ISR Work
Progress Report

CMSWeek,

CERN June 8th 2004

A. Benvenuti

INFN Bologna

News since Aachen

- 3MB3 and 2 MB4/4 arrived in May. The chambers have gone through the cosmic ray tests and are now under HV. No major problems found.
- 4 (?) MB2 and 8 MB1 are schedule to arrive next week bringing the DT count at the ISR to 132
- The next alignment calibration campaign will start next week (26 Chambers)
- Replacing HVBs and testing with cosmics has been the major activity.

HVB_I Substitution

- The HVB substitution is almost complete:
- 10 MB1 and 3 MB4/9-11 done by May 28th
- 5 MB2 and 2 MB4/10 done by May 22nd
- 10 MB3 done by May 28th
- 2 MB4/4 were equipped with HVB_Is in Legnaro
- 4 MB2 equipped with HVB_Is will arrive at the ISR next week
- 1 MB2 (MB2C19) with HVB still to be replaced

- The HVB_I should be just enough (one more
- MB4/9-11 with HVB_Is than needed =>YB-1)

Status of MB1 for YB+2

Chamber	DT Work	CR Test	DT Work	CR Test	HV
MB1C10	HVB	Theta Prob	Fix + O-R	Phi1 Noisy	OK
MB1C14	HVB	OK			OK
MB1C15	HVB	OK			OK
MB1C17	HVB	Theta /Phi1	Fixed	OK	OK
MB1C20	HVB	OK			OK (Theta/Phi1)
MB1C09			HVB + O-R	**test**	Phi2 A interlock
MB1C13			HVB	Phi1 Noisy	OK
MB1C16			HVB	Phi1 Noisy	OK
MB1C28	HVB	OK			OK
MB1C34			HVB	OK	OK
MB5C29	HVB	OK			OK
MB5C30	HVB	OK			OK
	14/04 – 22/04	21/04 - 05/05	17/05 – 27/05	01/06 - 06/06	24/05 – 02/06

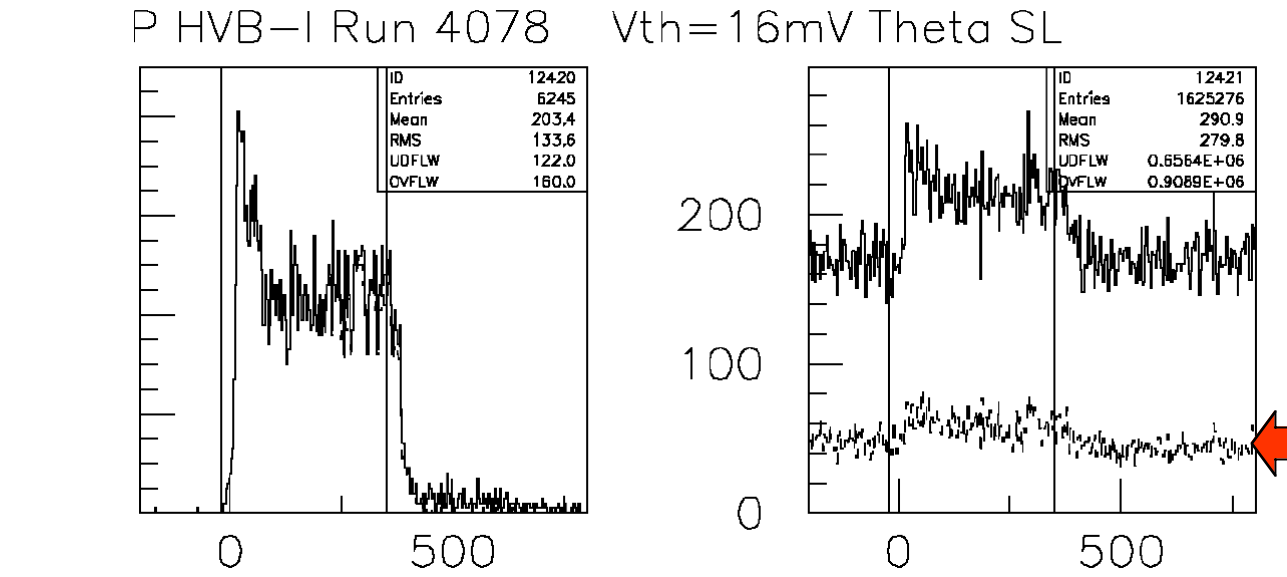
Bottom

Top

MB1 Repair Work

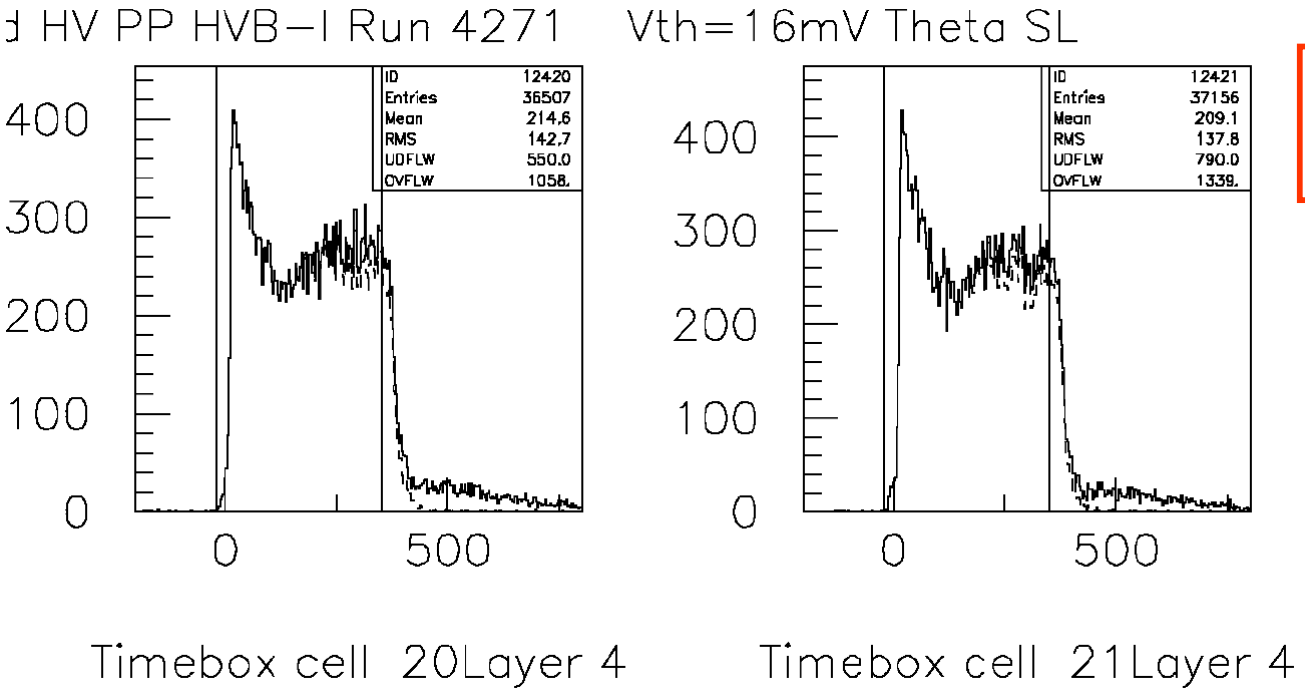
MB1C16	17/05 –24/05	Theta SL: broken wire Phi2 SL:HVC+FEB L3C49
MB1C13	17/05 –24/05	Phi 1 broken wire
MB1C10	17/05 –24/05	Theta SL: Fix Vth-Vcc short
MB1C17	17/05 –24/05	Theta:HVC+FEB L4C21 Noisy, Phi1 : L2C22 Replaced HVB (inefficient)

MB1C17 Theta SL layer 4 cell 21



Noise present in several runs taken at different times

First Hit

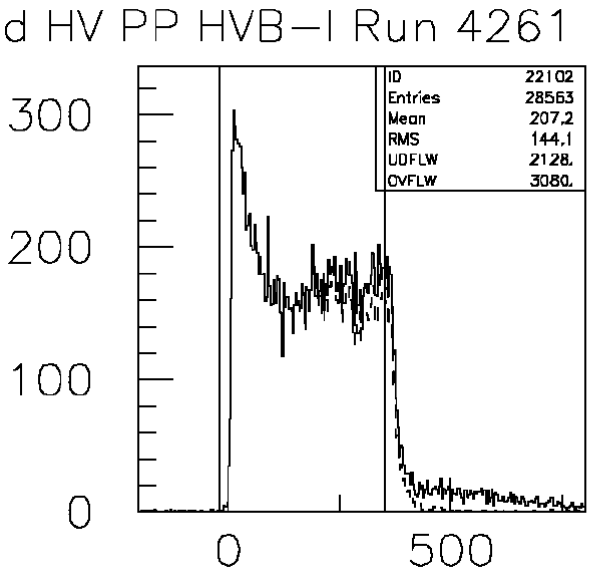


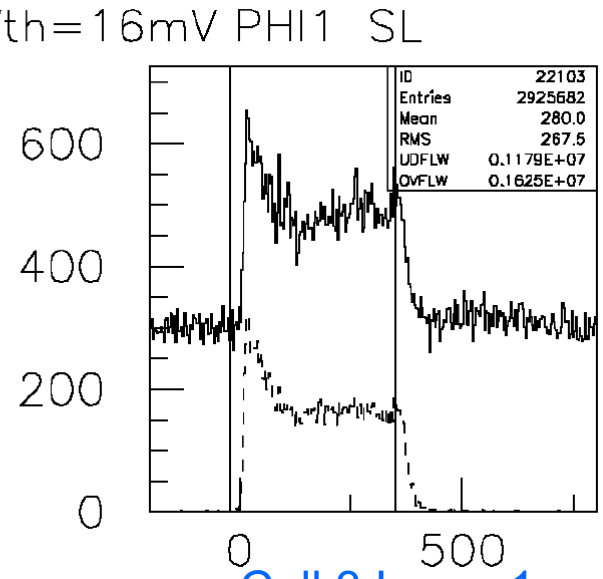
After replacing FEB + HVC

Please

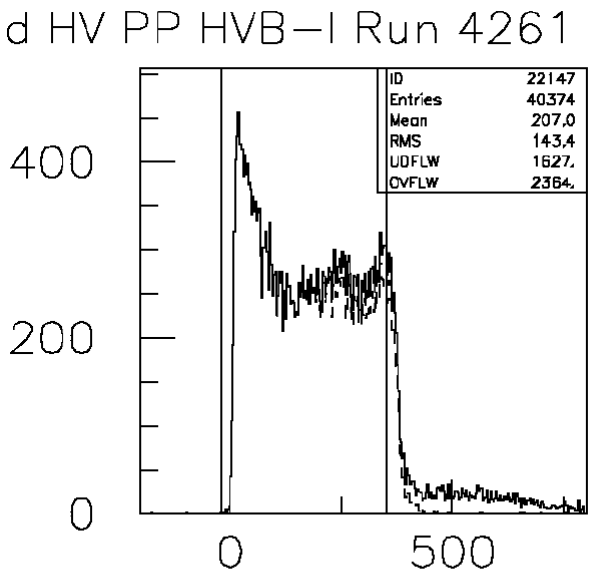
Send boards to Matteo for post-mortem

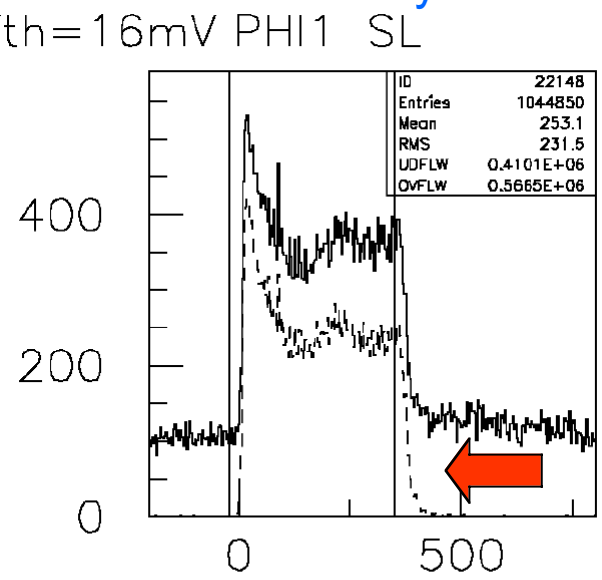
MB1C13 Phi1 SL





Cell 3 Layer 1



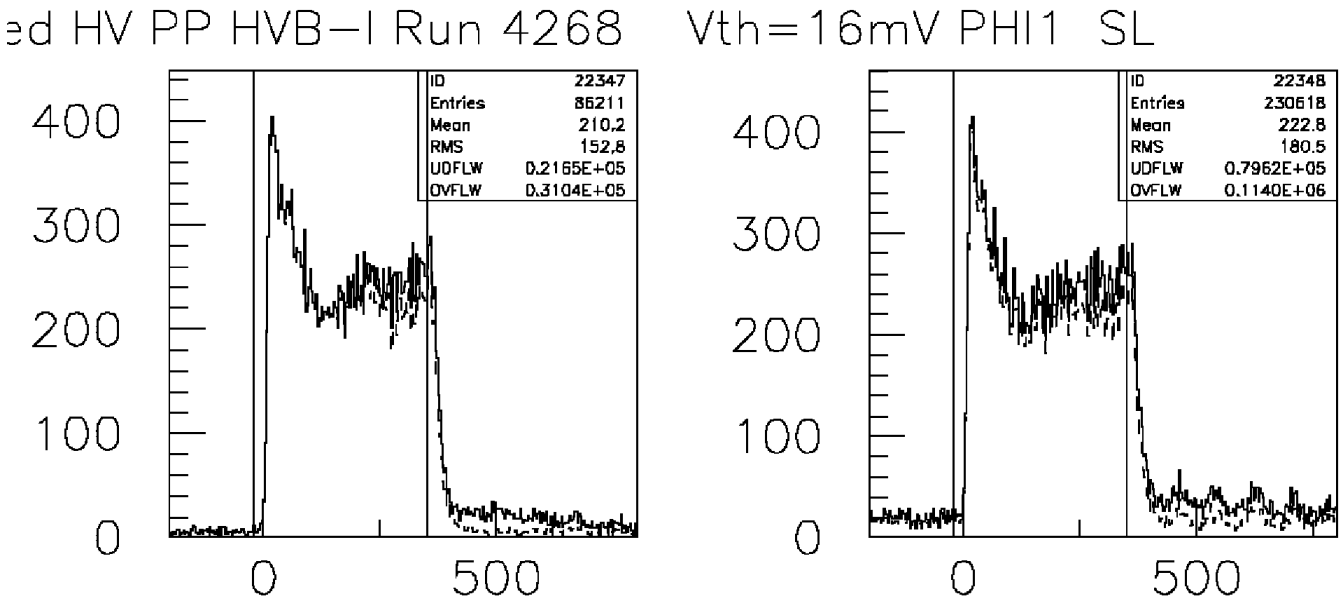


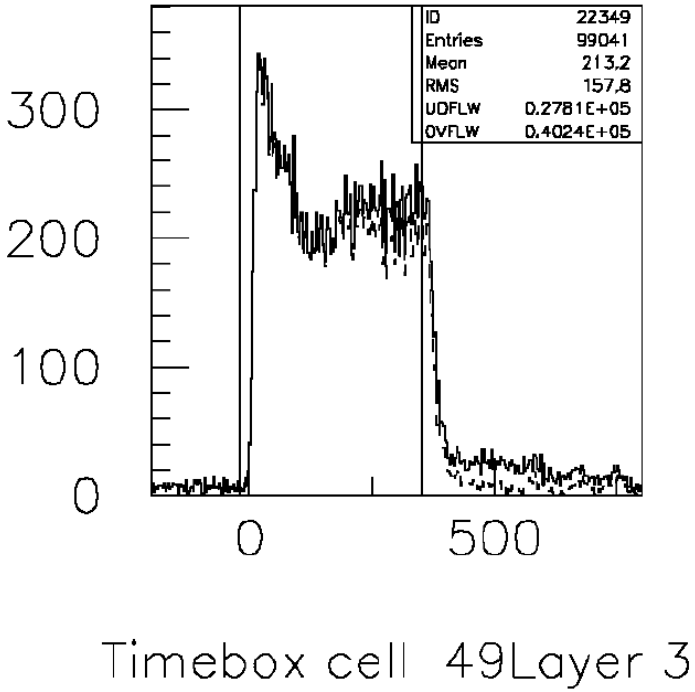
Same problem??

First Hit

Timebox cell 47Layer 1

Timebox cell 48Layer 1





[MB1C10]

More “garden variety” noise.

Not obvious if due to external cabling or to problems inside the chamber

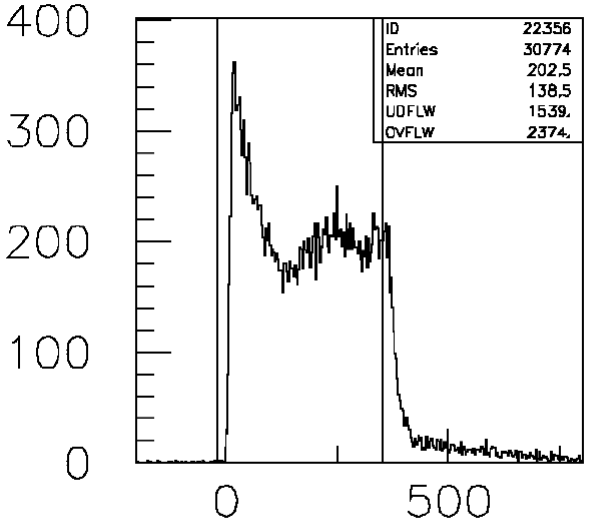
Status of MB2 for YB+2

Chamber	DT Work	CR Test	DT Work	CR Test	HV
MB2C17	HVB16	Phi2 DCS	HVB20	DCS Fixed OK	OK
MB2C22	HVB16	Theta BS	HVB20	Phi1 FEB Fixed / Phi1 BS	OK
MB2C23	HVB16	Phi2	HVB20	Theta w-k Phi2 Noisy	OK Theta Bc
MB2C24	HVB16	Ok	HVB20	Theta wHV Fixed/ OK	OK
MB2C26	HVB16	Phi2	HVB20	Phi1 HV	OK Phi1 Bc
MB2Cxx					
MB2Cxx					
MB2Cxx					
MB2Cxx					
MB2C19					
MB6C34	HVB	OK			
MB6C30	HVB	OK			
	Feb/Mar	21/02 - 18/03	19/05 – 23/05	**24/05 –31/05**	

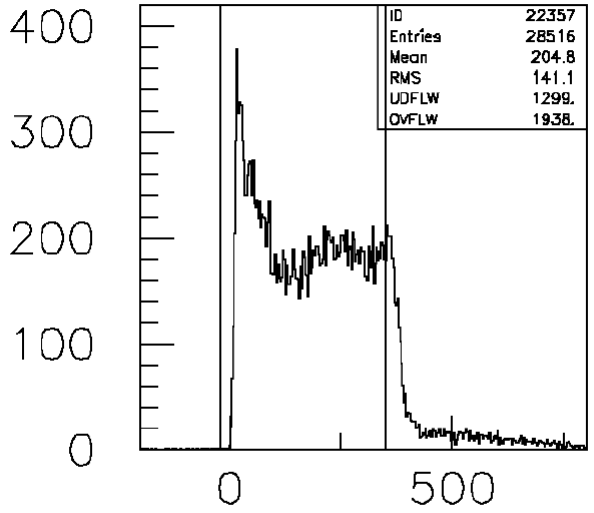
Bottom

Top

Run 3025 HV 3200 Vth=16mV PHI1 SL



Timebox cell 56 Layer3

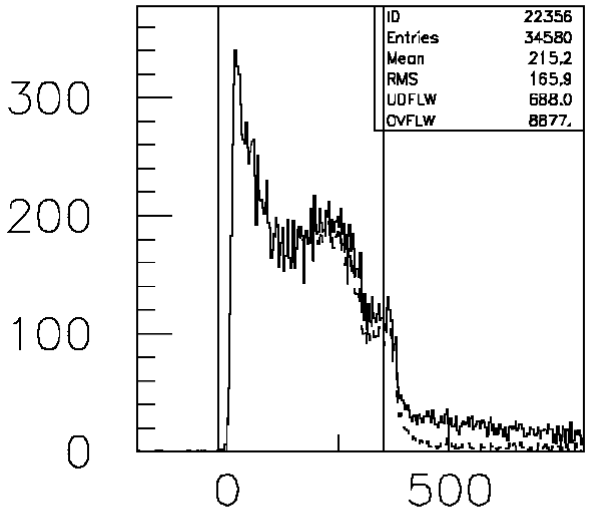


Timebox cell 57 Layer3

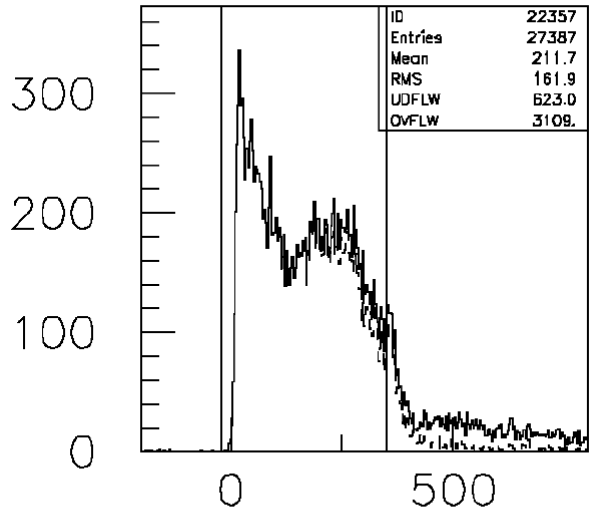
[MB2C22]

Disconnected
I-beam

d HV PP HVB−I Run 4255 Vth=16mV PHI1 SL



Timebox cell 56Layer 3



Timebox cell 57Layer 3

MB2 Repair

- MB2C17: Phi1 Vdd readout went in error during 2003/2004 shutdown while chamber sitting on test table. Data readout was OK. Franco diagnosed sc Vdd mon-fastmask. DCS cable showed that a connector was crimped twice.
- MB2C22: dead channels in Phi 1 with cosmics/pulser Franco diagnosed sc Vcc FEB 9 to ground , opened and replaced FEB and HVC
- MB2C24: dead channels in Theta with cosmics, OK with pulser, disconnected HV wire jumper. Opened and fixed

Jesus is continuing the work since the weekend

MB2 gas test

Problems during CR tests due to large oxygen contaminations observed in some MB2 after several days under gas (MB2C26 had to be removed after it was already cabled)

Repeat leak test:

	Chamber	Phi2	Theta	Phi1
MB2C17 (02/06/04)	172 min	416	172	Leak
MB2C22 (27/05/04		339	226	348
MB2C23 (24/05/04)	244	210	216	839
MB2C24 (26/05/04)	~infnite			
MB2C26 (26/05/04)	213	Leak	1648	91

MB1C17 Phi1: bad thread on passage blocked by plastic cap
Theta has a leak at the Front-end side

Remaining leaks mostly at corners, marked on chamber.

If a SL is opened at the HV side the chamber must be tested again with cosmics

Status of MB3 for YB+2

Chamber	DT Work	CR Test	DT Work	CR Test	HV
MB3C08	HVB20	OK			OK
MB3C10	HVB20	Phi1 cathd	Phi1 BS	**Test**	Theta w0L3 w1L4
MB3C12	HVB20/fix	Phi1	Phi1 HV BS	**Test**	Phi2 w0L2 Theta w1L1
MB3C14	HVB20/fix	OK			Phi1 B removed ?
MB3C16	HVB20/fix	Theta Phi2	Theta,Phi2	**Test**	Phi1 w0L3
MB3C04	HVB+covr	OK			OK
MB3C18	HVB	OK			Phi1 w1L1
MB3C24			HVB	**Test**	OK
MB3C30			HVB	**Test**	OK
MB3C32			HVB	**Test**	Phi2 Wire High Imon
MB7C03		Phi2 Prob			
MB7C04		OK			
	19/04 – 23/04	07/05 – 24/05	24/05 – 28/05	**08/06 –16/06**	24/05 – 03/06

Bottom

Top

MB3 Repair work

MB3C16	24/05 –28/05	Theta SL broken wire Damaged jumper cable Phi2 Damaged jumper cable
MB3C10	17/05 –24/05	Phi 1 : -1200V disconnected 2 damaged jumpers
MB3C12	17/05 –24/05	Phi1: hvb wire disconnected
MB3C12	19/04 –23/04	Phi1: I-beam contact
MB3C14	19/04 –23/04	Phi1: I-beam HV jumper disconnected Theta:: damaged jumper, wrong HV connection Phi2: I-beam HV jumper disconnected
MB3C16	19/04 –23/04	Phi2: L3 wire connections

HV current spikes in SY1527 are much smaller than in old system,at the level of 1-2 microA. No major problems after fixes

MB3C18 Phi1

L1 w1 current spikes ~ 1 microA

MB3C12 Theta

L1 w1 current spikes up to 2 microA

DT for First Installation July-September 2004

YB2 + Bottom

Sectors	+8	+9	+10		+11	+12
Services	Left (ZpB)	Right (ZpA)	Left (ZpB)		Right (ZpA)	Left (ZpB)
Chambers	MB1P10	MB1P14	MB1P15		MB1P17	MB1P20
Chambers	MB2P22	MB2P23	MB2P24		MB2P17	MB2P26
Chambers	MB3P08	MB3P10	MB3P12		MB3P14	MB3P16
Balance B	Right	Right	Right		Left	Left
Chambers		MB4C29	MB4 L34	MB4 R30	MB4C30	
Balance B			R	L		

Red = Chambers to be repaired

Blue = Certified for installation (dressing to be completed)

Black = Chambers to be tested

DT for First Installation July-September 2004

YB2 + Top

Sectors	+2	+3	+4		+5	+6
Services	Left (ZpB)	Right(ZpA)	Left (ZpB)		Right(ZpA)	Left (ZpB)
Chambers	MB1P28	MB1P34	MB1P09		MB1P16	MB1P13
Chambers	MB2P00	MB2P00	MB2P00		MB2P00	MB2P00
Chambers	MB3P18	MB3P30	MB3P32		MB3P24	MB3P04
Balance B	Left	Left	Right		Right	Right
Chambers			MB4 4C3	MB4 4C4		
Balance B			L	R		

Priority to complete MB1 and MB3

MB2 are naked and cannot be installed until October (RPC)

Replacing HVBs

- One team (2 trained people) can replace HVB in one chamber in one day
- Two teams can replace HVBs at the same time
- Repair work following CR tests should be done as soon as the problem is detected (it worked very well for MB2)
- Repair work at a later stage is very inefficient.
- The optimal scenario is then to have teams from assembly sites to replace HVBs and a local permanent(equivalent) team that does the testing and repairs.

Replacing HVBs

- The operation is risky, 1 to 3 wires were lost for each DT type
- We should adopt the same procedure for each team:

  attach Mylar,

  check for missing covers,

  check for bad contacts,

  use a common procedure to isolate unused wires/pins (heat shrink tubes instead of rubber)
- Summary sheets of work done and problems found are important to find pitfalls avoid mistakes…
- Suggestions to improve the working conditions: lamps, chairs… are welcome

Replacing HVBs

More surprises:

- First FEB failure on a chamber that should already be installed
- FEB/HVC problems that give extremely noisy channels
- First interlock missing on a HV connector (check all)

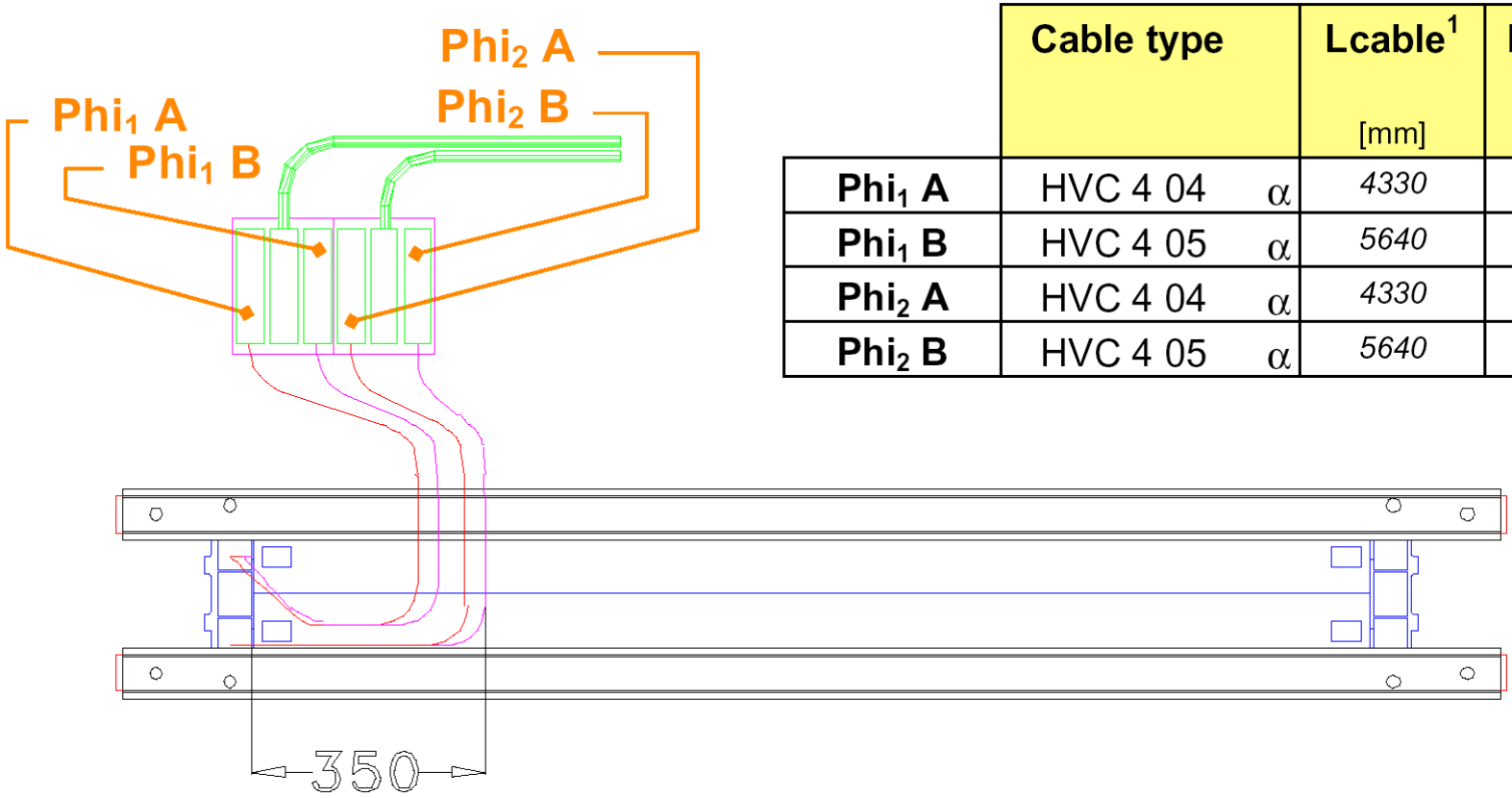
We must have a bookkeeping of such problems and inform the relevant persons (Matteo)

The HV current spikes seems to be disappearing but might be related to O2 contamination. Gerd can procure some free O2 analyzers (need cartridges) to put at the gas outlets.

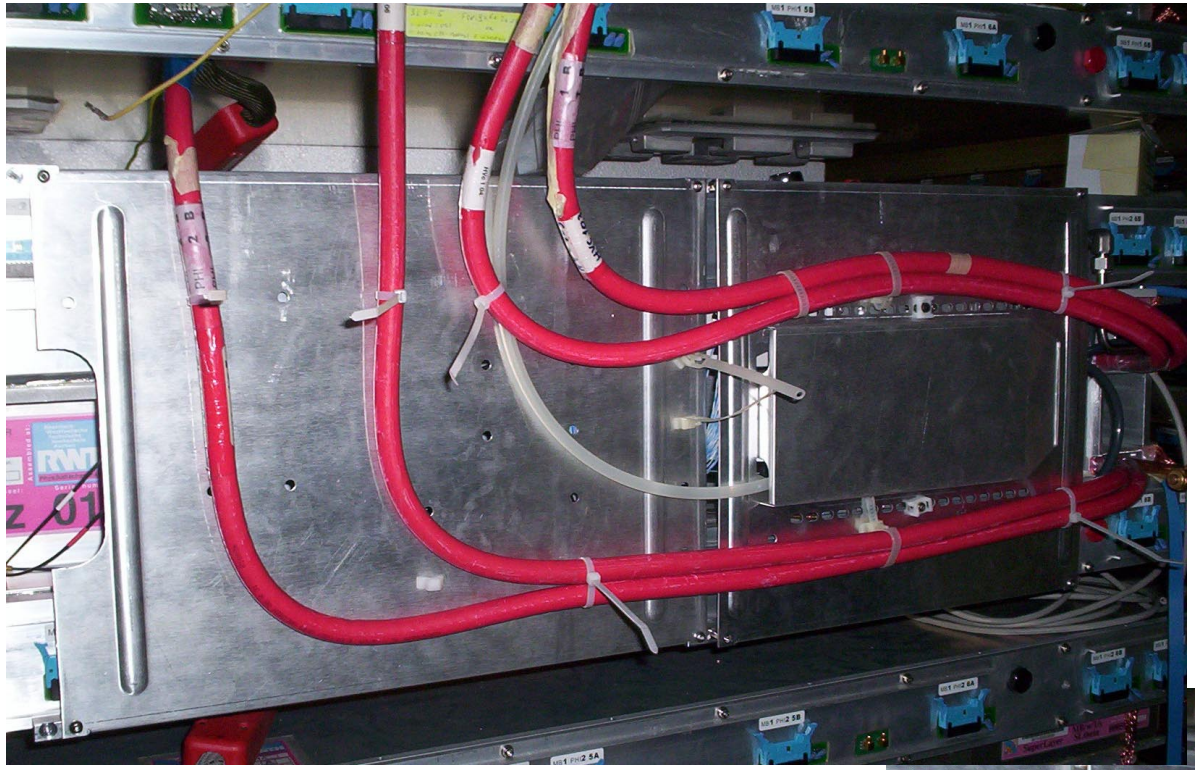
DT Dressing

Some tasks must be done after the HVB substitution and the chambers are certified with cosmics:

- Grounding straps at the HV side,
- Theta SL Front-end cabling (time consuming), started today for MB1. XiaoLu, Wang,Sandro trained by Vittorio
- Cooling pipes.
- Drawings for MB4/9-11 and MB4/10 HV cabling completed by Fabio. Cabling is starting this week.
- Last carter prototype tested by Massimo (and Vincenzo) now in production.



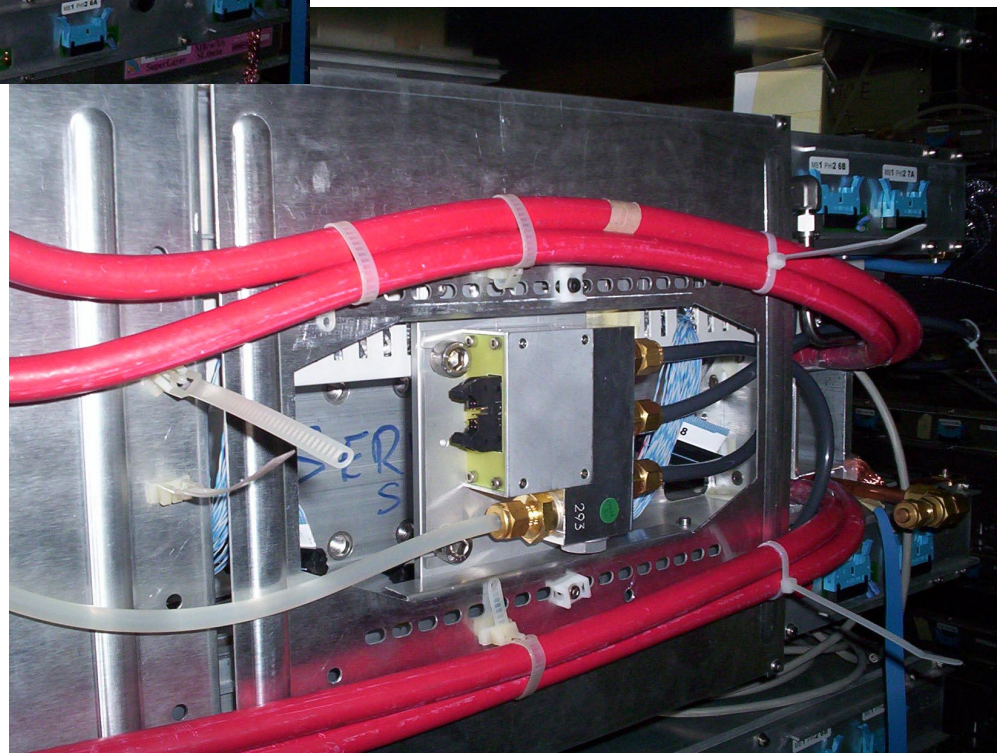
	Cable type	Lcable[1] [mm]	Louter[2] +0 – 50 [mm]
Phi$_1$ A	HVC 4 04 α	*4330*	1450
Phi$_1$ B	HVC 4 05 α	*5640*	1470
Phi$_2$ A	HVC 4 04 α	*4330*	1450
Phi$_2$ B	HVC 4 05 α	*5640*	1400



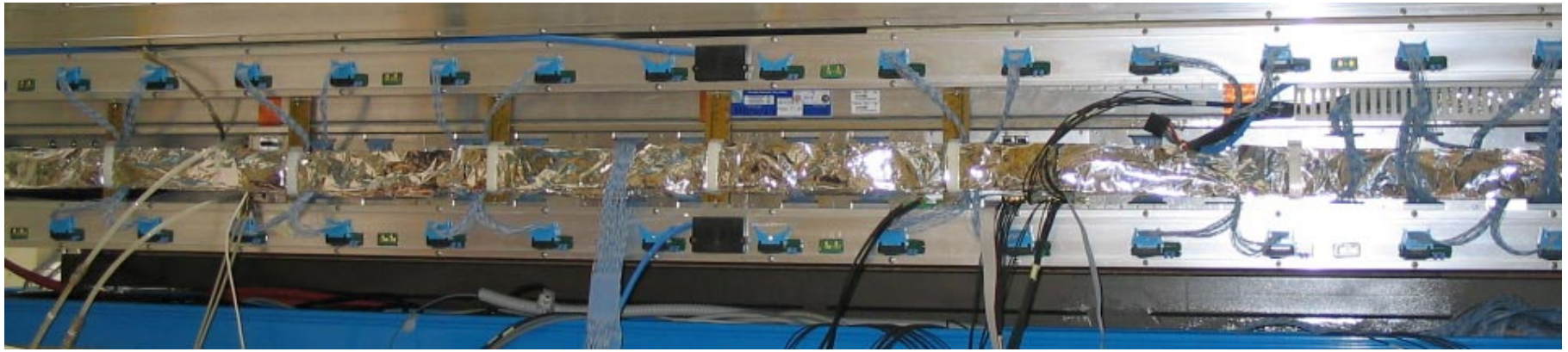
Gas Manifold Carter

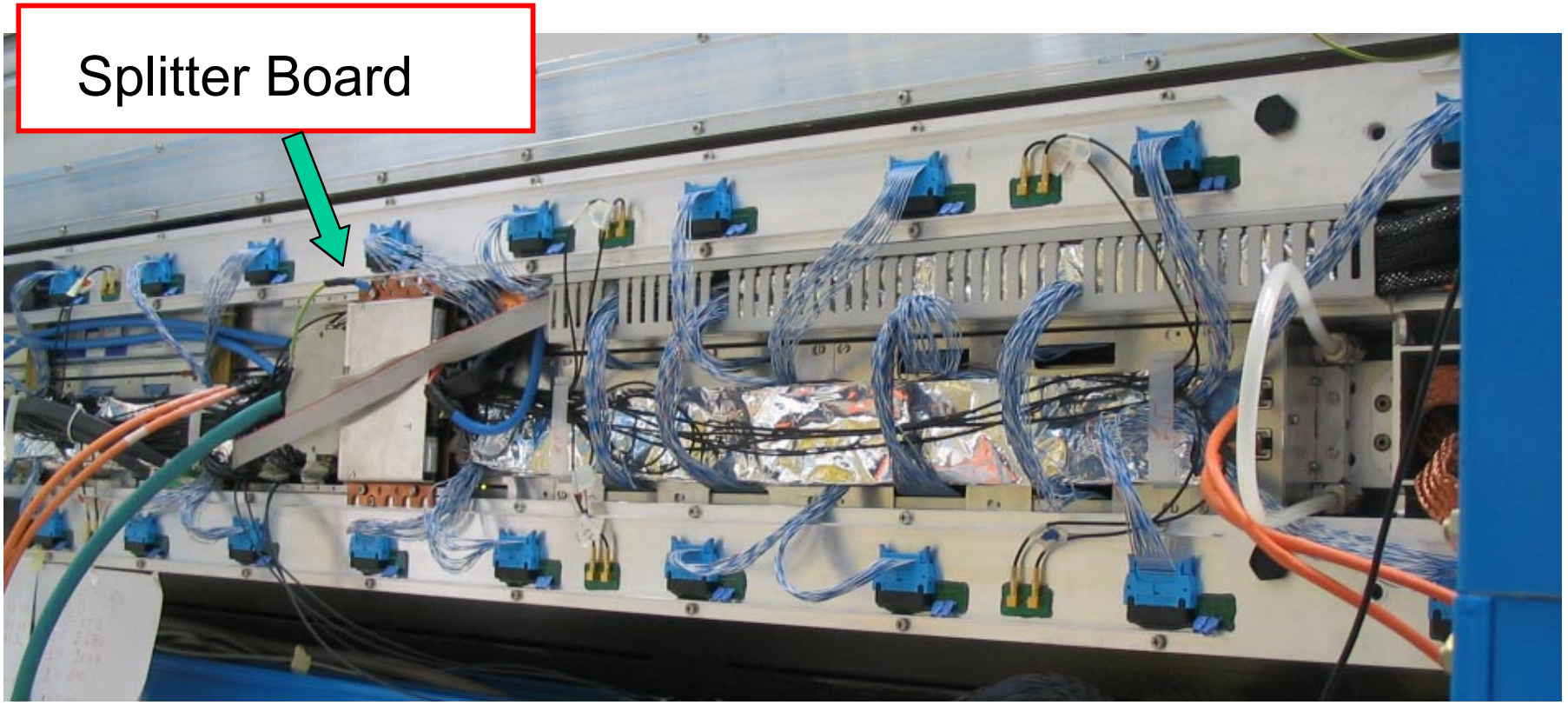
Test with MiniCrate and final cables needed to be sure that all fits.

Problems happen as seen with the alignment DCS cable (to be replaced in ~60 Chambers)



MB3 Mini Crate Cabling (Legnaro)





Summary (Aachen)

- It is crucial that the HVB substitution is completed as soon as possible, particularly on the MB2s DONE
- At least one “expert” person should be at the ISR until the repair work is completed for the YB2 bottom installation and the MB1 for YB2 top IT DID NOT HAPPEN, if it does not happen we may install in September
- The HV problems must be addressed and additional manpower must be dedicated to check the HV behavior of the chambers. FADING but might be O2 contamination
- As delays accumulate, the work for substituting HVB, testing the chambers and dressing for installation is compressed in an ever shrinking time frame. We must foresee adequate manpower at the ISR, especially physicists and expert technicians for these tasks.
- The next round of alignment calibration must be scheduled as soon as the next batch of MB2 with HVB_I arrives at CERN (mid June?) OK
- A dressing exercise with a minicrate, samples of all connecting cables and connectors and carters is long overdue. The alternative is yet more surprises in a very uncomfortable spot