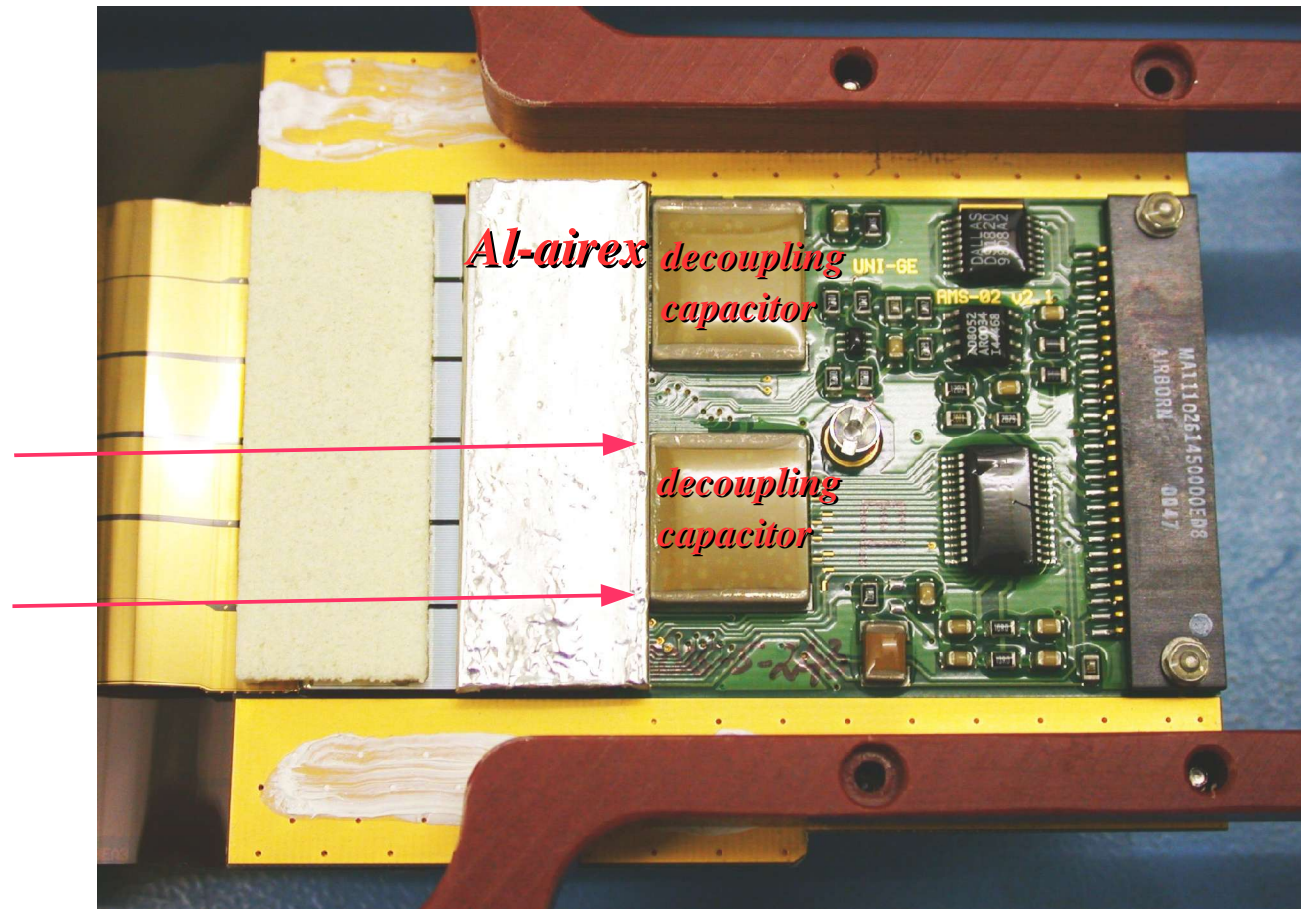
**Being used in the DSP code test**  
 (together with 3 rejected ladders)  
**Needed from Perugia another rejected ladder**  
**to replace L12AI067 in the test setup**

## Solving the L15A0095 mystery:

**Problem:** *Very high leakage current after phase-2*

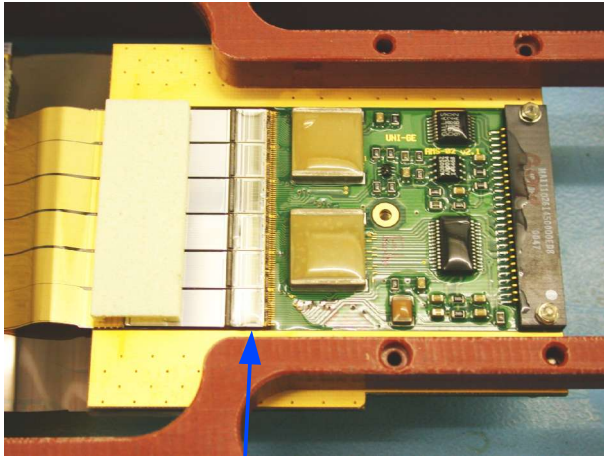
**Cause:** *Short between S and K local grounds via light-tightness Al-airex cover + hybrids box*

**Solution:** *Insulate Al-airex cover (to be done on all outer ladders)*

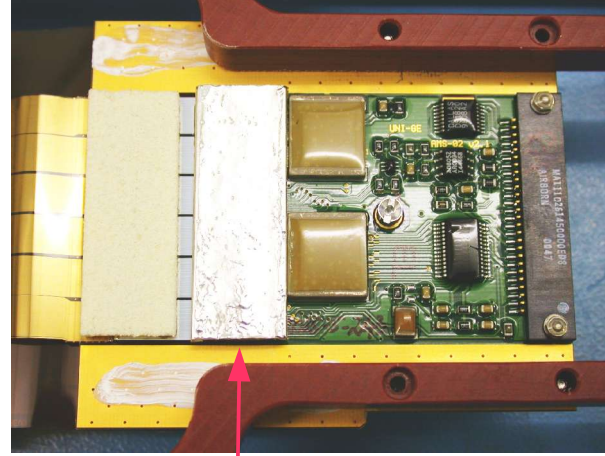


*Al-airex cover  
in contact with  
one of the  
decoupling  
capacitor*

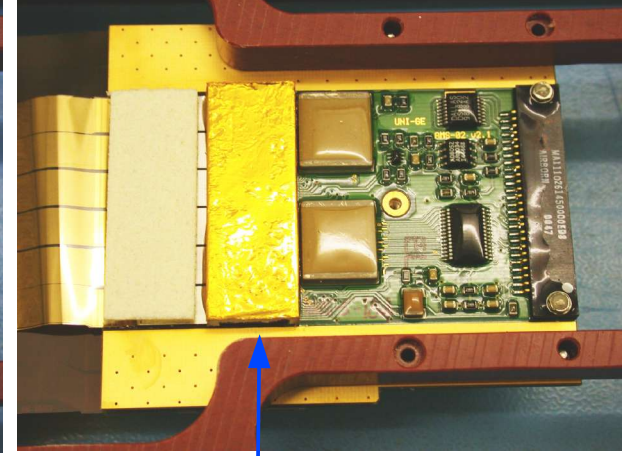
# *Light-tight airex: introduced on outer ladders to protect hybrids VAs from light*



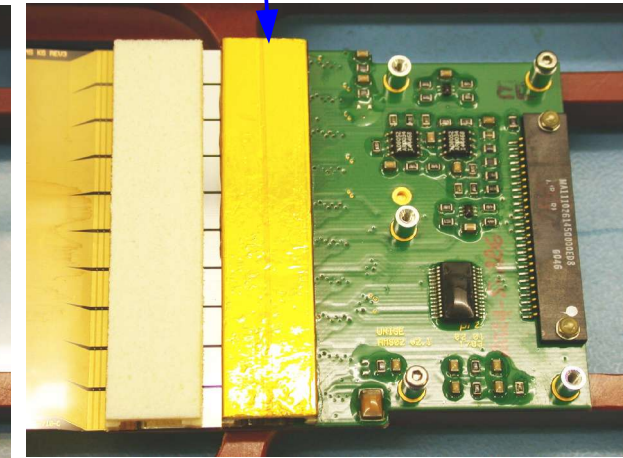
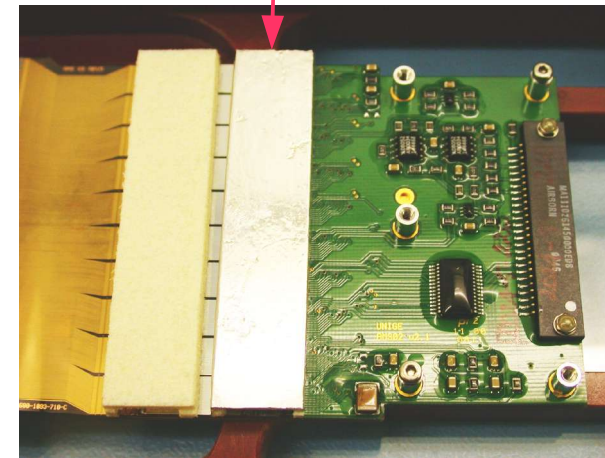
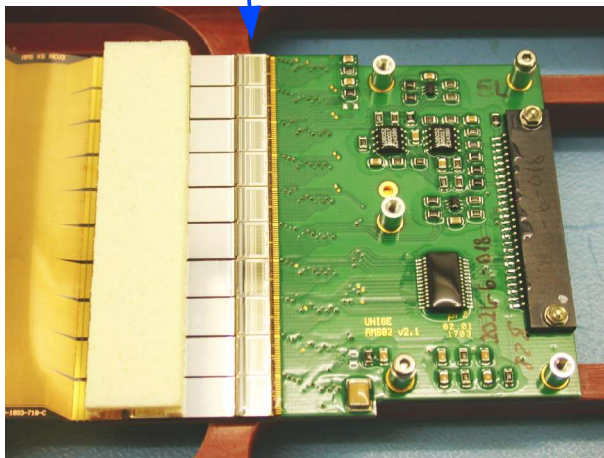
VAs



*Light-tight airex 1<sup>st</sup> version :  
Al+ airex cover*

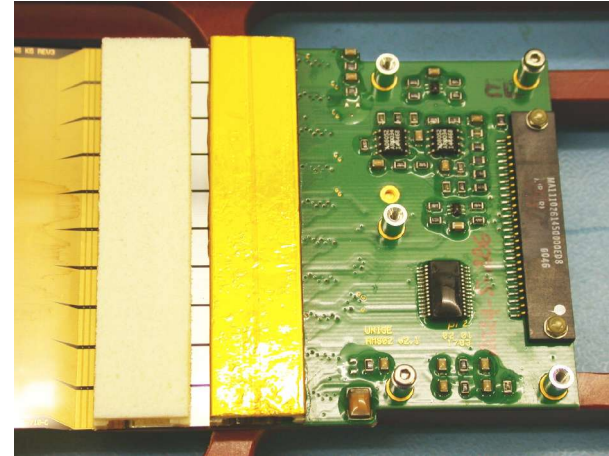
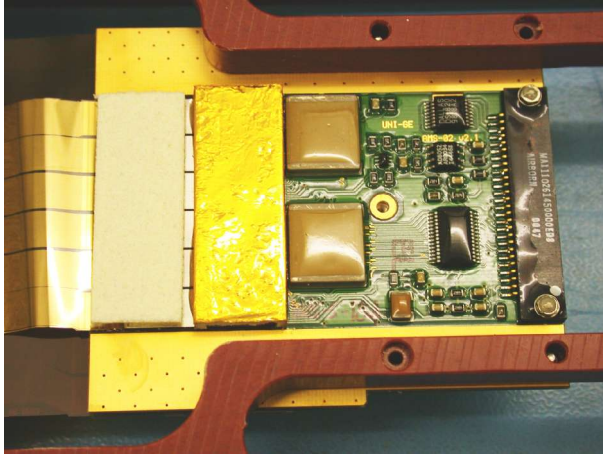


*Light-tight airex last version :  
Al+ airex+insulating scotch*

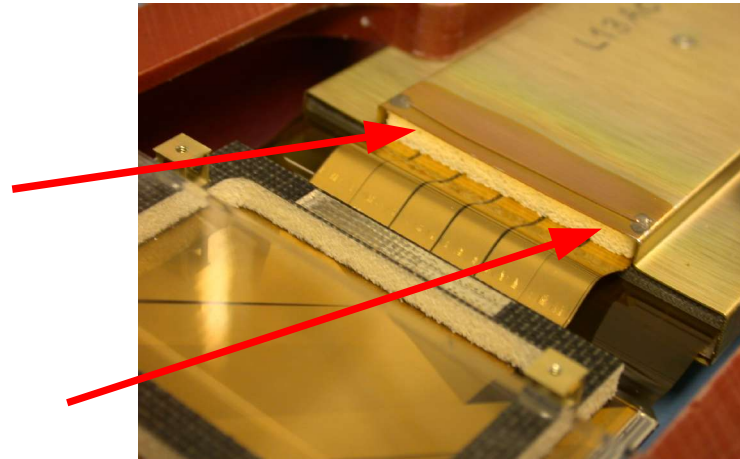


## ***Additional work to be done on OUTER ladders :***

- ***Insulate Al-airer cover*** (need to open hybrids box of most of outer ladders )



- ***Glue external airex to hybrids box*** (see presentation at previous Tracker meeting)  
(concerns also inner ladders )





## ***Need to open hybrids box on 25/175 outer ladders :***

- L12AO105 assembly completed / light-tight airex not insulated / external airex not glued*
- L12AO106 assembly completed / light-tight airex not insulated / external airex not glued*
- L12AO107 assembly completed / light-tight airex not insulated / external airex not glued*
- L13AO126 assembly completed / light-tight airex not insulated / external airex not glued*
- L13AO072 assembly completed / light-tight airex not insulated / external airex not glued*
- L13AO073 assembly completed / light-tight airex not insulated / external airex not glued*
- L14AO119 assembly completed / light-tight airex not insulated / external airex not glued*
- L15AP098 assembly completed / light-tight airex not insulated / external airex not glued*
- L15AP110 assembly completed / light-tight airex not insulated / external airex not glued*
- L13AO114** hbox installed / light-tight airex not insulated / external airex glued*
- L13AO111** hbox installed / light-tight airex not insulated / external airex glued*
- L14AO120 hbox installed / light-tight airex not insulated / external airex not glued*
- L14AO121 hbox installed / light-tight airex not insulated / external airex not glued*
- L14AO124** hbox installed / light-tight airex not insulated / external airex glued*
- L15AN100** hbox installed / light-tight airex not insulated / external airex glued*
- L15AN101 hbox installed / light-tight airex not insulated / external airex not glued*
- L15AN113 hbox installed / light-tight airex not insulated / external airex not glued*
- L15AN117** hbox installed / light-tight airex not insulated / external airex glued*
- L15AN118 hbox installed / light-tight airex not insulated / external airex not glued*
- L15AO093 hbox installed / light-tight airex not insulated / external airex not glued*
- L15AO097 hbox installed / light-tight airex not insulated / external airex not glued*
- L15AP099 hbox installed / light-tight airex not insulated / external airex not glued*
- L15AP109 hbox installed / light-tight airex not insulated / external airex not glued*
- L15AP112** hbox installed / light-tight airex not insulated / external airex glued*
- L13AO025 hbox installed / light-tight airex not insulated / external airex not glued*



## ***Ladders to be repaired (8/175) :***

***Weak gain hybrids: L09GI002 (Hs)***

***L09GI011 (Hs)***

***Hybrids capacitors damaged by cable failure at G&A:***

***L10AO149 (Hs)***

***L11AO153 (Hs-capacitor 10)***

***L14AO156 (Hs)***

***Hybrids capacitors damaged:***

***L14AI032 (Hs)***

***L12AI012 (Hk-capacitor 16)***

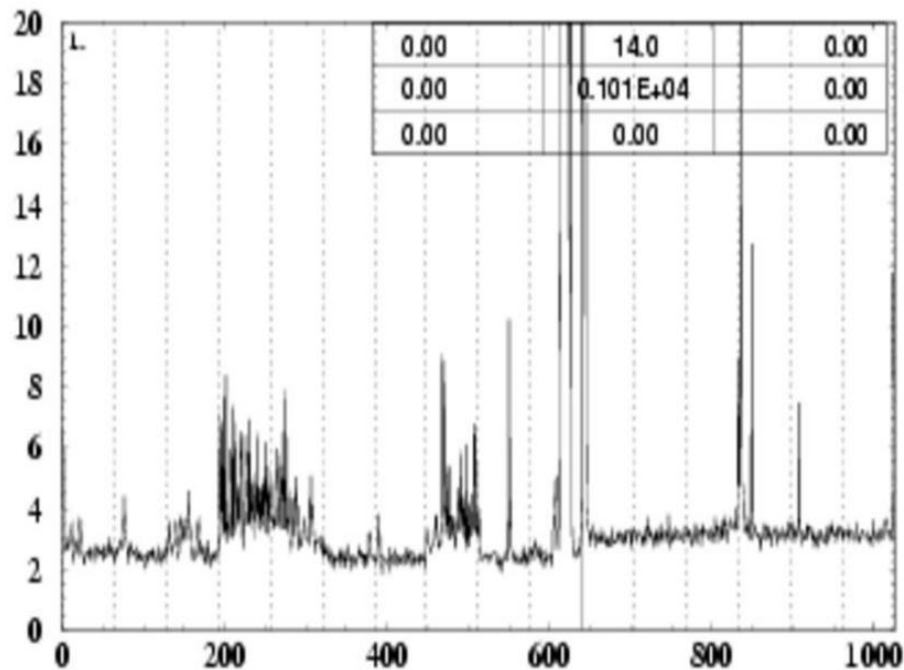
***L14AO123 (Hk)***

***black: already shielded – blue: feet glued – green: before phase-2***

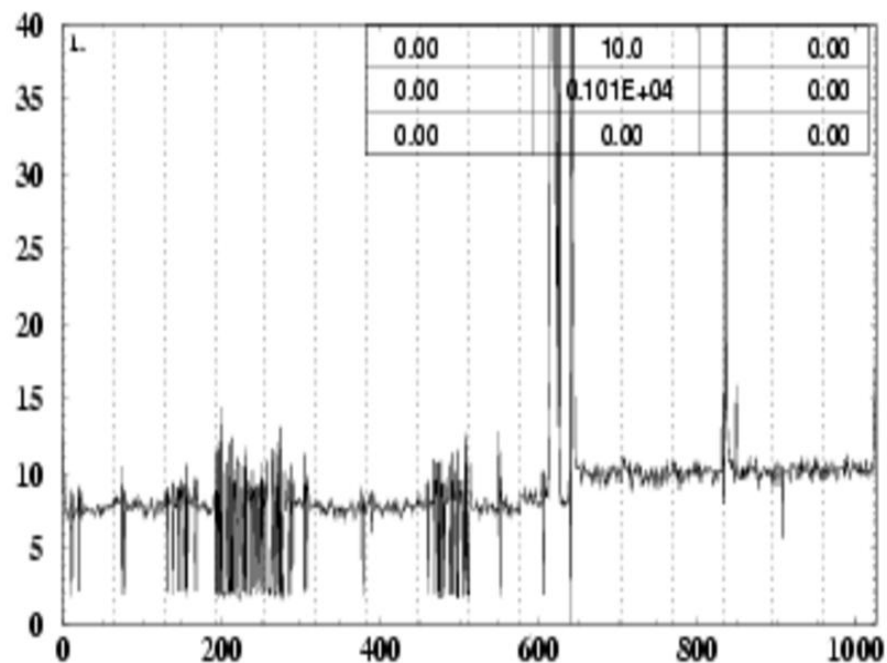


# ***L14AI032: capacitors 1, 2, 3, 4, 5 and 8 damaged***

sigmas



sraw



***Guard-ring voltages: S-side= -4.5 V , K-side= +5.0V; Bias Voltage= 70.5 V  
 (standard values used :S-side= -2.0 V , K-side= +5.0V; Bias Voltage= 73 V)***



## ***Reparation status :***

***We have in Geneva 1 K-hybrid  
(maybe used to repair L14A0123)***

***We are repairing 2 S-hybrids***

***Needed 5 S-hybrids (->Perugia)***





## ***Ladders in stand-by (7/175) :***

***L15AO161 (many bad channels)***

***L12AI016 (87 bad channels)***

***L12AH028 (63 bad channels)***

***L12AH058 (VA 7)***

***L12AJ033 (VA 15)***

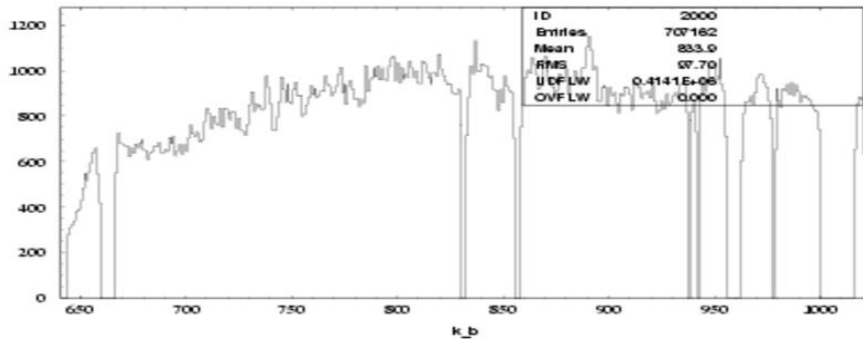
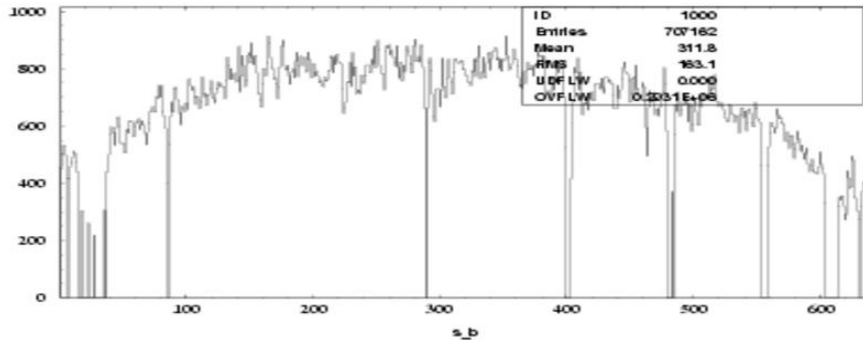
***L14AO125 (VA 13 lower gain after phase-2)***



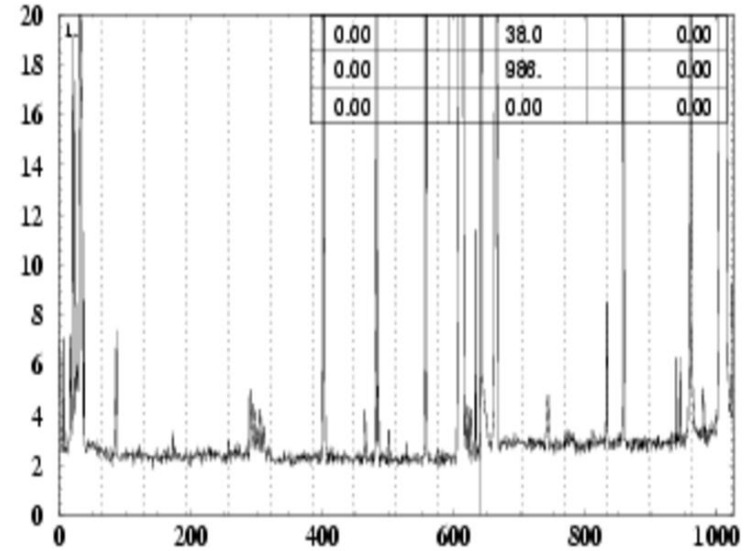
# L12AI016:

- **87 bad channels**  
(45 on S-side + 42 on K-side)
- **S and K hybrids already replaced once**

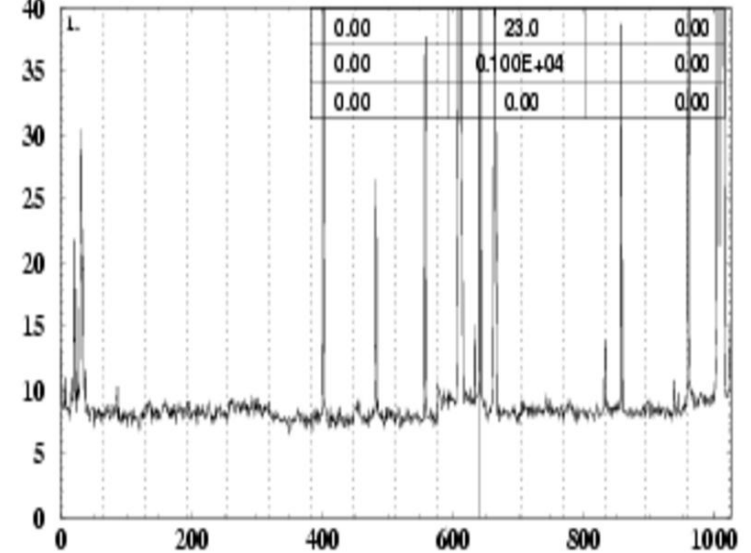
## Source Test



## sigmas



## sraw

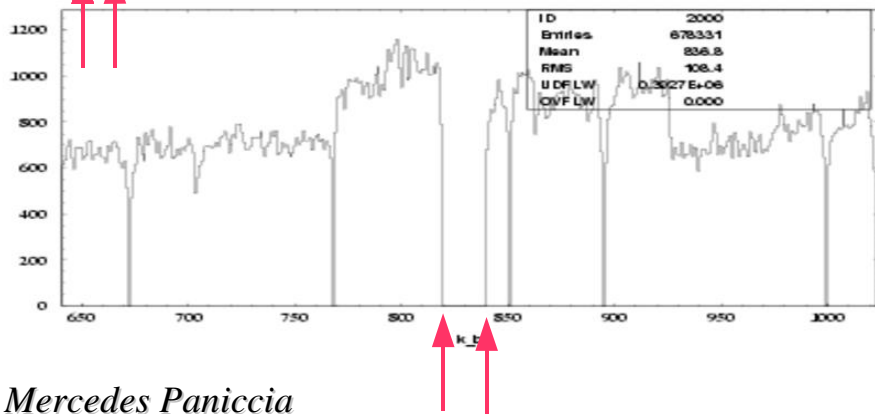
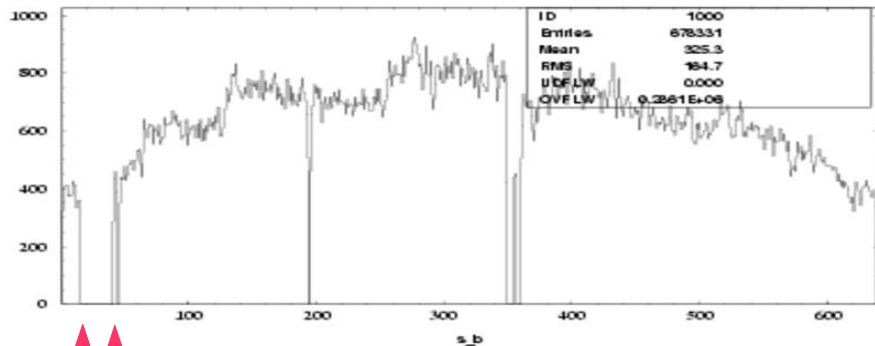




# L15A0161:

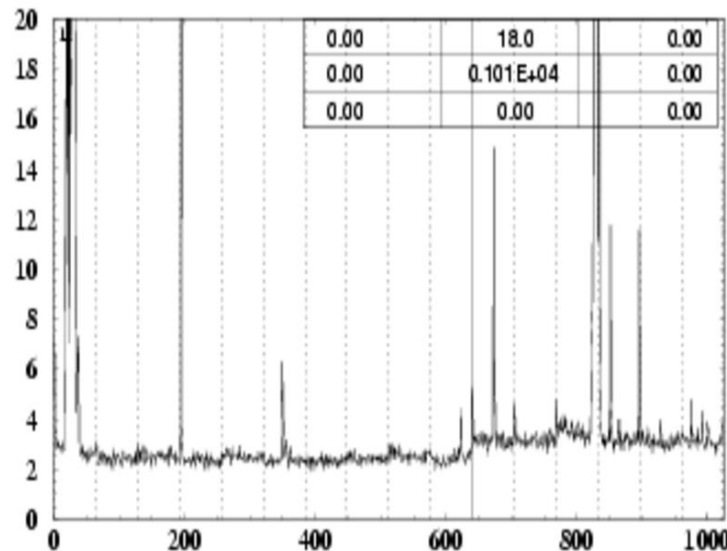
- **95 bad channels (60 on S-side + 35 on K-side)**
- **S-side hole 26 channels wide**
- **K-side hole 20 channels wide**
- **Problem likely due to silicon**

Source Test

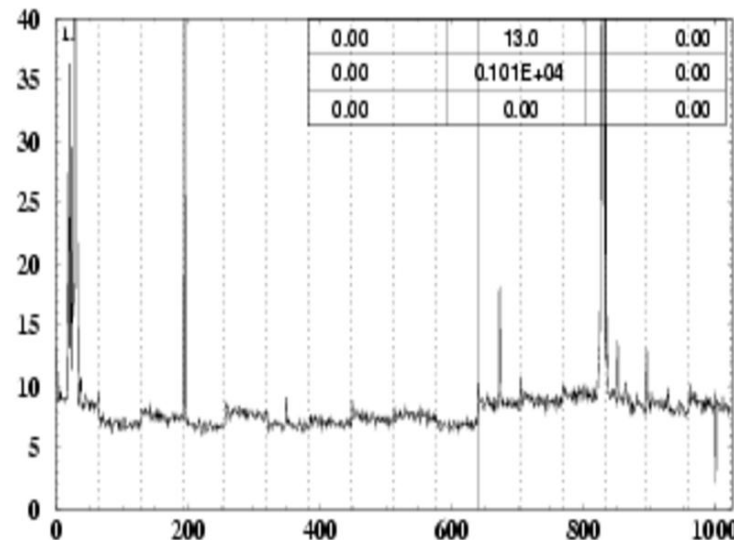


Mercedes Paniccia

sigmas



sraw



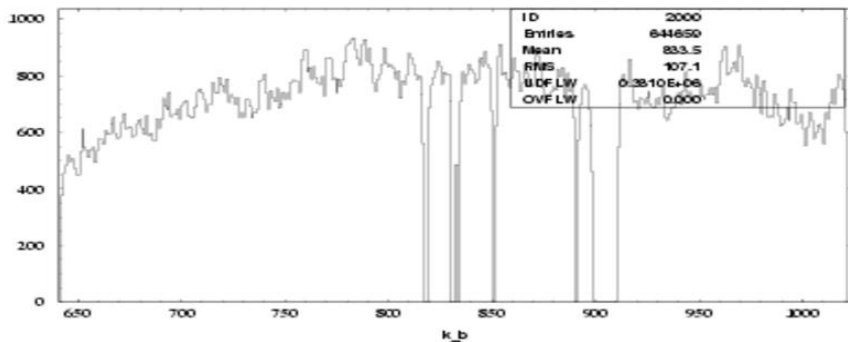
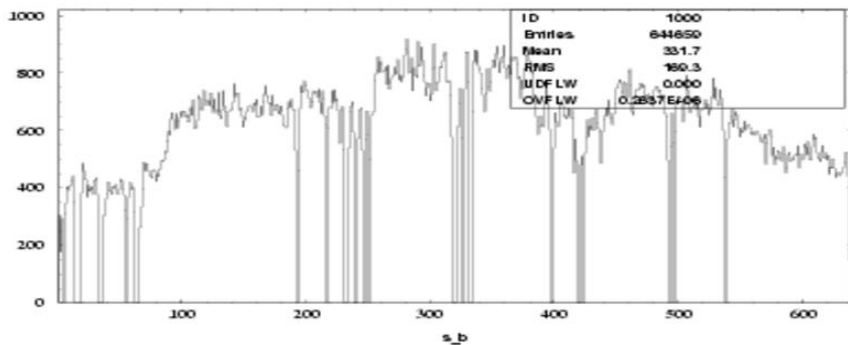
University of Geneva



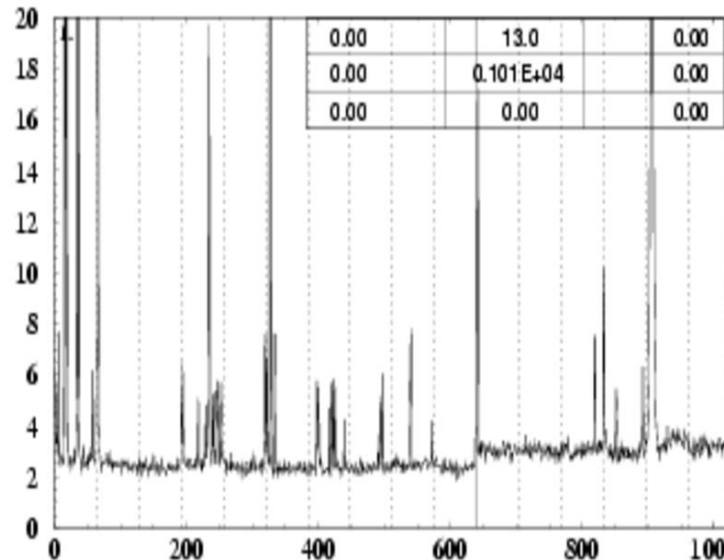
# L12AH028:

- **from 34 to 63 bad channels after shielding**
- **S-hybrid already replaced once**
- **test with variable S guard-ring voltage has not shown supplementary dead channels**

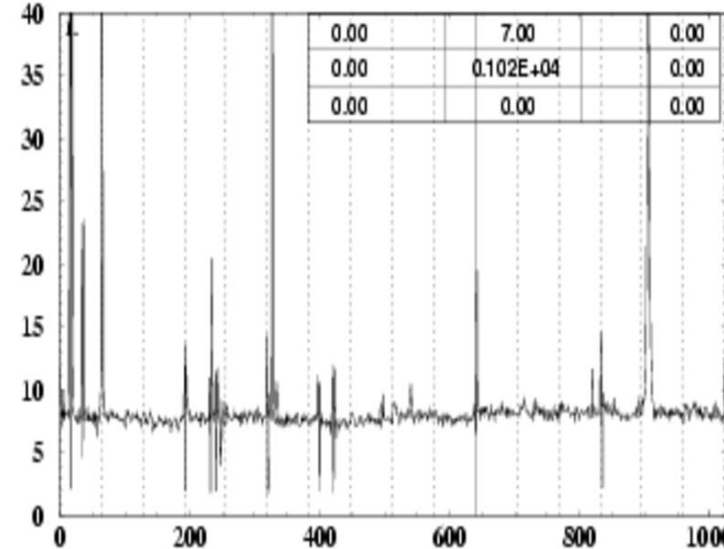
Source Test



sigmas



sraw

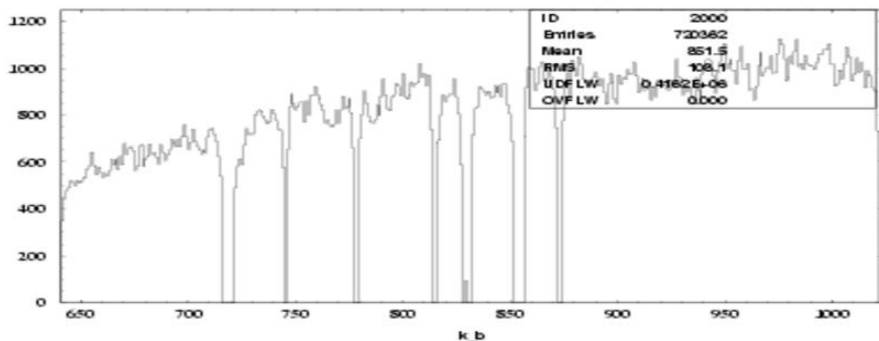
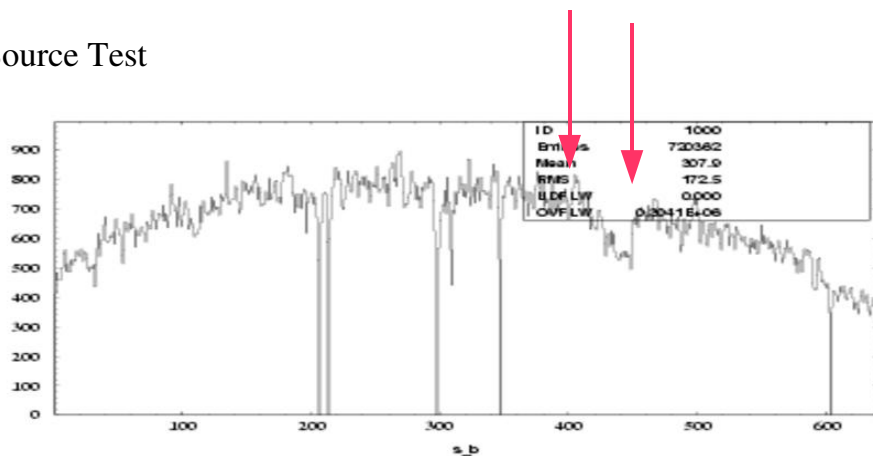




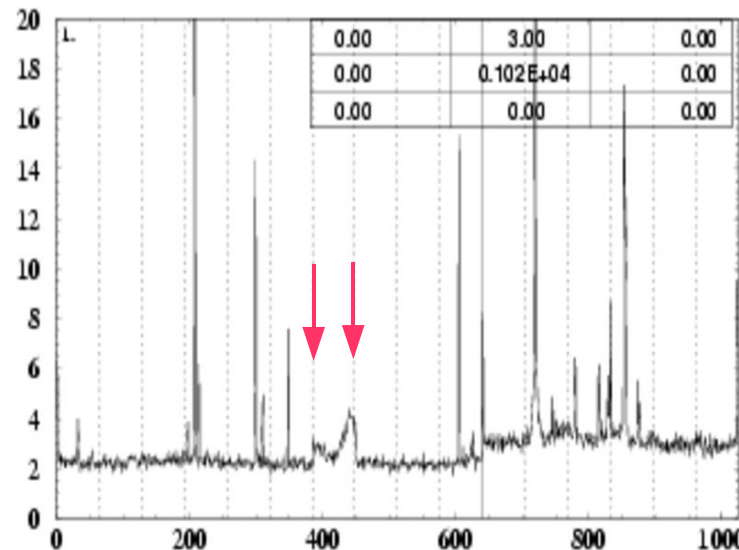
# L12AH058:

- *S hybrid VA 7 strange feature*
- *S hybrid already replaced once accept or try to repair?*

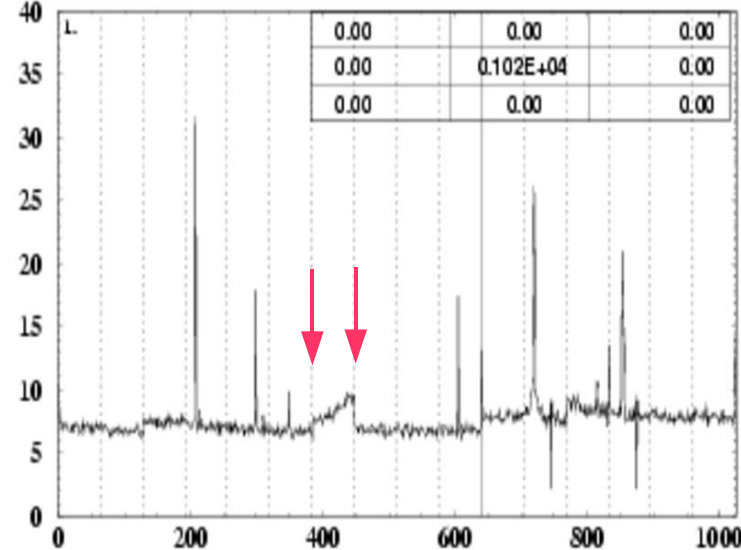
Source Test



sigmas



sraw

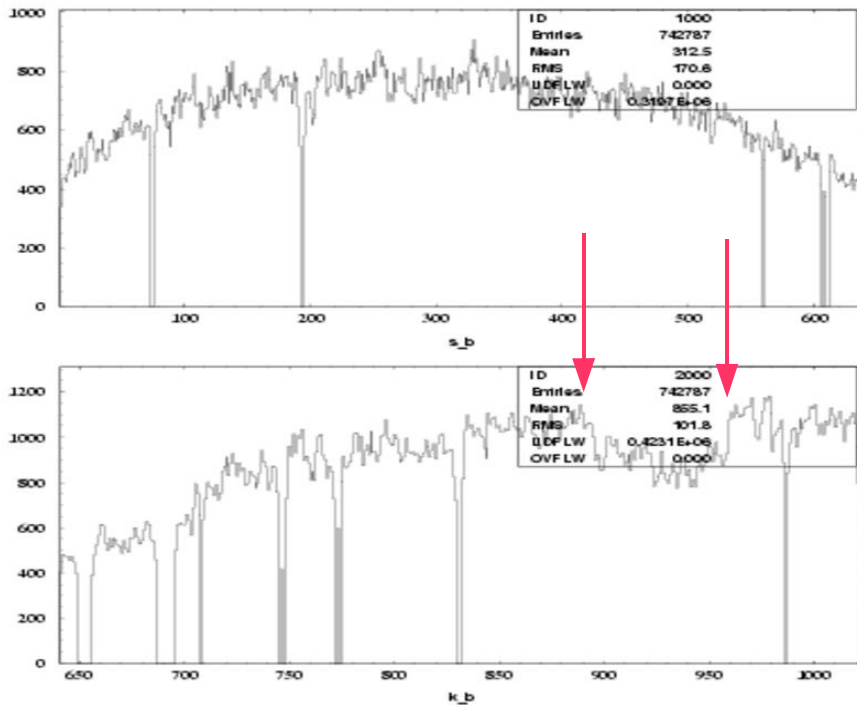




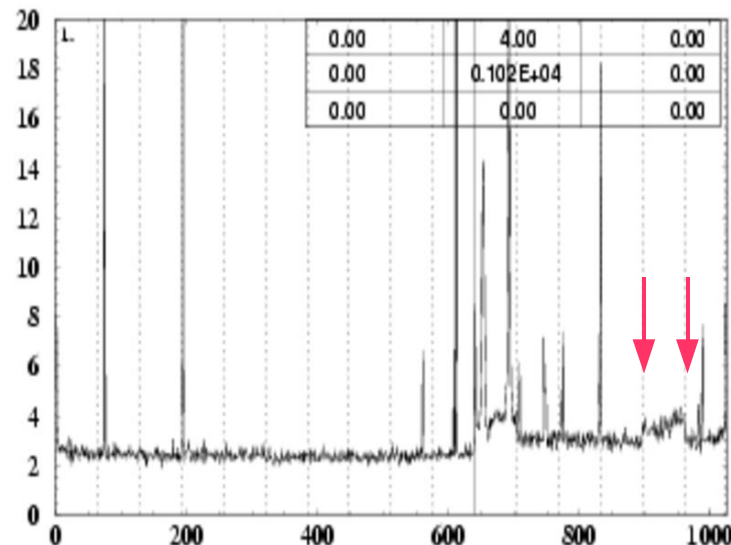
# L12AJ033:

- **K hybrid VA 15 strange feature**
- **K hybrid already replaced once accept or try to repair?**

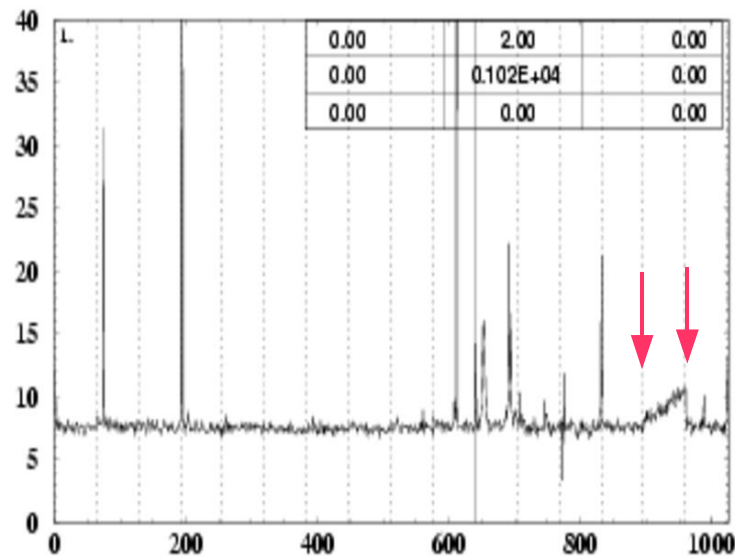
## Source Test



## sigmas



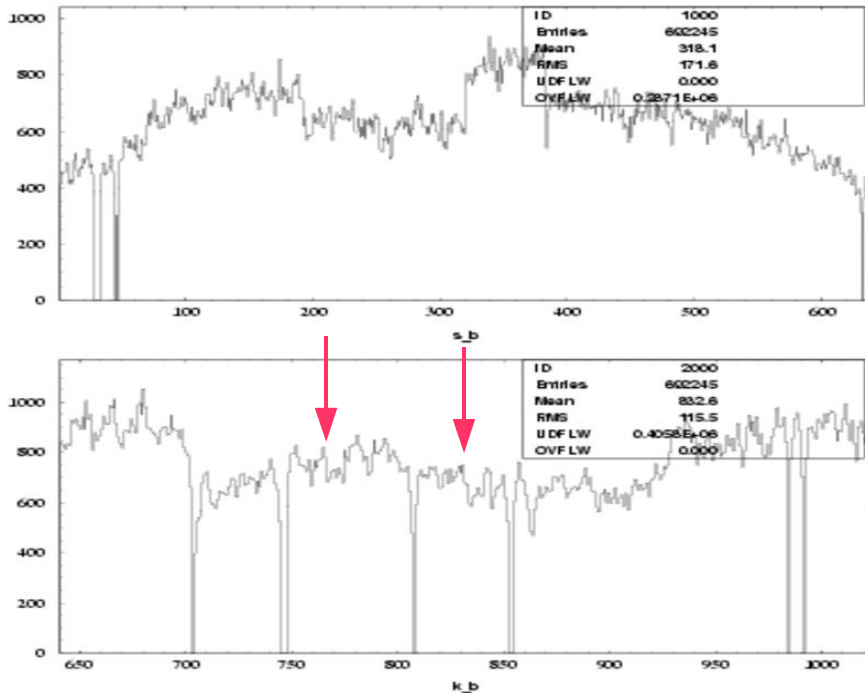
## sraw



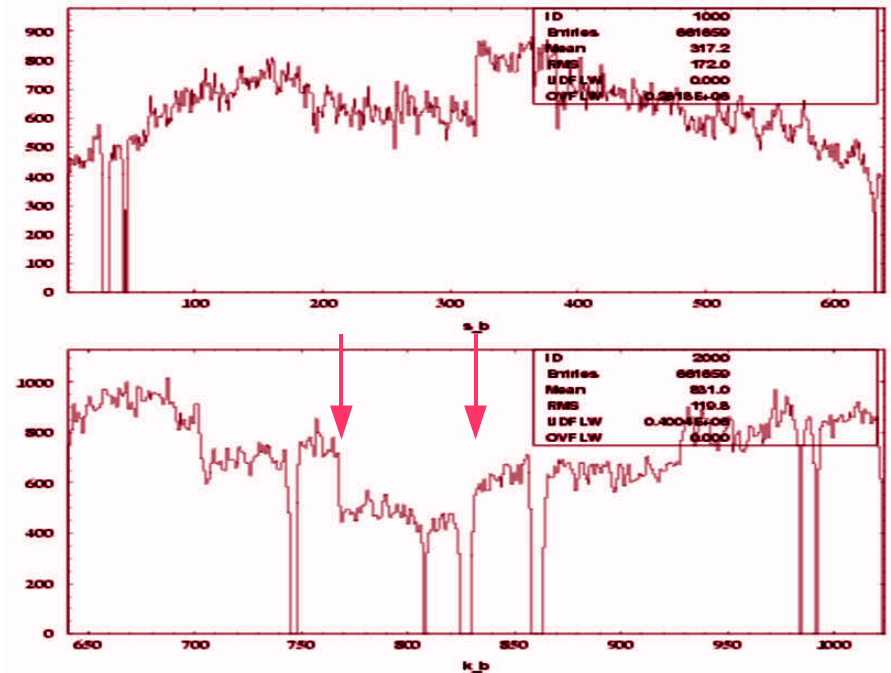


**L14A0125: VA 13 lower gain after phase-2**  
*also tested with triggered source in Perugia*  
*accept or try to repair?*

source test before phase-2

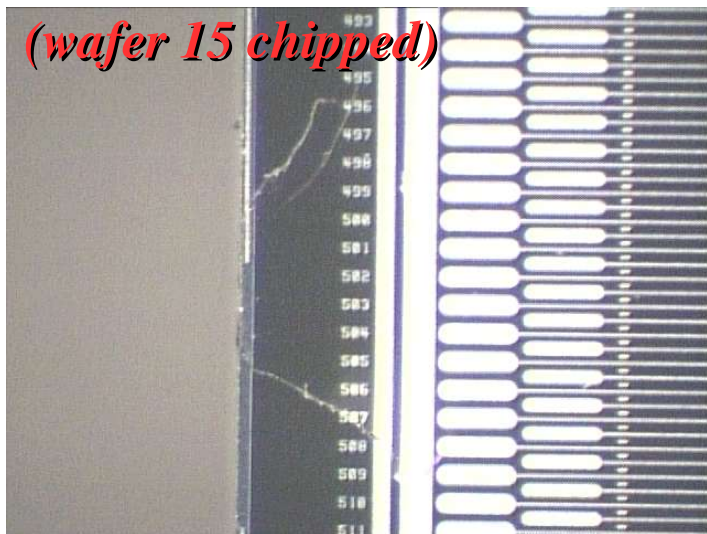


source test after phase-2

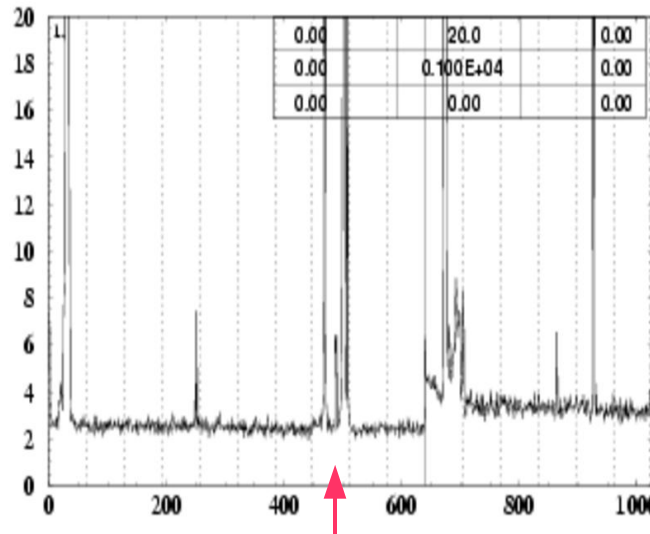




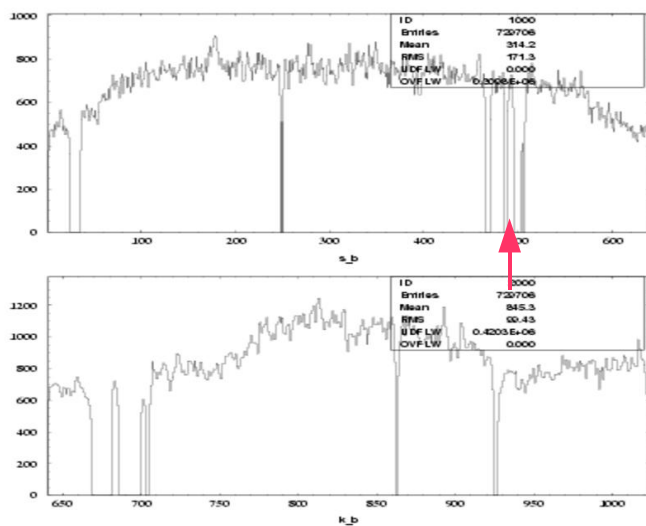
# Progress on L15A0094 diagnosis



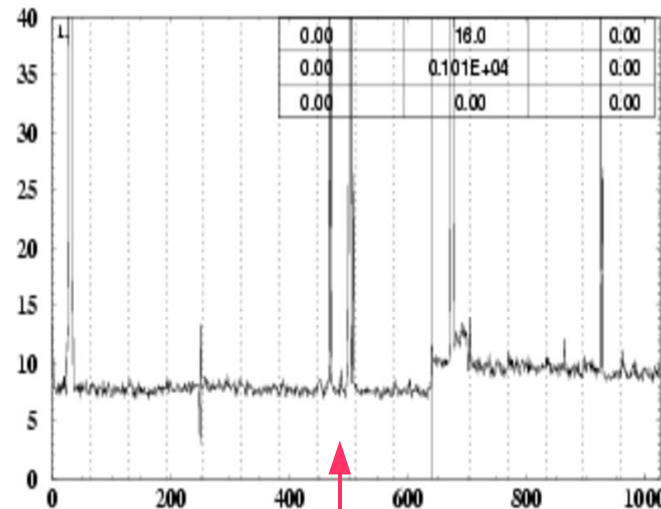
sigmas



Source Test



srw





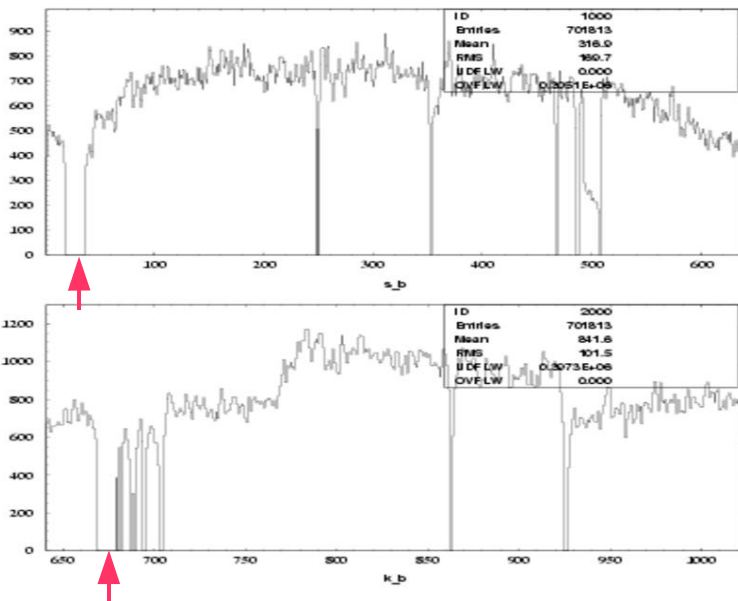


# L15A0094:

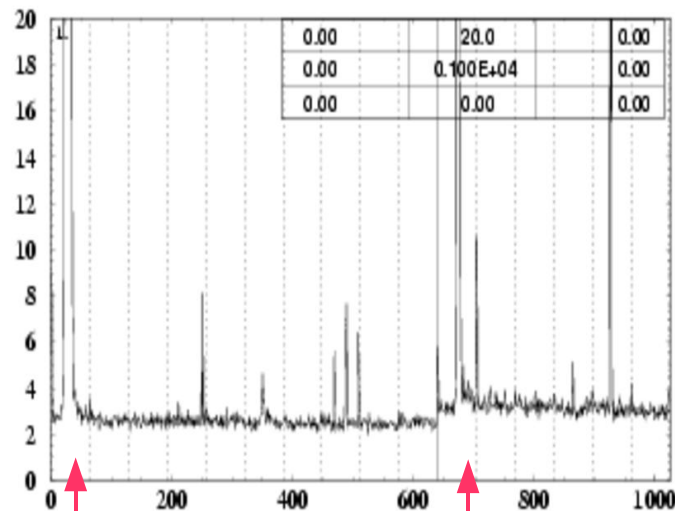
after disconnecting

bonds 495->509 between wafer 15 and 14

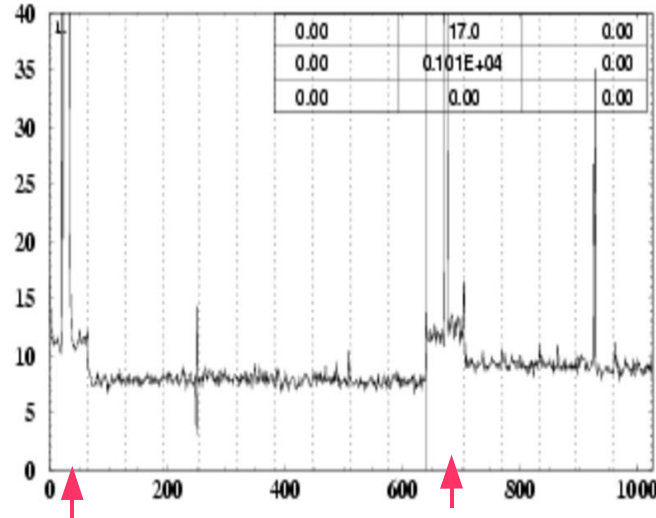
Source Test



sigmas



sraw



Recovered CHs 495->509 from wafers 14 to 1  
Still "hole" on CHs 19->37 and CHs 670->679

Total bad chs: 26 on S-side + 15 on K-side

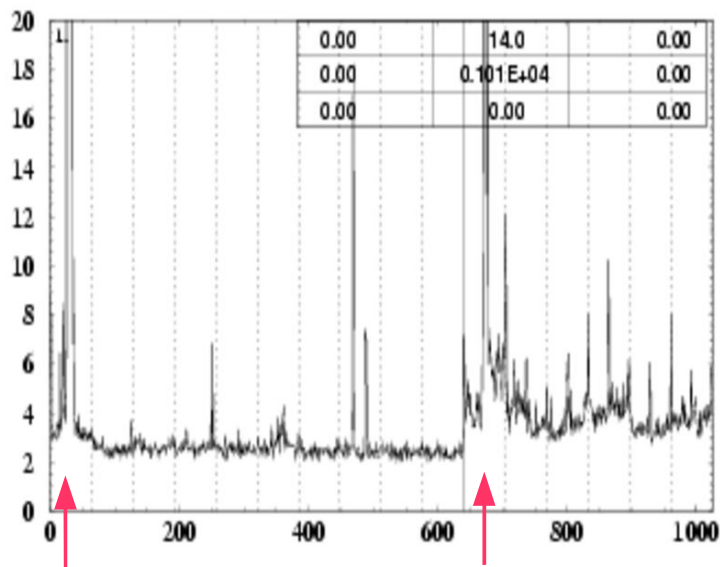
**Proposal at previous Tracker meeting:  
test with wafer 15 completely disconnected  
and eventually replace wafer 15**

***L15A0094 after completely disconnecting wafer 15:***

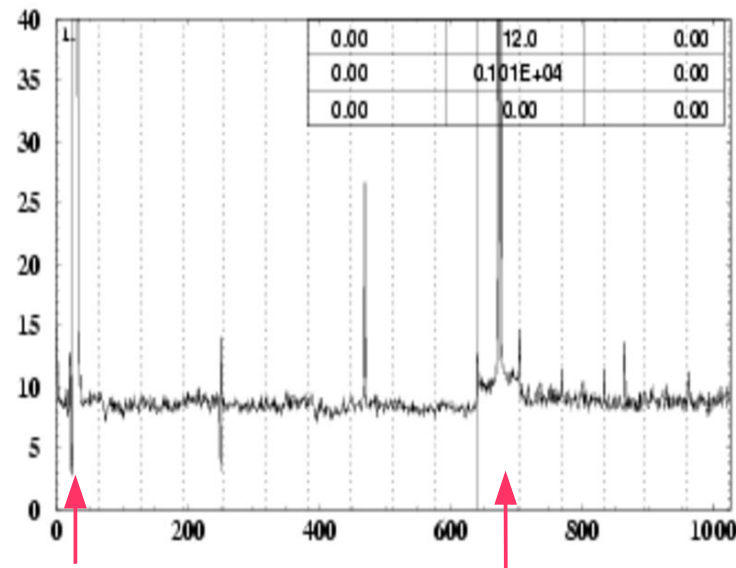
*The problem on VAs 1 and 11 is caused by another sensor (or more), thus just changing wafer 15 will not save the ladder!*

***Rejected after discussion with G.Ambrosi, Ph. Azzarello and M. Ionica spare ladder to replace this one already foreseen.***

sigmas



sraw





## ***Rejected Ladders (6/175):***

***1 L11 + 4 L12XI + 1 L15XO:***

***L11GI007 (Hs,k (vibr.))***

***L12AI002 (S2,3)***

***L12AI009 (S7,8)***

***L12AI010 (Hk still pbs)***

***L12AI070 (80 bad chs)***

***L15AO094 (S15 chipped and more)***



## ***Planning for the next future:***

- ***Complete assembly of ladders needed for Layers L6 and L8***
- ***Reinforce airex gluing on ladders mounted on L2, L4 and L5 and those still in the production phase***
- ***Prepare Layer L8 for ladders installation***
- ***Insulate light-tightness airex of outer ladders***
- ***Complete hybrids reparation***
- ***Repair ladders according to hybrids availability***
- ***Continue phase-2 and shielding***



## *Open questions:*

### *Hybrids status @ Perugia:*

*how many available for ladders reparation?*

### *Last 3 spare ladders to be produced:*

*which is the deadline to decide which type produce?*