

Workshop Summary

Marcos Cerrada
CMS Barrel muon week (April 2004)





CMS MUON WEEK MEETING AT CIEMAT FROM MAY 6 TO MAY 8

PRELIMINARY A

U. Dosselli

General status of DT chambers project

.....
 real problem: get organized to start preproduction: when? How?

Action items list for this meeting

- FREEZE CELL PARAMETERS (cf. Massimo)
- FREEZE END-PLUGS AND ORDER PRE-PRODUCTION
- SHARE PRE-PRODUCTION AMONGST INSTITUTES AND
START ORDERS
- AGREE ON A PRODUCTION STARTING MECHANISM

14:00-16:30

20'

20'

20'

20'

20'

10'

10'

10'

15'

16:30-16:45

16:45-19:00

1) Thursday 6/5 :

Welcome an

Opening ses

and list of ite

the rest of th

Drift Tube

RPC's (I.

Alignment

Trigger/Sc

Integration

Detector Co

Coffee Break

Common Dr

- Det

open

- Rep

- FR4

- Qua

Lunch



CMS MUON WEEK MEETING AT CIEMAT FROM MAY 6 TO MAY 8

2) Friday 7/5 :

Common RPC session		
Integration aspects (I. Iaselli)	9:00- 9:45	
Electronics and services (A. Ranieri)	9:45-10:30	
Coffee Break	10:30-10:45	
Visit to the Chamber Assembly Hall	10:45-12:00	
Common Alignment Session		
Barrel Alignment Status (L. Brunel)	12:00-12:30	
Tracker Alignment		
CERN alignment group (R. Ribeiro)	12:30-13:00	
Lunch	13:00-14:00	
Common Integration session		
(organized by D. Dattola)	14:00-14:40	
Common Trigger session		
(organized by G. Wrochna)	14:40-15:20	
- Muon Trigger since Muon TDR (G. Wrochna)	10'	
- Barrel di-muon trigger rates (M. Dallavalle)	20'	
- Isolated Muon Trigger (C. Albajar)	10'	
Common Software/Physics session		
(organized by U. Gasparini)	15:20-16:00	
Coffee Break	16:00-16:15	
Parallel sessions	16:15-19:00	

3) Saturday 8/5 :

DTIC session (restricted)		9:00-12:00
0) approval of Agenda and of the minutes March 17		
1) communications (FGasparini)		10'
2) Milestones (Cerrada)		10'
3) sizes and tolerances at the end of the drift tubes		?
4) Material procurement for CIEMAT and Legnaro (Q4, MB2SL, MB3)		30'
5) Organization issues (in view of the EDR)		15'
6) Status of various MoUs:		20'
	plates (Staiano) , I-beams (Benvenuti) , IHEP (HV, De Giorgi) , (DT chambers, all)	
7) COST BOOK (1):	CORE expenditures/commitments	30'
8) COST BOOK (2):	DT, RPC, Alignment updated costs	30'
9) Status and plans for purchasing/tendering of various items		30'
10) Design of chambers in the chimney sectors		10'
Parallel Sessions		9:00-12:00
Conclusion (Summary session)		12:00-13:00
The DTIC meeting might continue in the afternoon if needed.		

Padova Barrel Muon Week October 99

Status of Muon Software and HLT activities	U.G
Drift Tubes Trigger Design	PL.Z
DT session (Reports from the Labs)	
Test beam results	N.C, M.C.F, S.P, PL.Z
DT quality control	S.M

Torino Barrel Muon Week April 00

First CMS meeting I missed



Workshop on "LHC Physics with High-Pt Muons in CMS" Bologna, April 9-12, 2003

conference venue: Aula Giorgio Prodi
Piazza San Giovanni in Monte 2 - 40124 Bologna

mail address: Istituto Nazionale di Fisica Nucleare, sezione di Bologna
Dipartimento di Fisica dell'Universita' di Bologna
Viale C. Berti Pichat 6/2 - 40127 Bologna

Phone: +39 051 209 5245, or 5241 (Fax: +39 051 209 5269)

Purpose and Program

This CMS Workshop is the fifth of a series of Research Workshops.

The workshop is dedicated to the technological aspects of the CMS muon barrel detectors, with the aim of optimizing their performance in exploiting the physics potential of muons with large transverse momentum in pp interactions at LHC, in particular for Higgs Boson and New Particle Searches.

Nearly hundred experimental physicists are expected to attend the meeting.

[*Workshop Program* with links to talks](#)

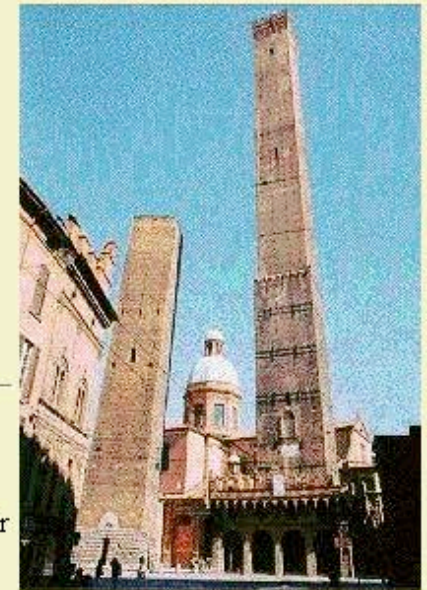
[PHOTO](#)

Local Organising Committee (INFN, sez. Bologna, and University of Bologna)

Silvia Arcelli, Anastasia Casoni (secr.), Francesca R. Cavallo, G. Marco Dallavalle (chair.), Fabrizio Fabbri, Alessandra Fanfani, Stefano Marcellini, Alessandro Montanari, Fabrizio Odorici, Andrea Perrotta, Tiziano Rovelli

International Advisory Committee

A. Ball (CERN, Geneva), A. Benvenuti (INFN, Bologna), P. Capiluppi (Bologna Univ.), M. Cerrada (CIEMAT, Madrid), F. Gasparini (Padova Univ.), T. Hebbeker (RWTH III-A, Aachen), F. L. Navarria (Bologna Univ.), C. Peroni (Torino Univ.), H. Reithler (RWTH III-A, Aachen), A. M. Rossi (Bologna Univ.), P. Sphicas (CERN, Geneva, and University of Athens), T. Virdee (CERN, Geneva, and Imperial College, London), C. Willmott (CIEMAT, Madrid), G. Zumerle (Padova Univ.)





Workshop on LHC Physics with High_Pt Muons in CMS

Bologna, April 9-12, 2003

GENERAL PROGRAM

Wed 9	Thu 10		Fri 11		Sat 12
	S.Giovanni, aula Prodi 9.30 Plenary session 2 <u>Physics - Reconstruction - Simulation</u> 10:45 Coffee break <u>LV1 Trigger</u> 12.30 End		S. Giovanni, aula Prodi 9.30 Plenary session 3 <u>CMS Integration, Installation</u> 12.30 End		S. Giovanni, aula Prodi 9.30 Plenary session 4 Summaries of parallel sessions Conclusions 10:45 Coffee break Depending on the time left and on the interest, possible visit to ancient University buildings.
S. Giovanni, aula Prodi 14.30 Registration and Welcome 15.00 Plenary session 1 <u>Muon Detector Alignment</u> 16:30 Coffee break <u>May Test Beam</u> 19.30 End	S.Giovanni, aula Prodi 14.30 Parallel session 1 <u>Drift Tubes Chambers</u>	Physics Dep., aula 3 14.30 Parallel session 2 Resistive Plates Chambers	S.Giovanni, aula Prodi 14.30 Parallel session 3 MuTech. Board DTIC	Physics Dep., aula 3 14.30 Parallel session 4 <u>DT Quality Checking</u>	
	20 <u>Workshop dinner</u>				

CMS barrel muon workshop April 28-30, 2004 Aachen

Wednesday April 28	Thursday April 29	Friday April 30		
<p align="center">room 28 A 102</p> <p>09:00 Welcome (Thomas Hebbeker)</p> <p>09:30 -12:45 Electronics (Marco Dallavalle, Carlos Willmott)</p>	<p align="center">room 28 A 102</p> <p>09:00 - 12:45 <u>Physics - Reconstruction - Simulation</u> (Ugo Gasparini)</p>	<p align="center">room 28 A 102</p> <p>09:00 -10:15 Alignment (Teresa Rodrigo, Gyorgy Bencze)</p>		
<p align="center">contd</p>	<p align="center">contd</p>	<table border="1"> <tr> <td style="background-color: cyan;"> <p align="center">room 26 A 208</p> <p>10:30 -12:45 DTIC partII (Fabrizio Gasparini)</p> </td> <td style="background-color: cyan;"> <p align="center">room 28 A 102</p> <p>10:30 -12:45 Quality Control (Silvia Maselli, Kerstin Hoepfner)</p> </td> </tr> </table>	<p align="center">room 26 A 208</p> <p>10:30 -12:45 DTIC partII (Fabrizio Gasparini)</p>	<p align="center">room 28 A 102</p> <p>10:30 -12:45 Quality Control (Silvia Maselli, Kerstin Hoepfner)</p>
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<p align="center">13:00 - 14:00 Lunch (bistro "Aditec")</p>	<p align="center">13:00 - 14:00 Lunch (bistro "Aditec")</p>	<p align="center">13:00 - 14:00 Lunch (bistro "Aditec")</p>		
<p align="center">room 28 A 102</p> <p>14:00 Tour "chamber production" (Kerstin Hoepfner)</p> <p>15:00 DT (Hans Reithler)</p>	<p align="center">room 28 A 102</p> <p>14:00 TB /Integration (Fabrizio Gasparini, Alberto Benvenuti, Pino Iaselli)</p>	<p align="center">room 28 A 102</p> <p>14:00 Workshop Summary (Marcos Cerrada)</p> <p>14:45 Conclusions (Fabrizio Gasparini)</p>		
<p align="center">contd</p>	<p>17:15 DTIC part I [restricted] (Fabrizio Gasparini)</p>			
	<p align="center">20:00 Dinner (University Guesthouse)</p>			



A selection of some crytical items

Personal views

The HVB saga

My preciousssssssss...



From CMS Week September 02

J. Puerta

LONG TERM TEST PROBLEMS

- Two HVB (C9) failed when ramping up HV for the first time at ISR
- Two more HVB (C7) failed after 14 and 15 days of operation resp.

THESE 4 HVB PRESENT OBVIOUS DAMAGES

(replaced by suspicious ones)

- One more HVB (C9) replaced after 13 days

PROBABLY NOT A PROBLEM OF HVB ITSELF

- Afterwards, the situation became stable for ~1 month
- ~10 days ago we started ramping down/up again HV in ALL LT test chambers twice a day. Last Saturday we gave up

1 more HVB *died* yesterday during the night

From CMS Week September 03

M.C Fouz

Superlayer Testing

- Going on at "nominal speed"

Difficult to speed up here

- No rejection failures in HVB's which have been "cooked" following the agreed procedure (13 SL tested)

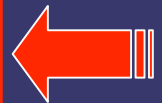
HVB's stand HV for a few days without apparent problems

We are concerned about possible failures after a long term HV test or during operation in CMS ...

- We started to include Slow Control testing at CIEMAT

If there is a detailed protocol to follow, please let us know.

9 SL tested up to now and no problems found (not the same



From CMS Week December 03

A. Benvenuti

Some Bad Surprises

- 3 MB3 chambers failed at this stage: **MB3P14** and **MB3P12**, for YB+2 installation, on 28/11/03 (repaired and tested again with cosmics) and **MB3P04**, for YB+1, on 5/12/03. All failures occurred during power up.
- These chambers were taken off the HV test at the end of June after:

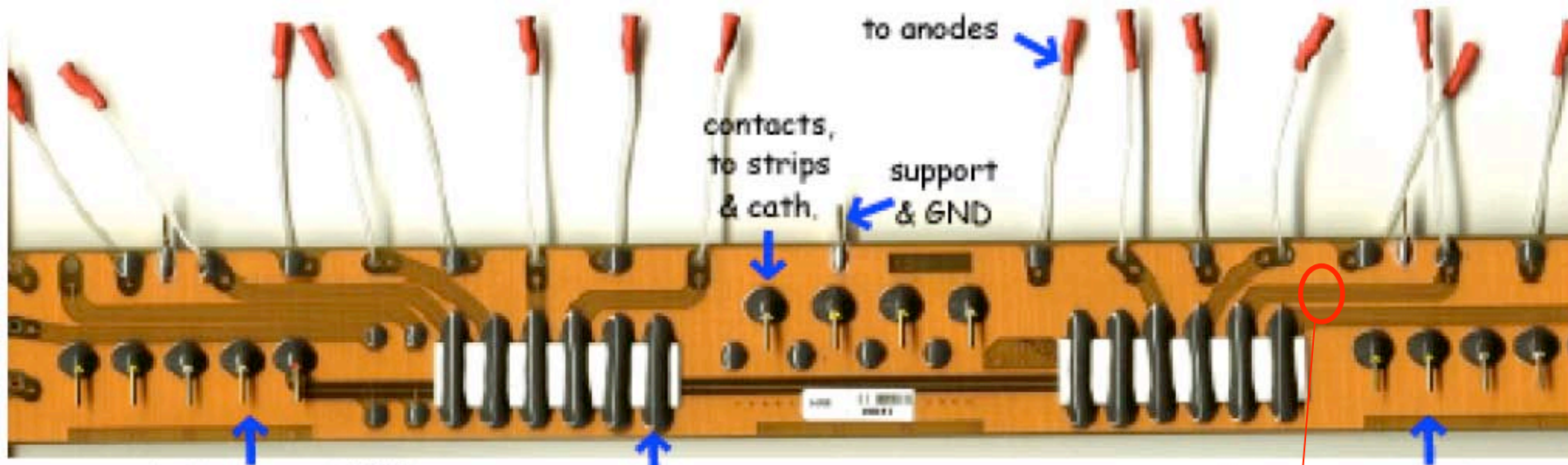
MB3P04 **2513h**, MB3P12 **2444h**, MB3P14 **2490h**

In January 04, 5 more HVB's died

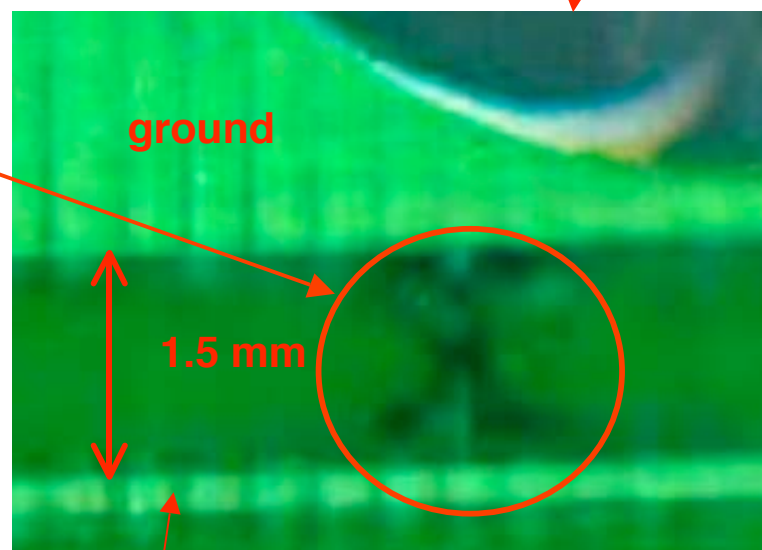
In all cases:

- In chambers ready to be installed
- All of them had been under HV for many hours (order of 2000-3000 hours)
- Under gas for some months after HV being switched off

- All of them in MB3 chambers !!!



The breakdown occurs only in the outer layers between the 3.8 kV line and the neighbouring ground plane, across the brown channels.



Decision in february 04:

Delay chamber installation and replace all HVB 's

In spite of:

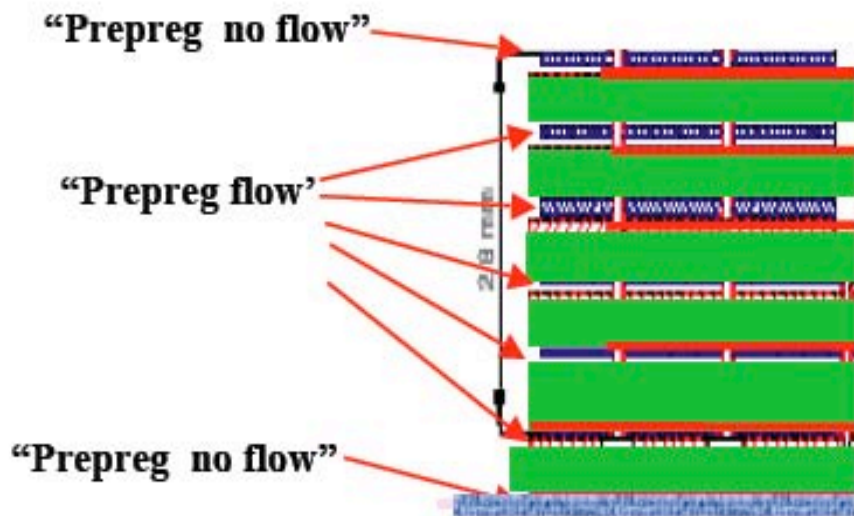
- 📊 No new design yet (and no prototyping either)
- 📊 No clear understanding of the reasons of the problems
- 📊 No detailed evaluation of the impact on the schedule
- 📊 No real knowledge of financial implications



Cross-Section of old and new HVB

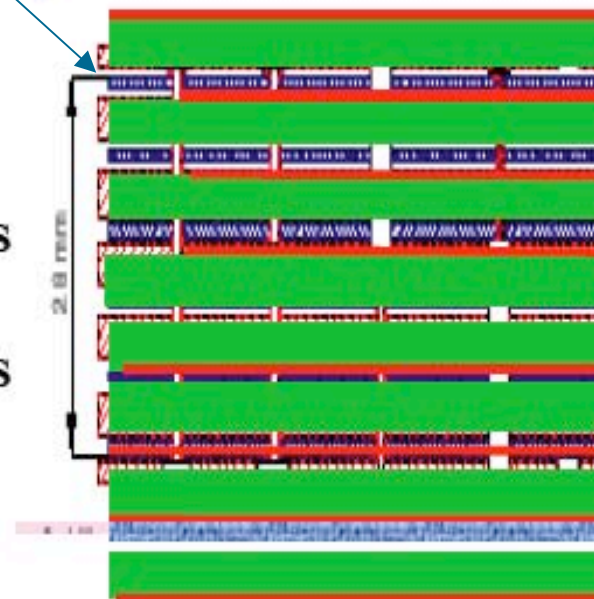
Eliminate ground plane on the outer layers.
Avoid contact of HV insulating space with Gas.

1, 2, 3rd GENERATION BOARD



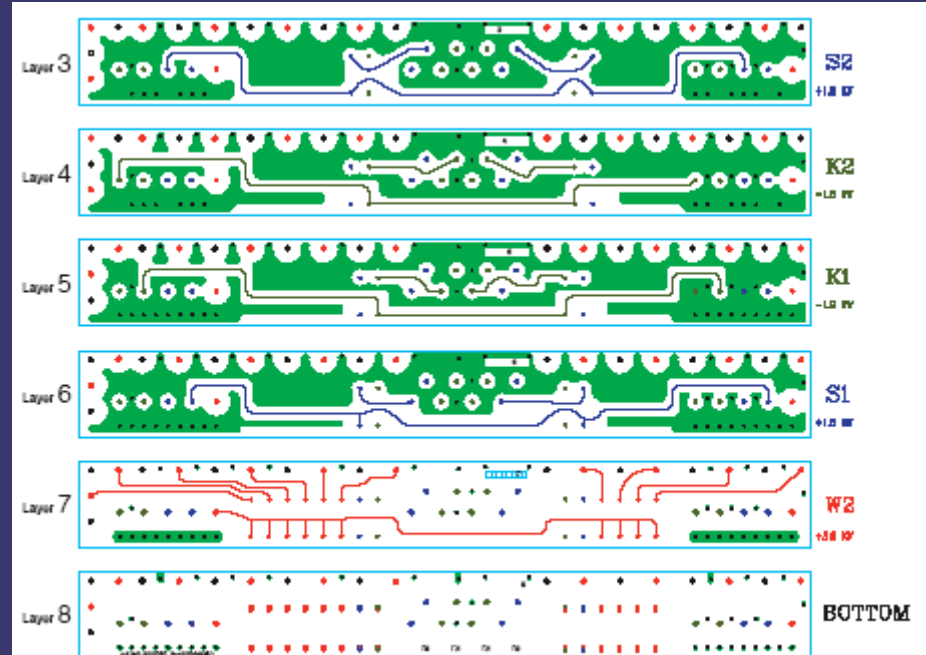
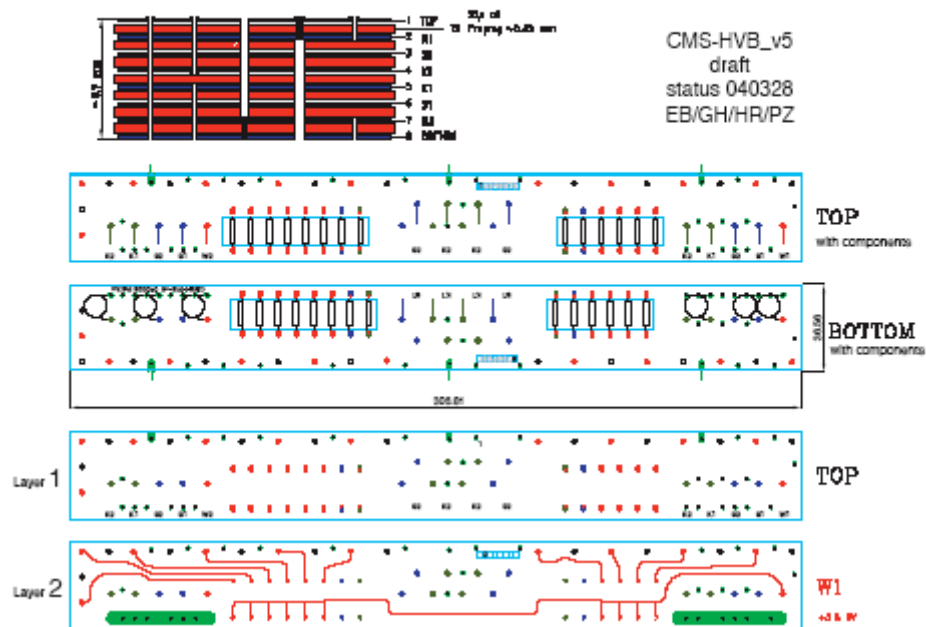
NEW BOARD DESIGN:
6 layers \square 8 layers

WIRES 1
STRIPS 1
CATHODES
CATHODES
STRIPS 2
WIRES 2



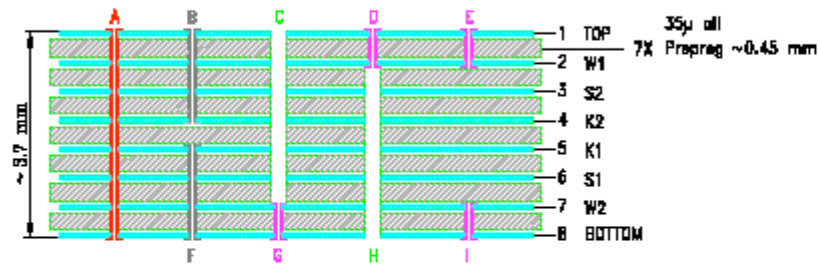
Layout of the new HVBs

File:040328HVb_v5_1-8w.pdf



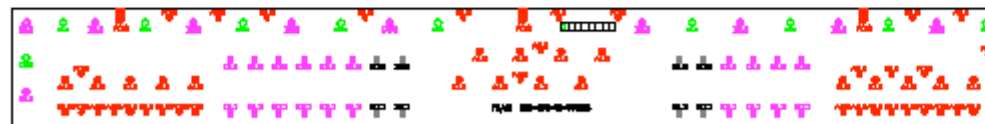
Layout of the new HVBs

CMS-HVB_v5
draft
status 040328
EB/GH/HR/PZ

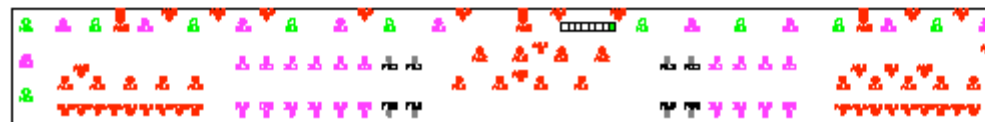


Notes:

- Color coding indicates type of vias, in this drawing
- To simplify the fabrication, vias are through 2, 4 or 8 layers; avoided through 3 layers, in this study.



TOP



BOTTOM
(top view)

Offers for PCB production



Company
MULTI-PCB (D)
CORONA (I)
MICRO-PCB (CH)
CISTERLAIEI (I)
STRASCHU (D)
E&K Leiterplatten (D)
SOMACIS (I)

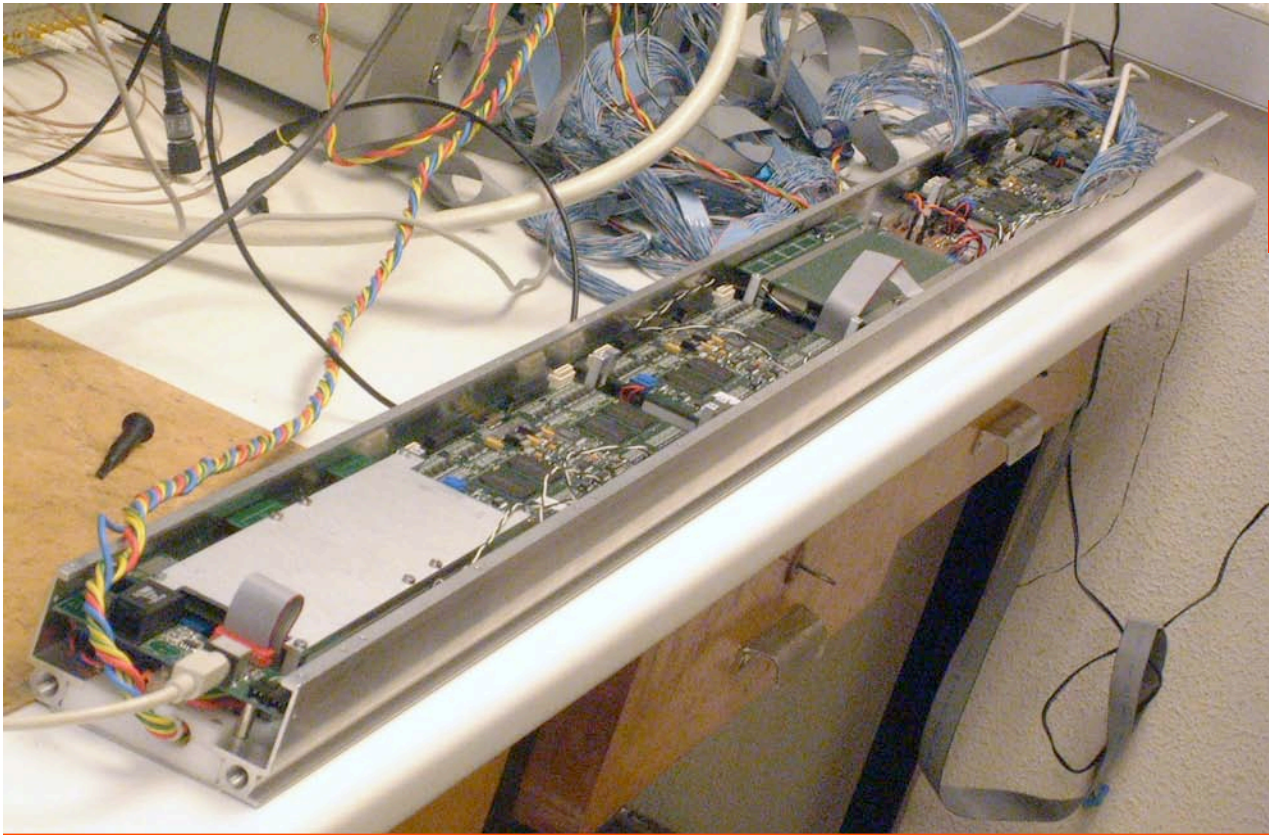
If we order now a preseries of 200 PCB (+1800 by Aachen), and another 200 PCB by Padova, we can plan (optimistic):

- 200 + 200 PCB 's mid may to be tested
- 200 + 200 complete HVB assembled by end of may
- 3 weeks for testing (green light to go ahead by mid june)
- 1800 PCB 's produced by mid july
- Ship to China and reception there by end july
- Back from China by end of august
- Start replacing HVB 's on YB+1 chambers in september
- Start making HV tests in october
- Start chamber installation in YB+1 in november

In the meantime we should have started YB+2 installation in june and hopefully completed it by end of october, using chambers with the so-called "old improved HVBoards"

The Minicrates SAGA

The Never Ending Story



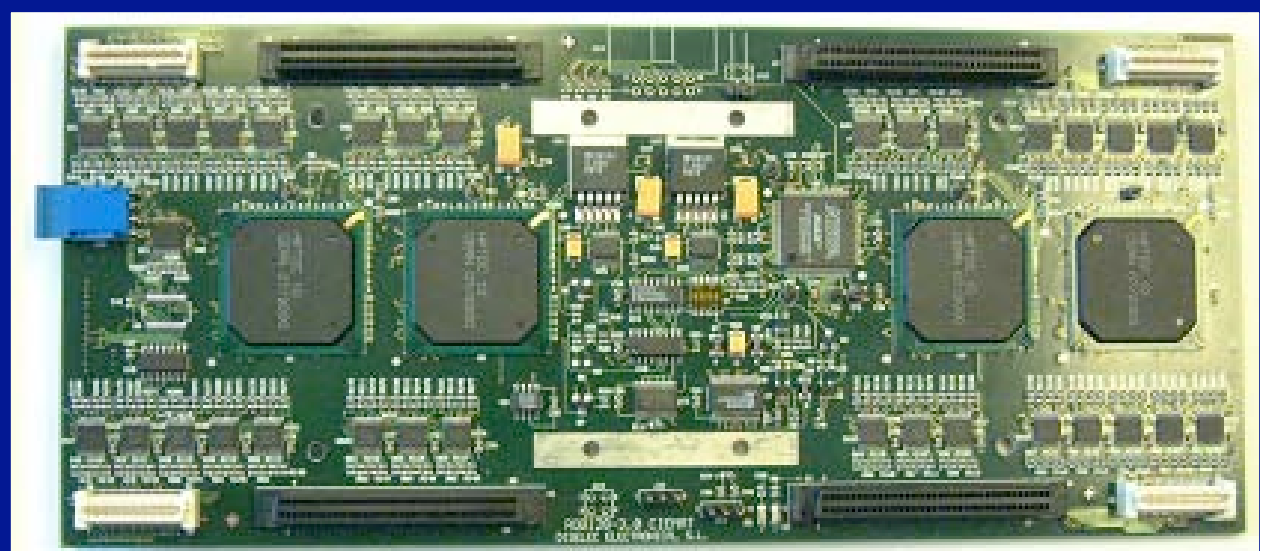
MINICRATE

Assembly of all Minicrates with ReadOut Boards has started at CIEMAT.

More than 50% of all mechanical pieces is available. By summer the remaining 50%

ROB production by a spanish firm has been completed.

READOUT BOARD (ROB)



BUT

From Carlos Willmott

- A possible **modification on Phi covers** is still pending. (M. Pegoraro).

- At some point already assembled MC's had to be **disassembled** due to a problem related with the clock cable length that had to be modified

- **L1A, Event reset and Bunch reset** signals do not come out of CCB with the same **phase** with respect to clock.
- Each **ROB** would require a **particular clock cable length** to synchronize all these signals, in a narrow time window.
- Still pending to measure **autotrigger L1A**, to insure that it has the proper phase.

- We have contracted the TRB cables production (around 3000 cables) with an industry in Madrid. It includes a **120 cables pre-series**.

- The production of the **TRB cables pre-series** has been **stopped last week** for a bug detected in the cable layout.

- This error has been corrected and the **first batch is going to be produced now**.

- **MC's shipment will be delayed** to include this cables.

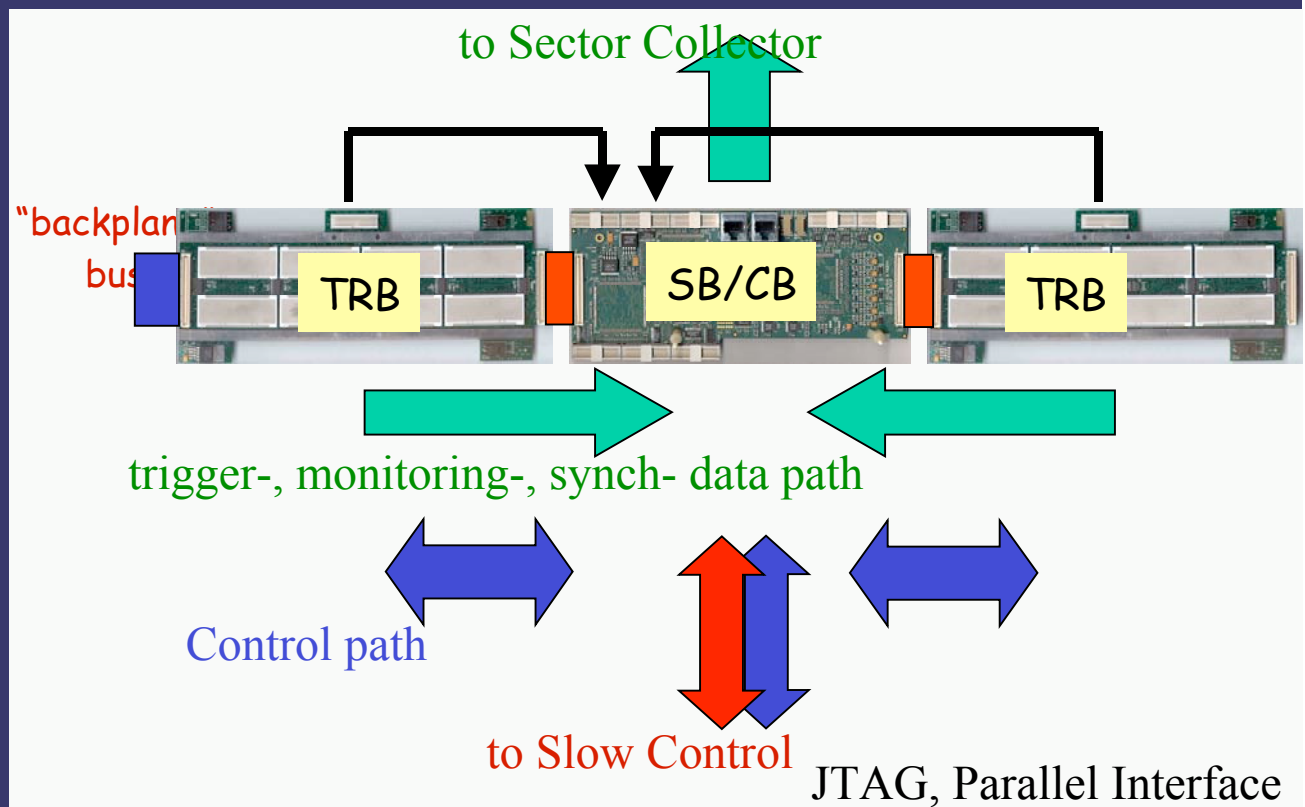
Minicrate Trigger Components

From Flavio del Corso

Enough CCB 's for 40 minicrates and TRB 's for 15 minicrates


Delivery of 200 TRB/month expected for September 04

From Marco Dallavalle
Enough SBs



MINICRATE Status

- New chamber installation plan: first **YB+2**, then **YB+1**, and then **YB0**.
- The MC's needed to accomplish with that planning are:
 - **5 MB1 for YB+2 top in July.**
 - **12 MC's of different types for YB+2 top in September.**
 - **19 MC's for bottom YB+2 by the end of 2004.**
- In total, **126 MC's before May 2005** to equip wheels YB+2, YB+1 and YB0.
- It has been proposed to set up two assembly sites in Italy to complete trigger part and install FE cables on the MC's : **Legnaro, starting in May, and Bologna, that would be ready by September 04.**
- The aim is to assemble **8 MC/month per site**, that is, **16 MC/month**. It is under study, but very **unlikely**, that Madrid could reach that production rate.
- Full MC's will be tested at those sites and additional infrastructure will be required. In particular **4 ROS-8 are now being fabricated.**



It is not possible to make a
“realistic” MC production
schedule until first 5 MB1
chambers have been completed

Electronics session

9:30-12:45 Wednesday April 28th, 2004

room 28 A 102

PRELIMINARY Agenda

Trigger boards production ([Flavio 20'](#) + Marco 20')

MiniCrates production (Carlos 20')

MiniCrates qualification tests: discussion (TBD 20')

Report on HVB (Hans 15')

2003 test beam results (Flavio 20')

MiniCrate tests with cosmics (Anna 10')

Report on RPC electronics (Pino 20')

September 2004 test beam: discussion (Enrico 20')

Bunched beam test of the CMS drift tubes local muon trigger

P. Arce^a, M. Bellato^b, M. Benettoni^b, A. Benvenuti^c, D. Bonacorsi^c, M. Bontenackels^d,
J. Caballero^a, V. Cafaro^c, P. Capiluppi^c, L. Castellani^b, F. R. Cavallo^c, M. Cerrada^a,
P. Checchia^b, N. Colino^a, E. Conti^b, M. Corvo^b, B. de la Cruz^a, F. Dal Corso^b, G. M. Dallavalle^c,
M. De Giorgi^b, F. Fabbri^c, A. Fanfani^c, C. Fernandez^a, J. Fernandez de Trocóniz^c, M. C. Fouz^a,
P. Garcia Abia^a, F. Gasparini^b, U. Gasparini^b, P. Giacomelli^c, V. Giordano^c, F. Gonella^b,
C. Grandi^c, M. Guang^b, L. Guiducci^c, M. Gulmini^f, T. Hebbeker^d, J. M. Hernandez^a, K. Hoepfner^d,
I. Josa^a, S. Lacaprara^b, I. Lippi^b, R. Mameghani^d, S. Marcellini^c, G. Maron^f, R. Martinelli^{b†},
S. Maselli^h, G. Masetti^c, A. T. Meneguzzo^b, V. Monaco^h, A. Montanari^c, F. Montecassiano^b,
F. Navarra^c, F. Odorici^c, M. Passaseo^b, M. Pegoraro^b, C. Peroni^h, A. Perrotta^c,
A. J. Ponte Sancho^{b‡}, J. Puerta^a, H. Reithler^d, A. Romero^h, L. Romero^a, P. Ronchese^b, A. Rossi^c,
T. Rovelli^c, R. Sacchi^h, A. Staiano^h, N. Toniolo^f, E. Torassa^b, G. Torromeo^c, R. Travaglini^c,
S. Vanini^b, L. Ventura^b, S. Ventura^b, C. Villanueva^a, C. Willmott^a, M. Zanetti^b, L. Zangrandò^f,
P. Zotto^b and G. Zumerle^b

^a CIEMAT - División de Física de Partículas, Avenida Complutense 22, E-28040 Madrid Spain

^b Dipartimento di Fisica dell'Università e Sezione INFN di Padova, Via Marzolo 8, I-35131 Padova, Italy

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^d III. Physikalisches Institut der RWTH Aachen, D-52056 Aachen, Germany

^e Universidad Autónoma de Madrid, Ctra. de Colmenar km 15, E-28049 Madrid, Spain

^f INFN, Laboratori Nazionali di Legnaro, Viale dell'Università 2, I-35020 Legnaro(PD), Italy

^h Dipartimento di Fisica dell'Università e Sezione INFN di Torino, Via Giuria 1, I-10125 Torino, Italy

[†] Until December 31st, 2000

[‡] Until August 31st, 1999

Submitted to Nuclear Instruments and Methods A

Abstract

The 40 MHz bunched beam set up at CERN was used in May 2003 to make a full test of the drift tubes local trigger. The test main goal was to prove that the integration of the various devices located on the chamber was adequately done both on the hardware and software side of the system. Furthermore the test provided complete information about the general performance of the trigger algorithms in terms of efficiency and noise. Data were collected with the default configuration of the trigger devices and with several alternative configurations at various incident angles. Tests on noise suppression and di-muon trigger capability were performed.

2004 Test Beam

Given the present circumstances it is difficult to make plans for this test beam.

Generally felt that it is a very important test beam. It is in our baseline and we should aim at having it.

Decisions will be taken by next CMS week when we expect to have a more clear picture of the situation.

----- Proposed agenda DT session -----

Wednesday 040428 15:00-19:00, room 28 A 102

MU Barrel DT Chamber

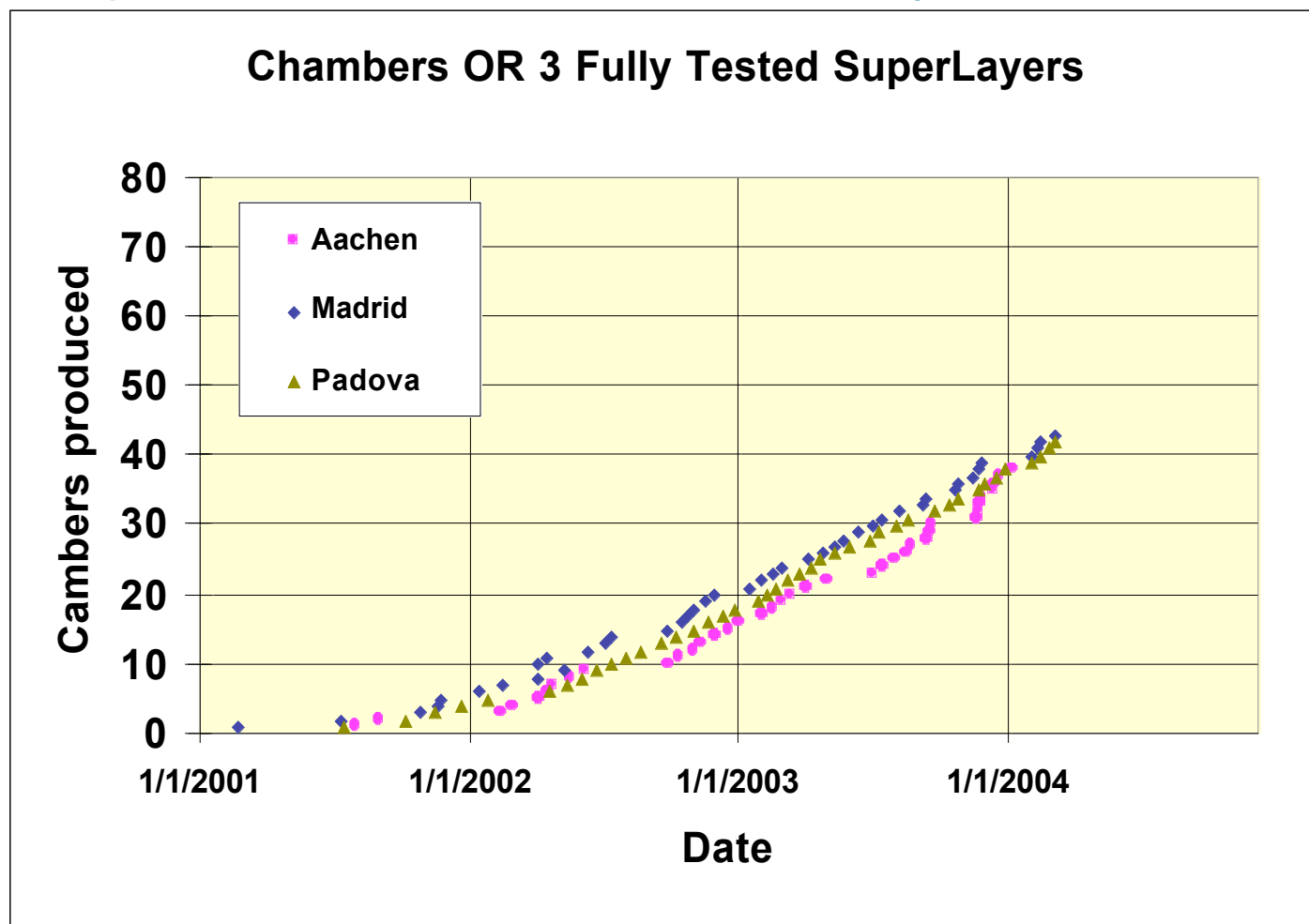
Assembly of components and DTs: status/plans/mat. flow:

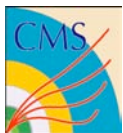
15:00 Bologna/Protvino cathode prod.	Alberto
15:25 Torino/Dubna plate prod.;	
DT ass. prep. at To.	Amedeo
15:50 Aachen DT prod.	Kerstin
16:15-16:30 --- coffee break ---	
16:30 HVB, HC, manometer prod.	Hans
16:45 Legnaro DT prod.	Paolo
17:10 Madrid DT prod.	Maricruz
17:35 ISR DT reception, test	Alberto
18:00 Chamber dressing issues	Alberto/Hans/Massimo/Matteo
18:20 Procurement, material flow, critical items	Marcos + all
18:30 Cosmics with minicrate in selftrigger	Anna
18:50 A.O.B.	
19:00 End of DT session	



Barrel DT Chambers (MB1, 2, 3)

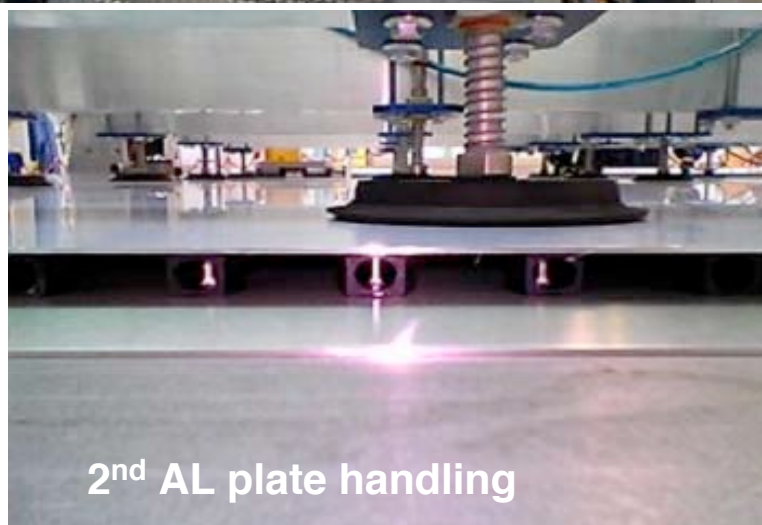
126/210 (60%) DT chambers produced. 115 chambers at CERN
End production around mid 2005 (20 ch./year/site).





MB4 Production in Torino Started

Plan: Produce 40 MB4 in 2 years (end Apr 06)



ISR Tunnel April 2004



115 chambers

ISR Activities

HV long term tests are a very important activity at ISR

Replacement of boards for YB+2 has started (22 chambers already done)

Items needed to complete chamber dressing are essentially defined, and most of them available in sufficient quantities



LV Cable assembly

2 hours/cable

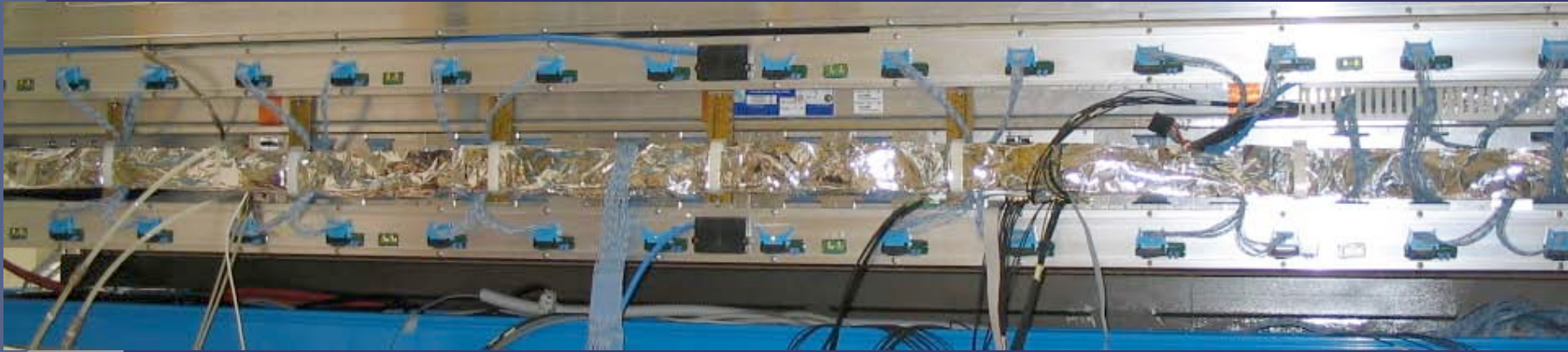
Length defined for
all Theta SLs



DT Dressing Summary (Major Items)

Type	@ISR	Align		HV/Gas	HV Cable	⊖ FE Cables	CR TEST
		L	R				
MB1P	23	12	11	23	23	0	23
MB1M	9	5	4	9	9	0	9
MB4/9,11	4	2	2	0	0	0	4
All MB1,4	36	19	17	32	32	0	36
MB2P	24	12	10	22	22	9	18
MB2M	14	5	5	10	10	0	9
MB4/10 L	3	2	1	0	0	0	3
MB4/10 R	3	2	1	0	0	0	3
All MB2,4	44	21	17	32	32	9	33
MB3P	23	9	9	18	18	12	23
MB3M	10	5	5	10	10	0	10
MB4/4	2	0	2	0	0	0	2
All MB3,4	35	14	16	28	28	12	35

MB3 Mini Crate Cabling (Legnaro)



Splitter Board





PRS/mu session in Barrel Muon week (Aachen)

[last update: Friday 23 April 2004]

Date/Time: Thursday 29 April 2004 from 09:00 to 12:45

Location: CERN

Chairperson: [U.Gasparini](#)

Description: *Physics Department, Aachen University
Room 28 A 102*

Thursday 29 April 2004

09:00	Standard Model physics in 1st year of LHC operation (40')	J. Mnich
09:40	Reconstruction & analysis software in CMS (25')	N.Neuneister
10:05	Validation of DT L1 trigger simulation in ORCA (20')	S. Vanini
10:50	Progress in alignment studies with tracks (25')	C. Martinez
11:20	DT calibration on Data Challenge dedicated stream (20')	N. Amapane
11:40	First experience on DST analysis at T1/T2 centers (20')	S. Lacaprara
12:00	Physics case study: H-> WW -> 2mu 2nu (10')	S. Lacaprara
12:10	Physics case study: H -> 4mu (25')	P. Arce

Technical Board/Integration
14:00 Thursday April 29th room 28 A 102

Agenda

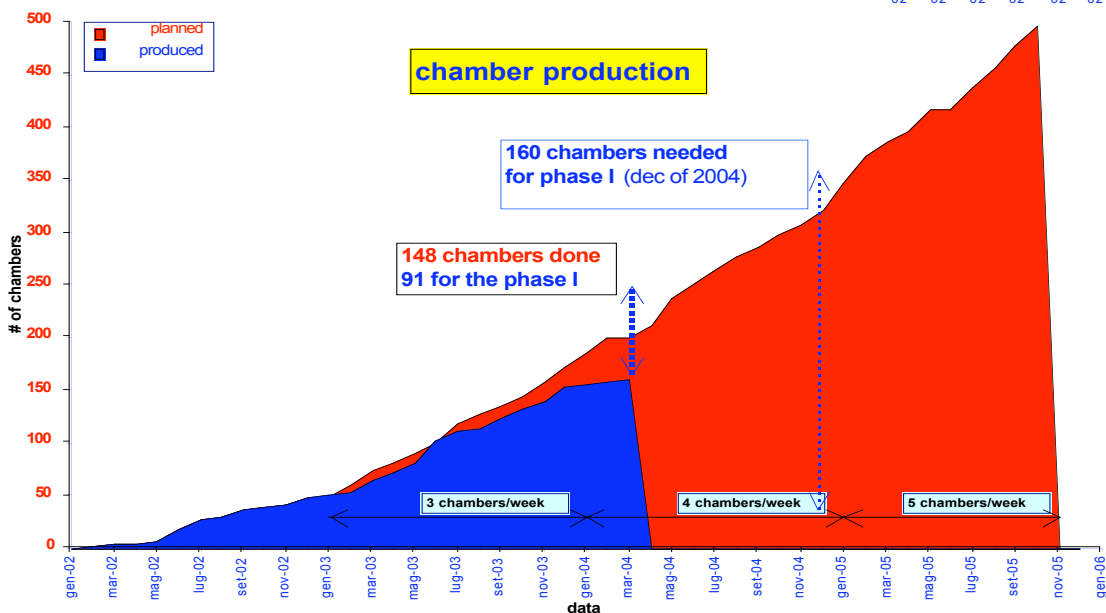
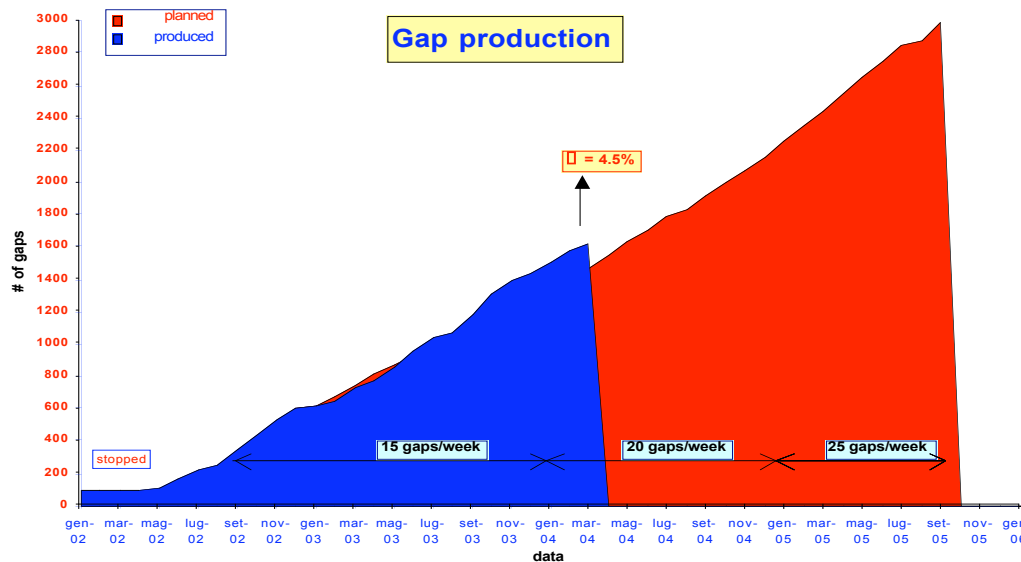
RPC Production Status	20'	Gabriella Pugliese
RPC readiness for Installation	20'	Anna Colaleo
DT production and Installation Schedule	15'	Alberto
Installation+Handling tools	15'	Alberto
On Wheel work	30'	Mimmo
Cabling Summary	20'	Fabio (Mimmo/AB)
HVB Production/test/material procurement	30'	Enrico
Points from the Electronics Session	15'	Carlos
Test at SX5	15'	Alberto

AoB



RPC Barrel Production Status

Gap production on schedule
 The gap rejection factor in 2004 is 11%



Chamber production delayed by 2.5 months. Full speed again from April

RPC production

Single gap production ahead of schedule

Double gap production on schedule

Chamber production: 156 chambers done
14 weeks delay

Chamber testing: 142 chambers tested
20 weeks delay

Good performance of tested chambers

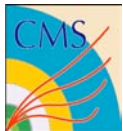
59 chambers ready for installation

No major conflict with DT installation schedule

DT installation plans

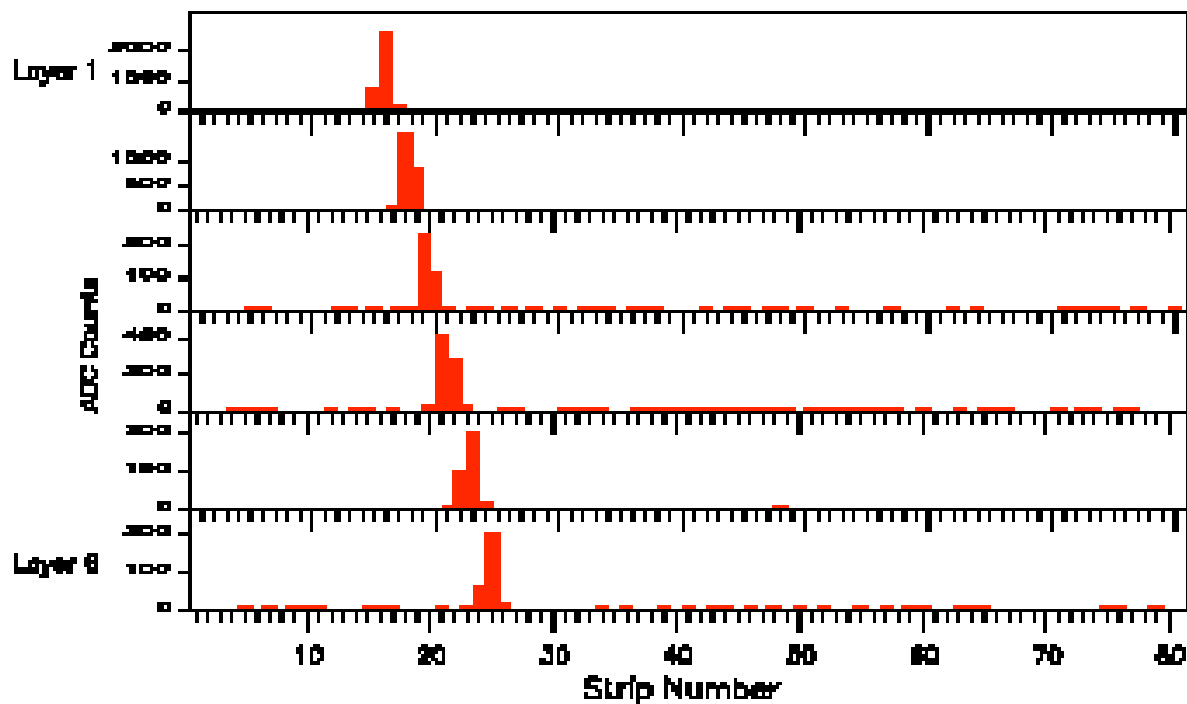
All the planning depends on the availability of:

- HVB's
- Minicrates
- MB4 chambers

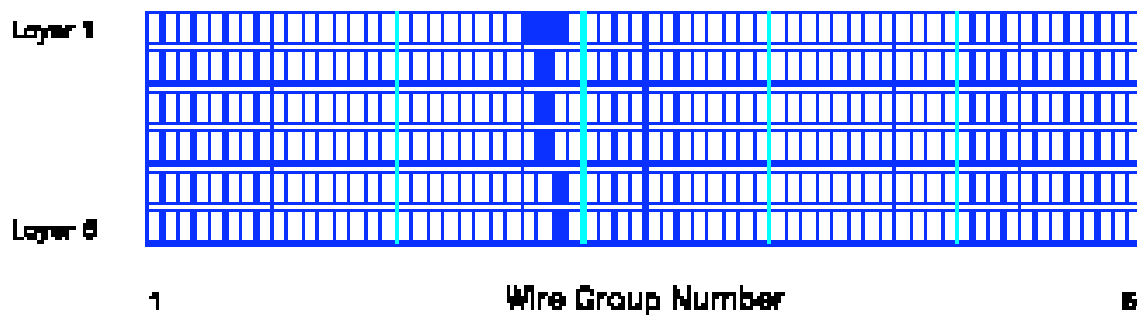


Cosmic Ray as Detected by a Chamber on a Disk at SX5

STRIPS



WIRES



CMS Barrel Muon Workshop: Alignment session

Place/Date: Aachen / April 2004

Agenda / News [\[ppt\]](#)

- 1.- Overview of the Barrel alignment project: G. Bencze [\[ppt\]](#)
- 2.- LED holders and DT chambers - Calibration experience (including QC aspects): Z. Szillasi [\[ppt\]](#)
- 3.- Summary of the Link project status (tbc) [\[ppt\]](#)
- 4.- Integration news (racks and cables): E. Calvo [\[ppt\]](#)

Alignment news

MAB's out of tolerances can be repaired
Z bars still under design. Conceptually OK
Fork production is very advanced

104 chambers calibrated (in the alignment bench)

VERY GOOD JOB !!!!

Good news : chamber geometry according to specs

Main milestone: to be ready for the magnet test

Cable routing looks OK

ISR set up schedule (for calibration purposes)

Link discs are being fabricated

Some final remarks

It was an excellent meeting

Perfect organization

Many thanks to our Aachen colleagues for their very kind hospitality and for all the work they have done to make this Muon Week so succesful