

MUONS

DT barrel chambers

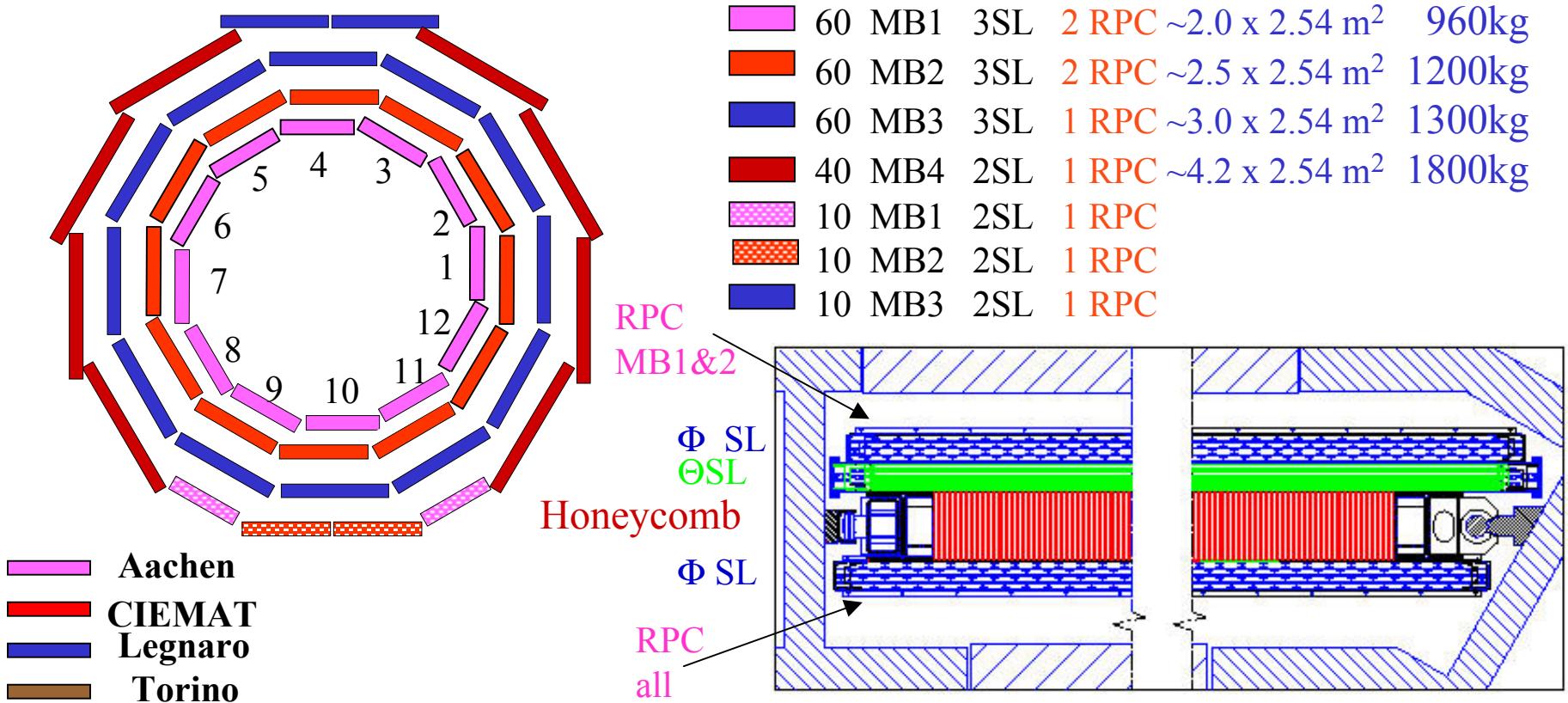
Endcap Chambers (Apollinari talk)

RPC

Alignment

F. Gasparini

The Barrel Muon : 5 Iron Wheels, 250 drift chambers & 484 RPC in 7 flavors, 171.732 Drift wires , 69120 RPC strips.

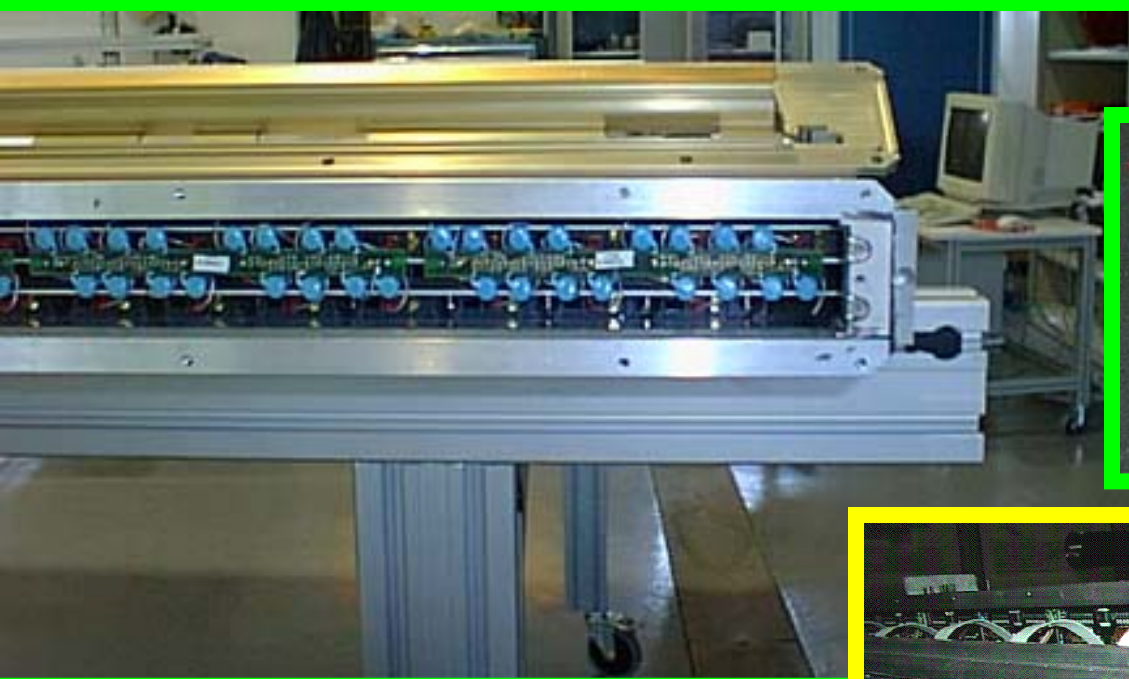


10 Sectors will be installed in SX5 => 210 Chambers(310 RPCs).

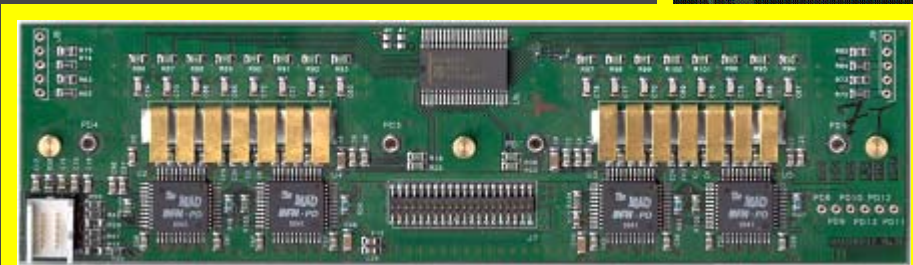
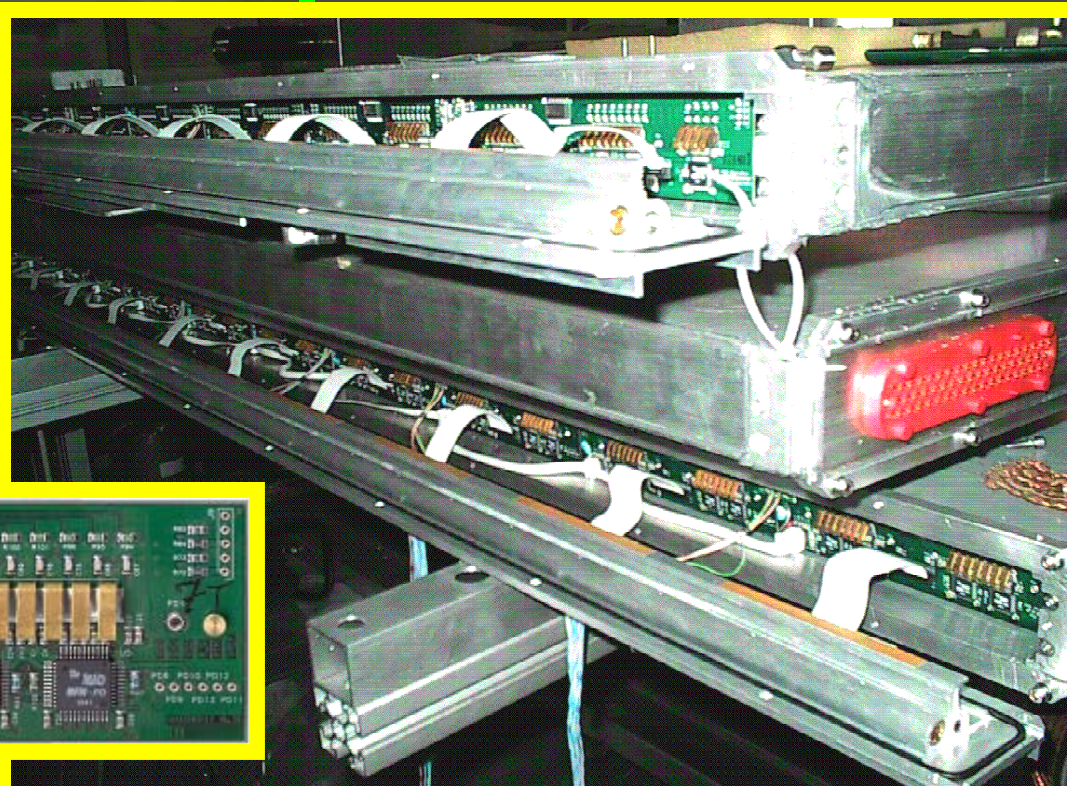
Sectors 1 and 7 are used for the lowering device and will be installed in UX5 => 40 Chambers(60 RPCs).

Electronics, FE Side

HVC BOARDS



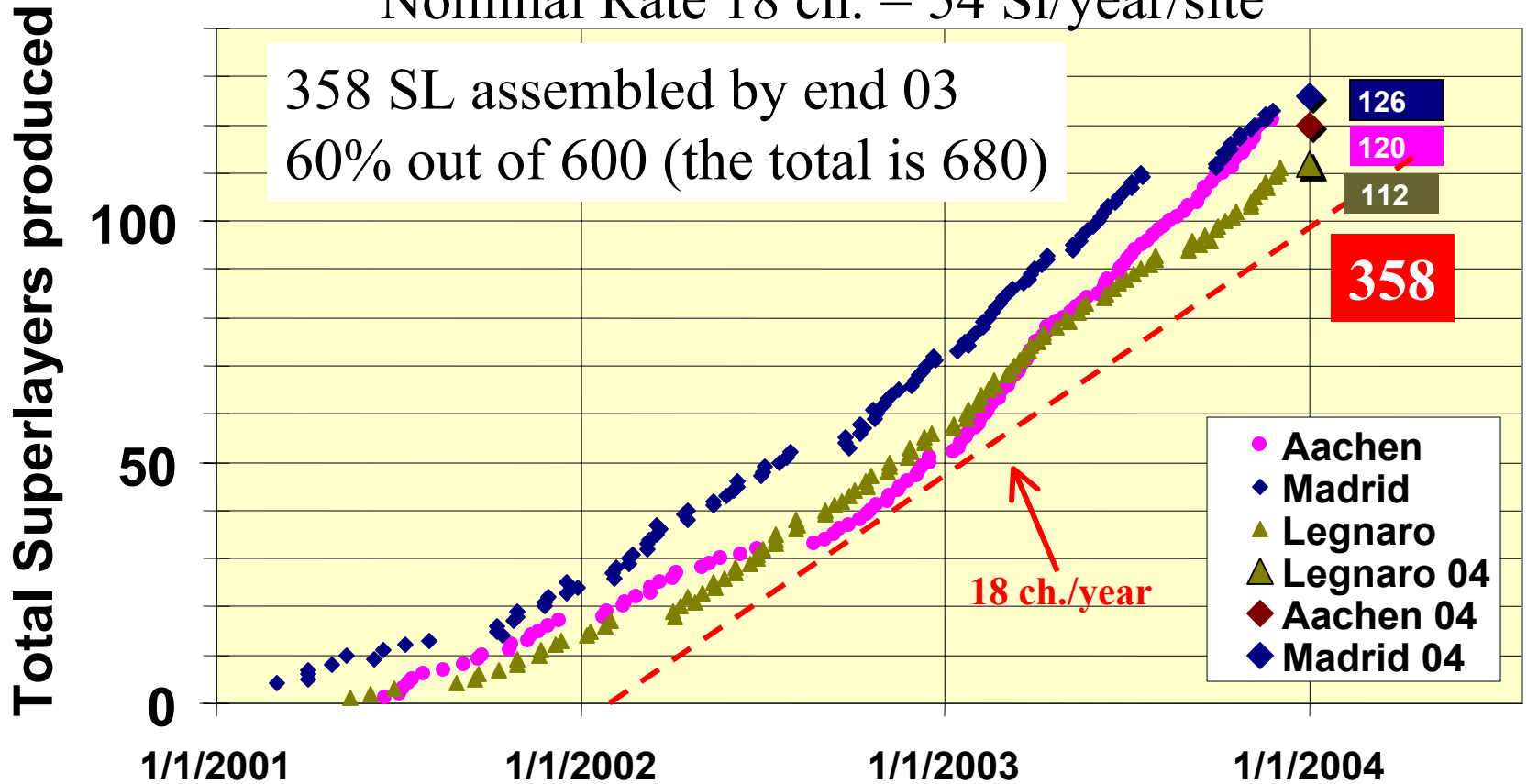
FE BOARDS



Three of the four assembly sites are operational since 2001

producing MB1,MB2,MB3 and three types of MB4

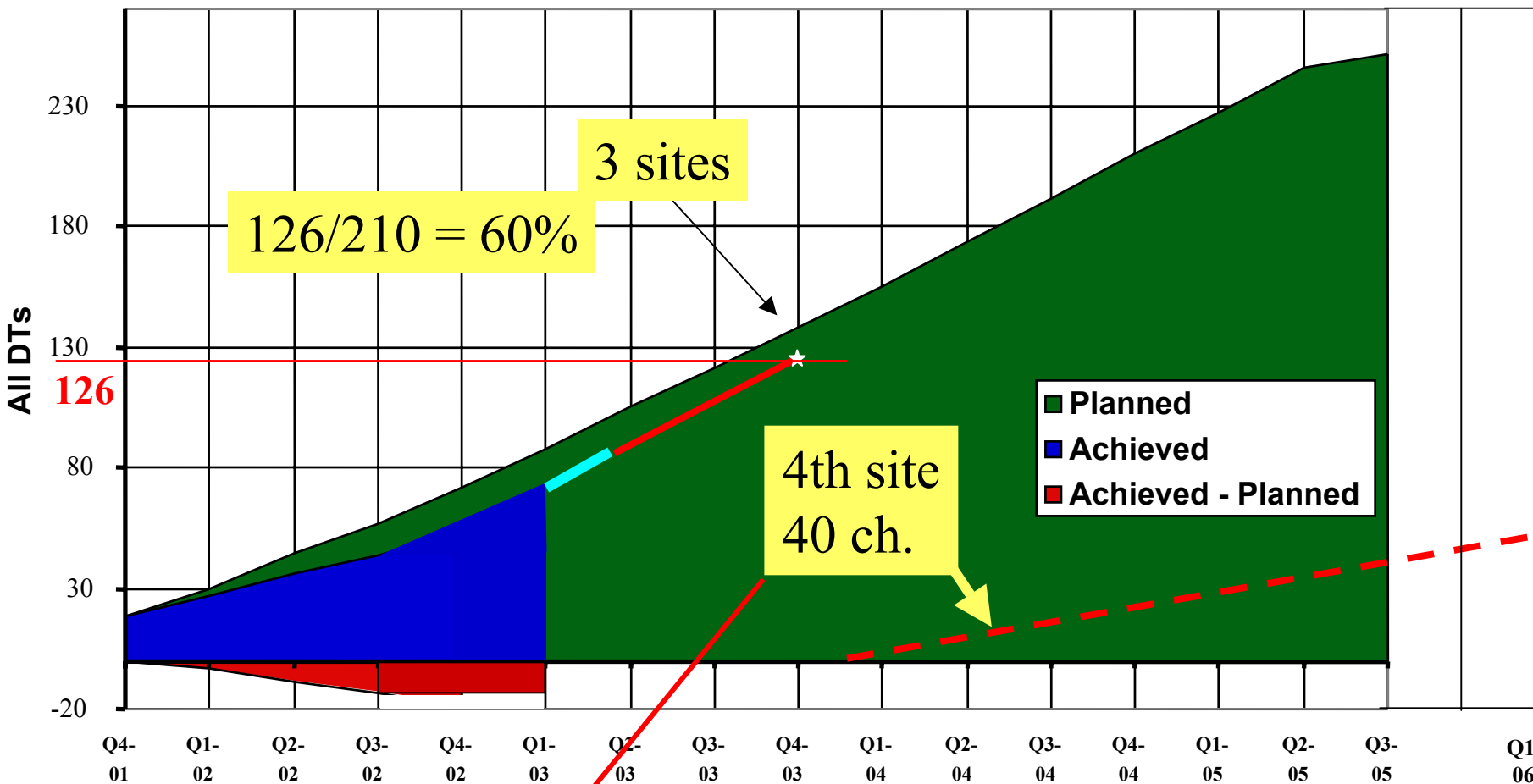
Nominal Rate 18 ch. = 54 SL/year/site



I-Beams from Protvino Al.Plates from Dubna
HVBoards,HV Cables,help at CRN and Legnaro from IHEP Beijing

DT Chamber Production (18DT/site/year)

SLs for 126 chambers will be available at end 2003



Torino: needs two assembly tables for MB4. Table 1 will be completed before Xmas, with the delivery of the first of the two I-Beams gluing tools.

Integral of produced chambers /quarter.

Only the SLs are completed at the Ass. Sites:connections between SL, that include gas and cooling pipes,HV,DCS and some signal cables (⊖ cables),cables fixation and protection covers are installed at CERN ISR.

ISR Work Update (16 November 2003)

-

Type	@ISR	HV Φ	HV \ominus	\ominus Cables
MB1	26	19	0	0
MB4/9-11	2	0	0	0
> MB2	28	19	9	4
MB4/10	6	0	0	0
> MB3	25	25	9	2
Total	87	63	18	6

today 100

In red chambers for 1st installation period (YB+2,YB+1)

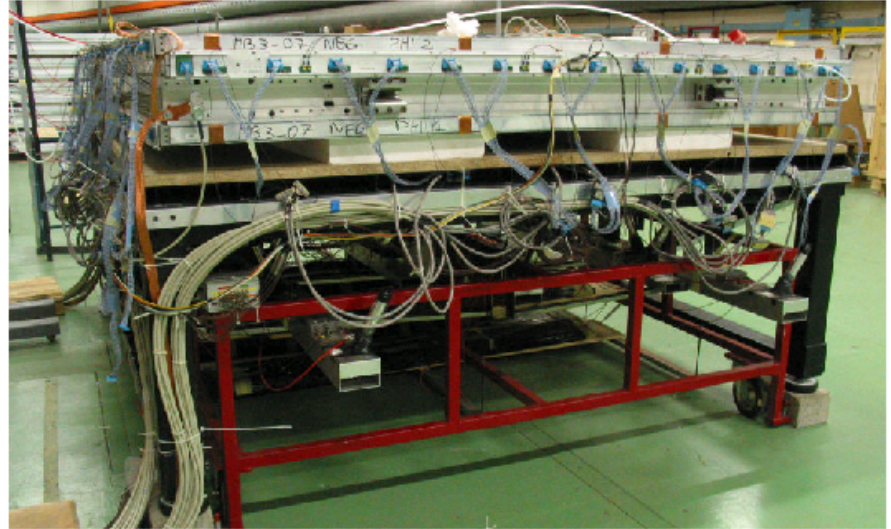
Chamber reception at ISR



Chambers dressed



Chamber Certification



MB3 installed in YB0 -5

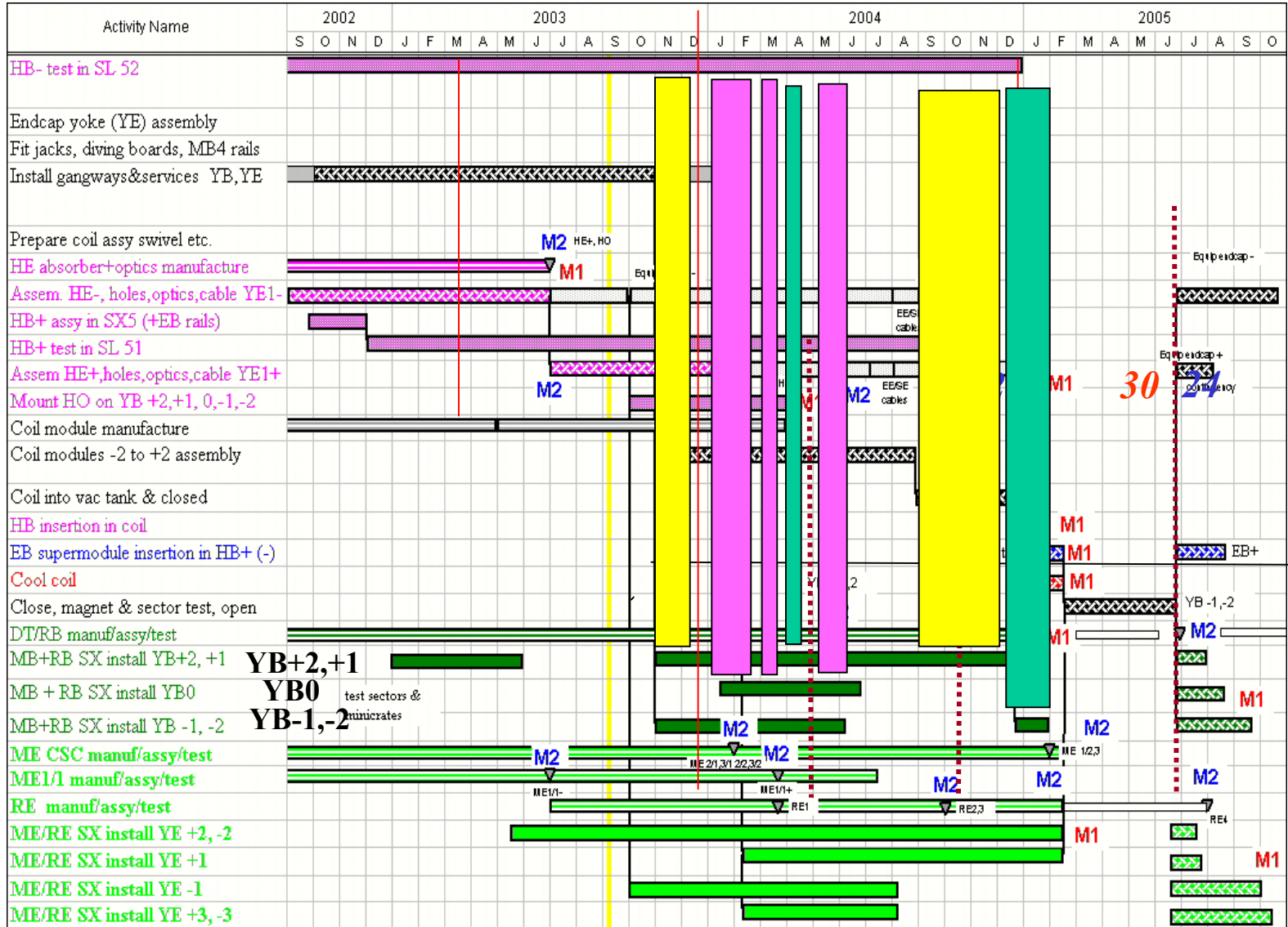
MB1 installed in YB0 -5

The chambers were removed and taken back to ISR.
Removing the chamber is as difficult and long as the installation.

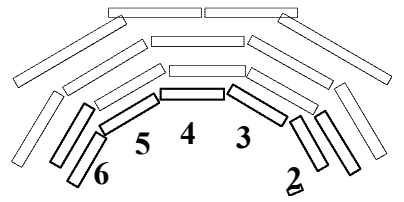
Installation tests



v33.2: Surface assembly



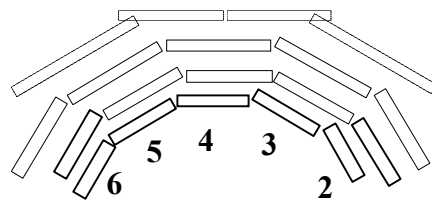
~ 24 ch



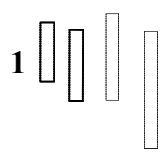
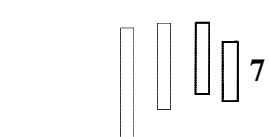
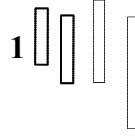
YB+1,+2
2003

5 to 8 ch/week

~ 23 ch



YB0
jan,feb 04¹



Torino
MB 4

TAKES INTO ACCOUNT
DELAY OF MB1SUPPORTS

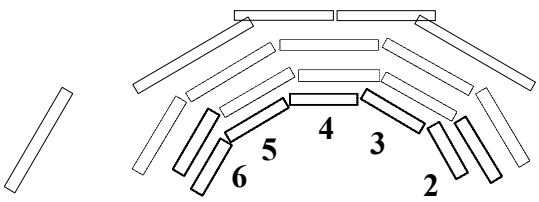
132 DT/RPC packs
installed by end 2004

Delayed of
two months

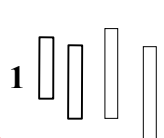
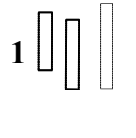
YB -1,-2
in 2005
< 64 ch.

YB-1

YB-2



YB 0,+1,+2
mar.apr 04¹



~24 ch

2 Mb1 in YB-1

YB0 first
(may/june)
(then +1,+2
In fall 04)

~21 ch

>42 ch*

*+ 4 MB4 sectors 8,9 of YB-1 and -2 that should be completed before the Mag.Test

ELECTRONICS:

**Read-out (TDC) and Trigger electronics are located on the chambers
Housed on special removable crates (MINICRATES) inserted in
the Honeycomb plates.**

**First complete MINICRATE (680 chanel. = 5 read out boards +5 Trg.Boards)
was tested in the 25 nsec Bunched Beam at CERN in May 2003)
(ESR in November 4th)**

**Production of Minicrates shared between CIEMAT (Read-Out) and
Padova/Legnaro (Trigger and full test)**

Assembly of complete Minicrates is starting this week in Legnaro

First chambers will be installed without Minicrates.

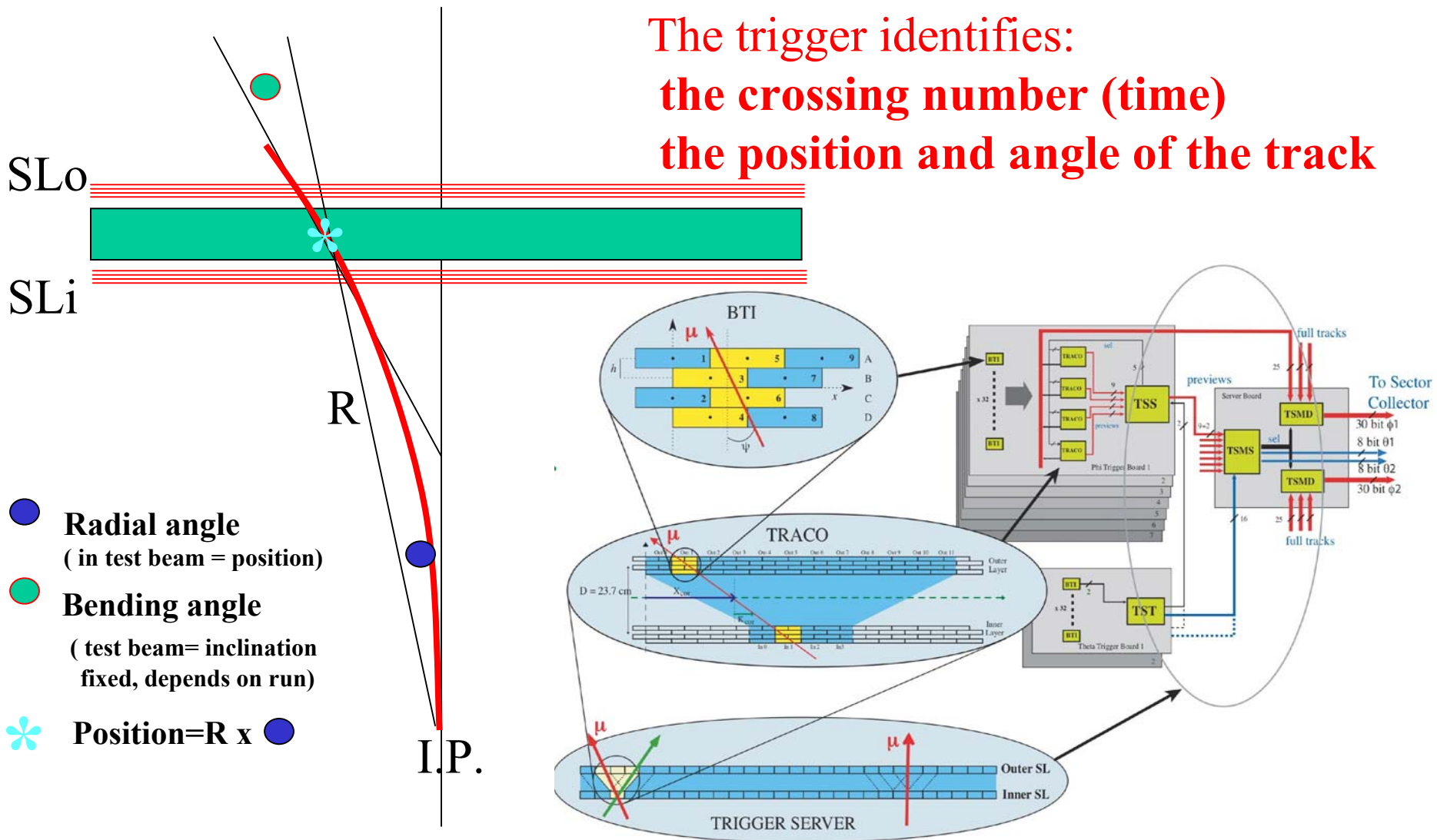
Irradiation tests

**Final Trigger Boards and Control Board submitted to irradiation
(60 MeV protons at PSI) in November 25 and 25/03**

~ 80 LHC years equivalent:

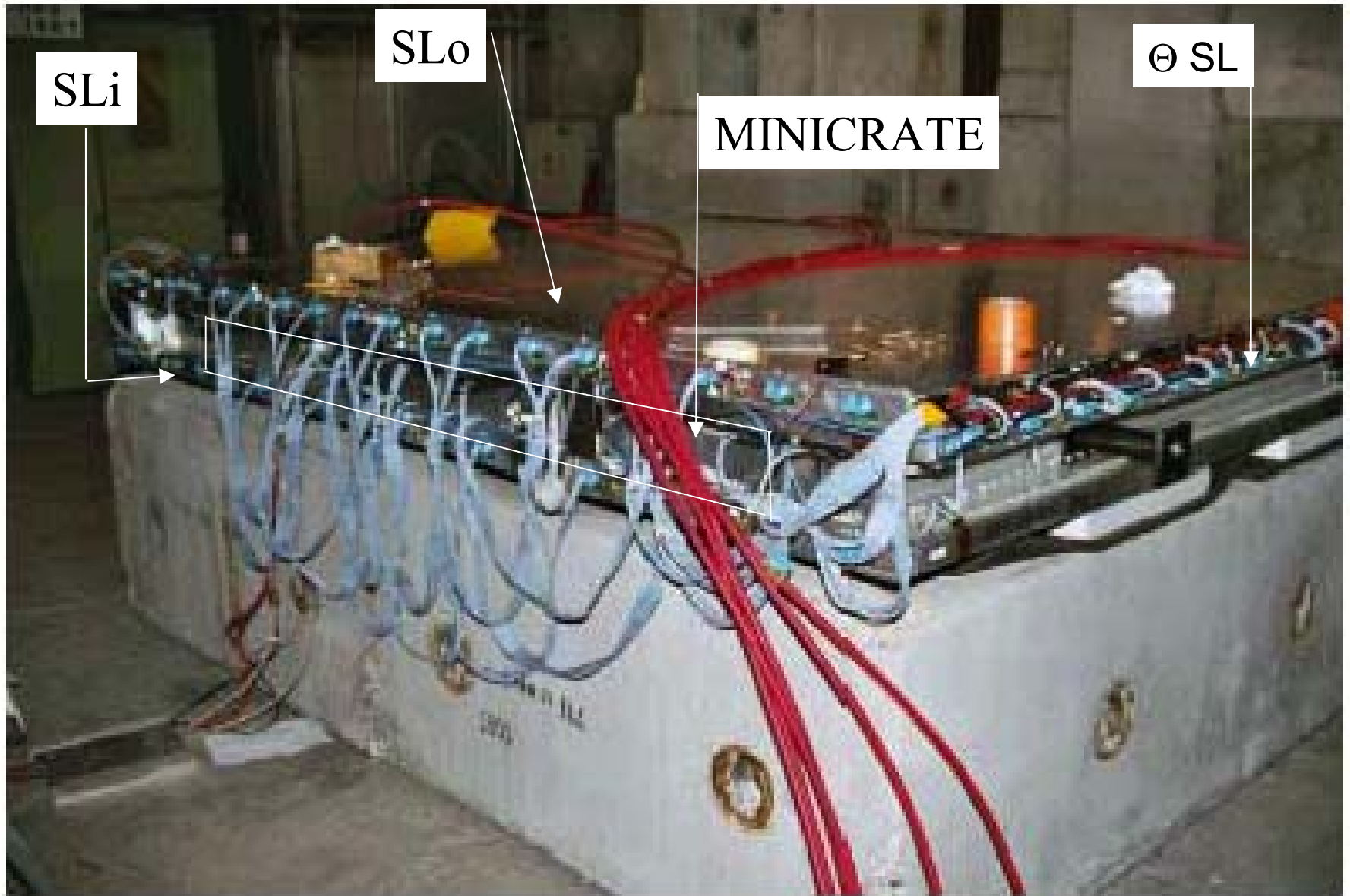
satisfactory results,waiting the boards back for a complete analysis.

The trigger identifies:
the crossing number (time)
the position and angle of the track

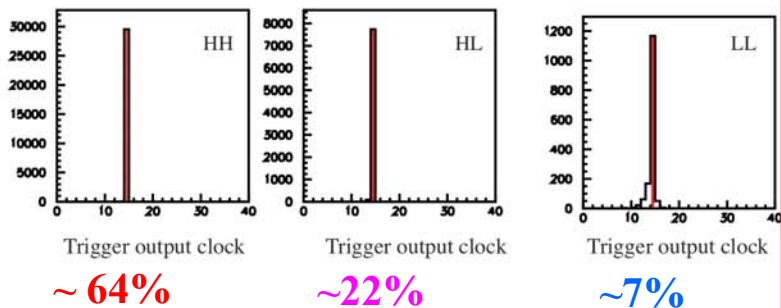


BTI works at SLayer level, requires at least three hits/4
TRACO and TSS require at least a BTI in one of the two SL
in the CMS bending plane (PHI)

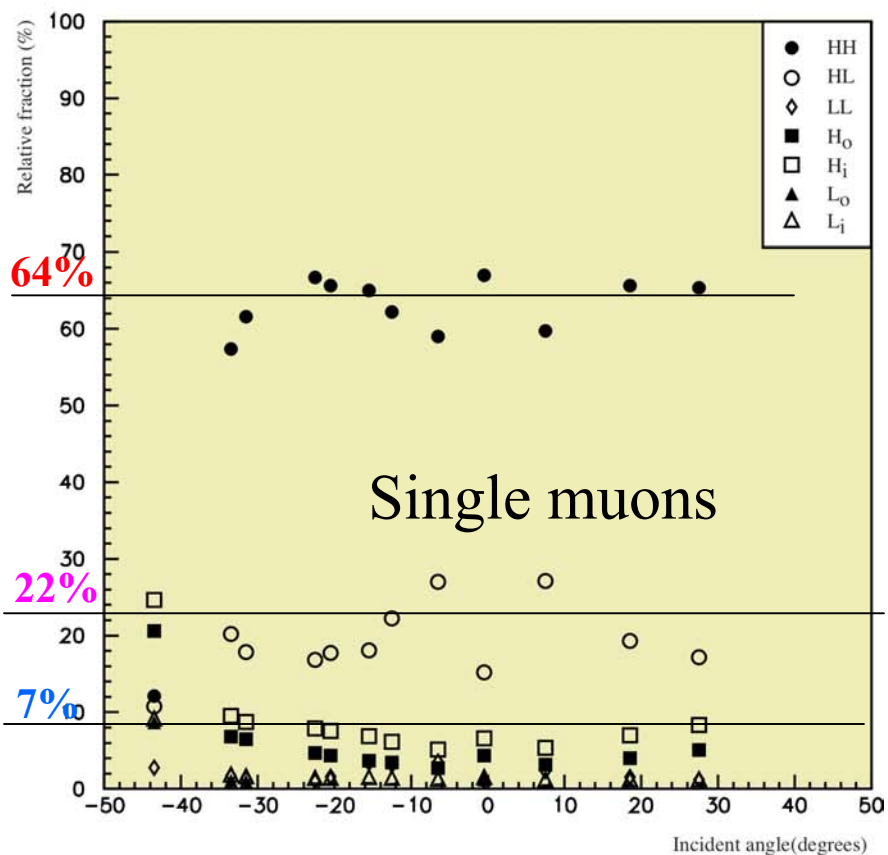
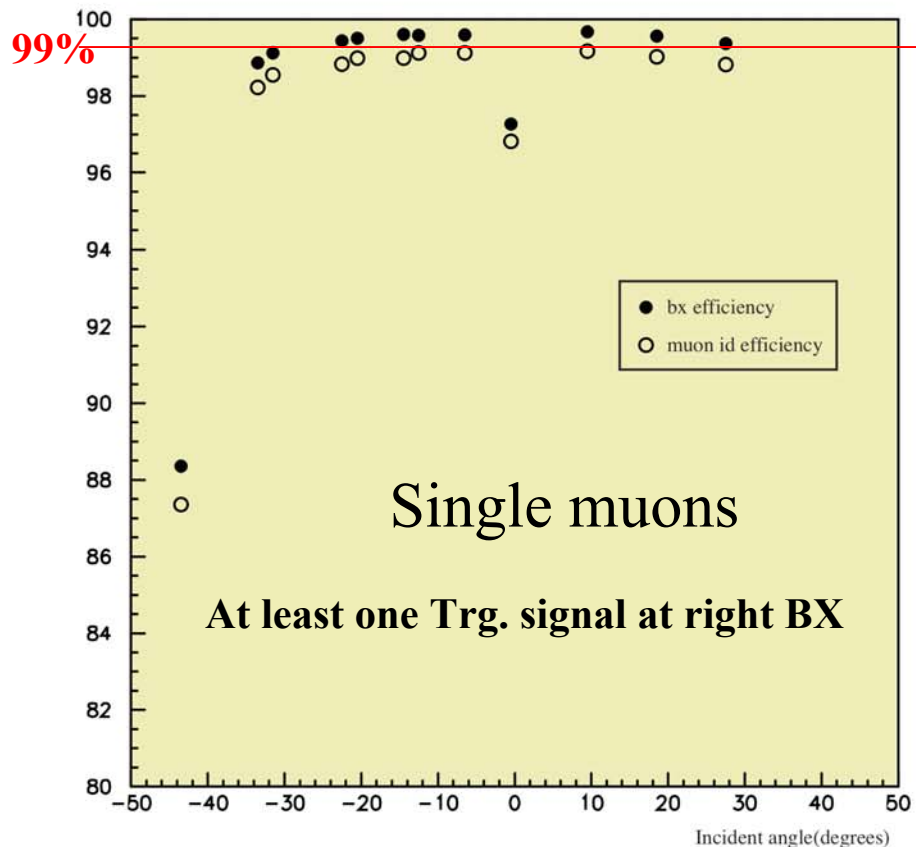
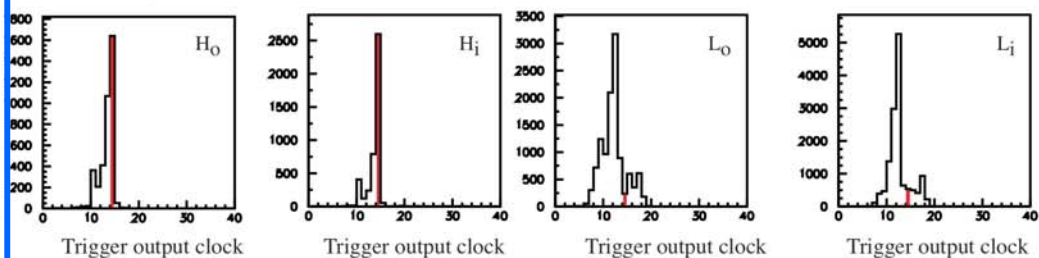
TDC and Trigger boards are housed in Minicrates (up to 2m long, 10 cm high, 5 cm deep) inserted in the honeycomb plate of each chamber



Two SLayers

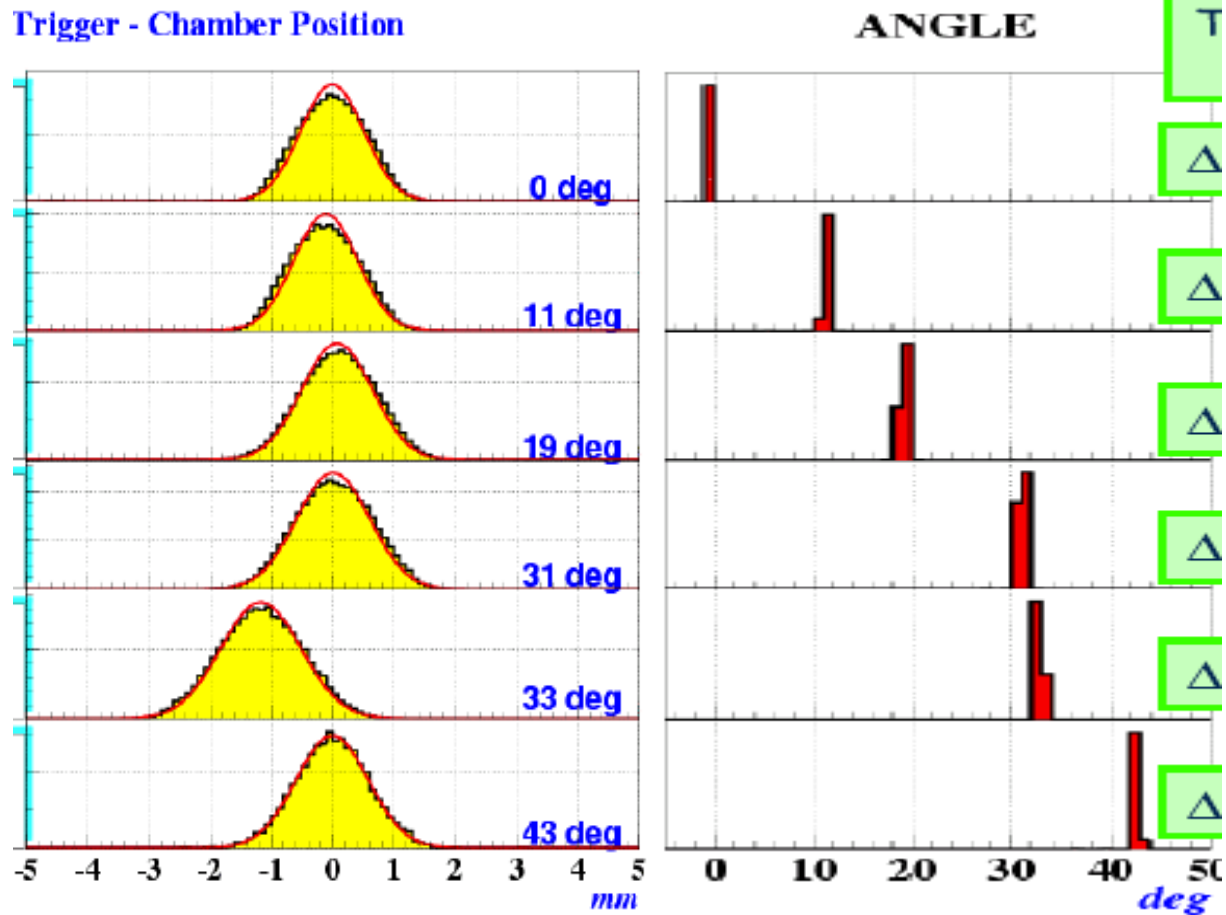


One SLayer



NOTE: this is the performance of ONE Station/4

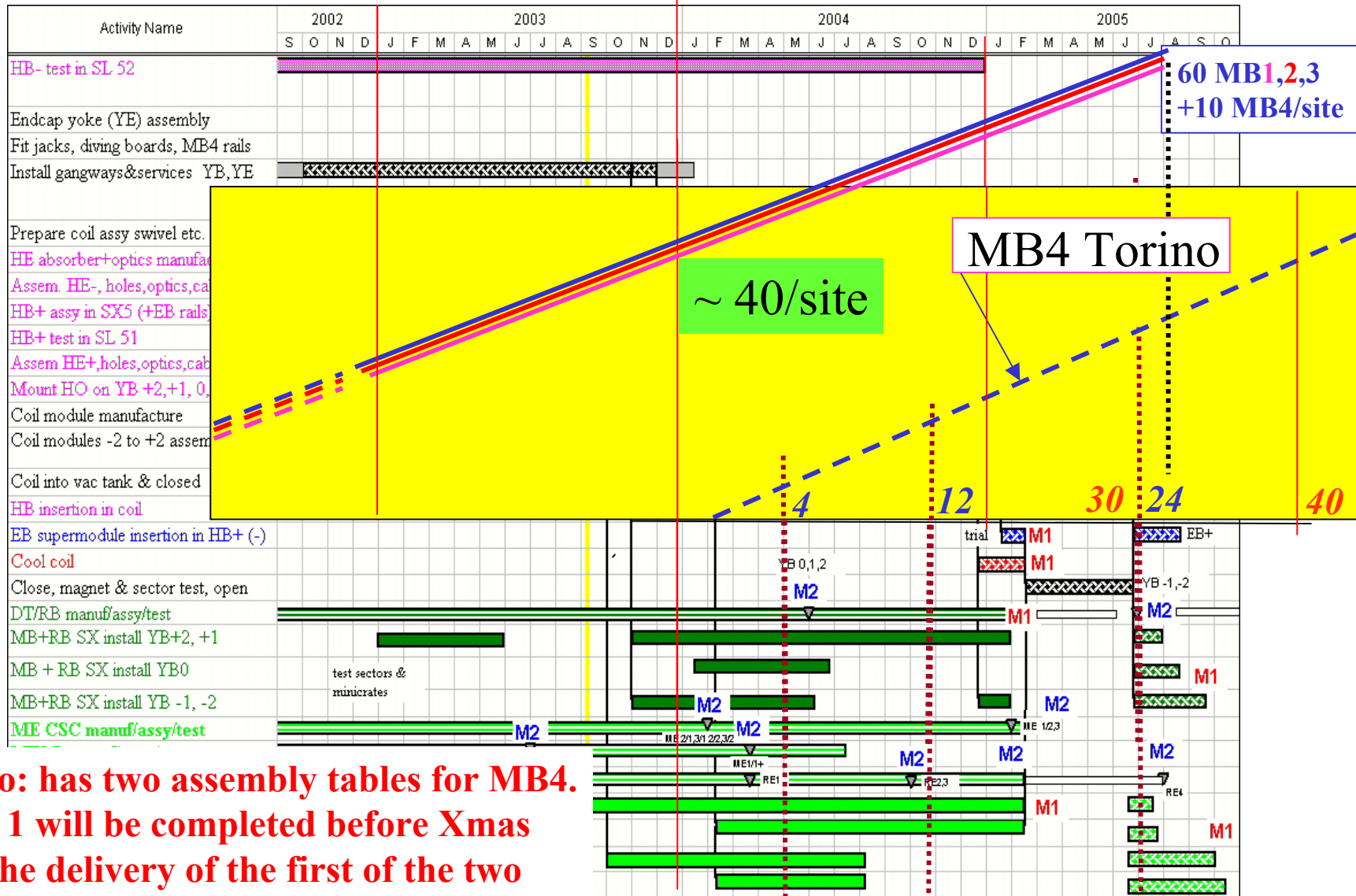
Two Slayer Triggers space resolution



0.4~0.6 mm

5~7 mrad

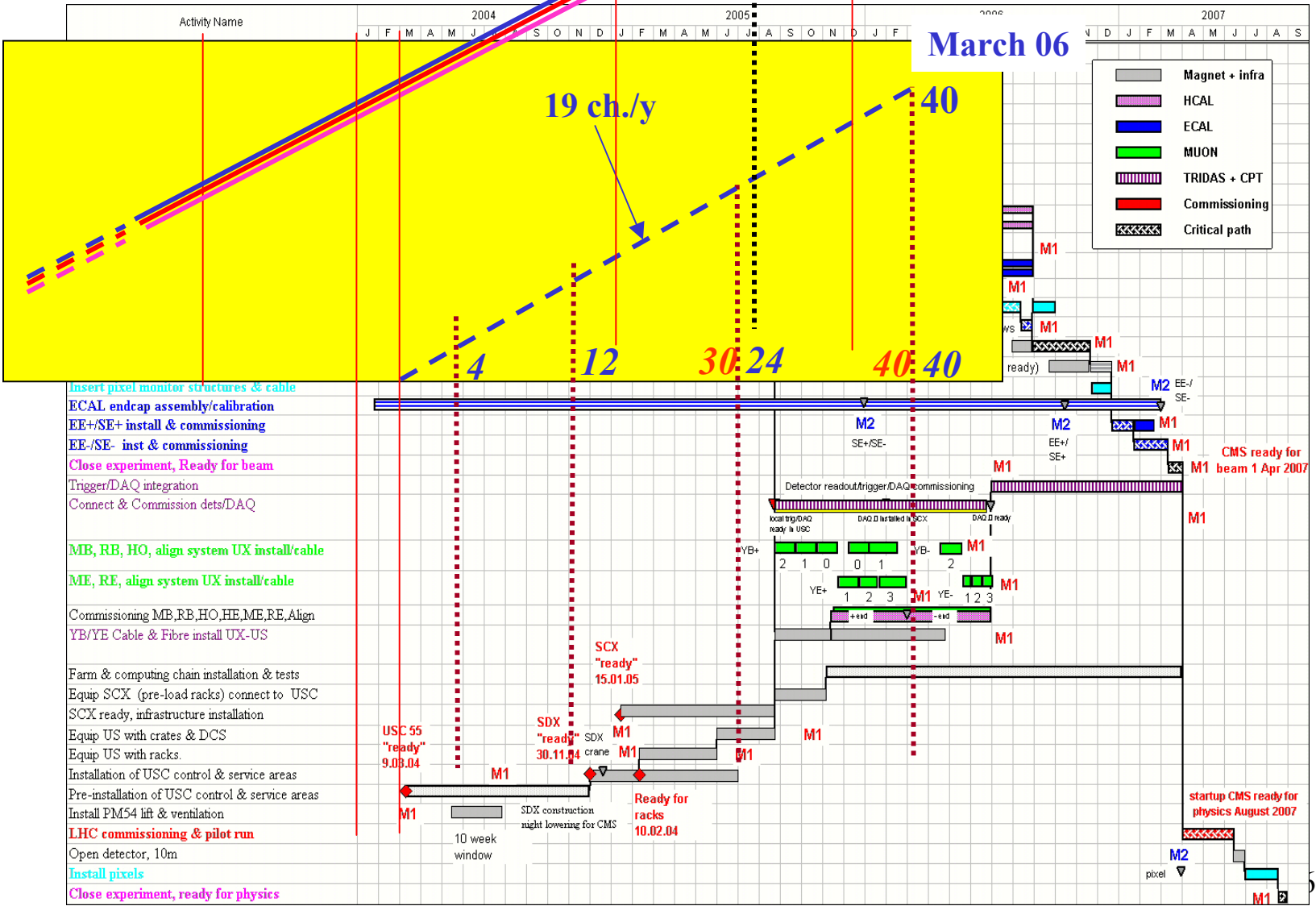
DT Chambers availability versus v33.2: Surface assembly



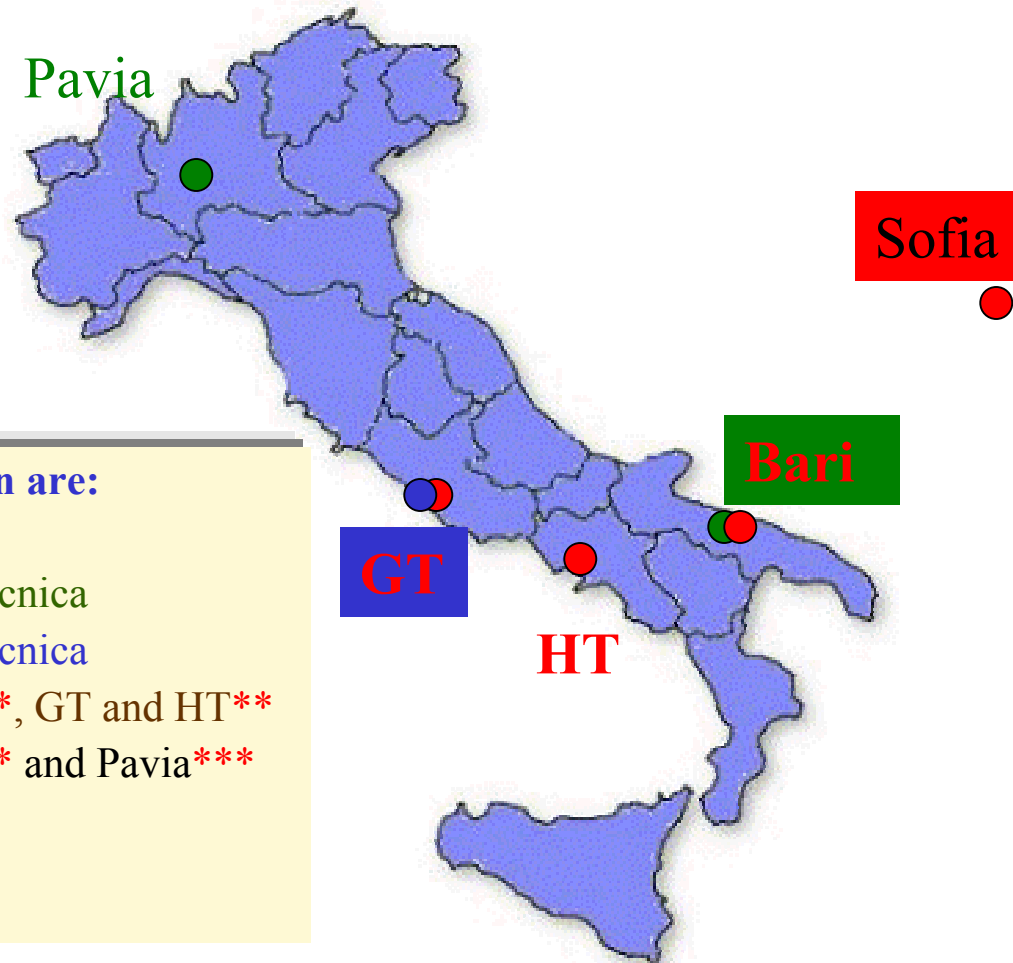
Torino: has two assembly tables for MB4. Table 1 will be completed before Xmas with the delivery of the first of the two I-Beams gluing tools.

DT chamber availability versus v33.2: underground assembly

60 MB1,2,3+10 MB4/site Aug.05



Barrel RPC production



The sites involved in the RPC construction are:

- **gap production** → General Tecnica
- **double-gap prod** → General Tecnica
- **chamber assembling** → Bari, Sofia*, GT and HT**
- **chamber test** → Bari, Sofia* and Pavia***

* from the 2004

** from june 2003

*** from june 2003



Barrel chamber production status

Chamber for first installation period (MB2 and MB3 only) are available at CERN ISR

	Needed	Built	Tested	To build
RB1	48	32	8	16
RB2	48	48	45	0
RB3	48	48	46	0
RB4	42	0	0	42

HT and Pavia in operation

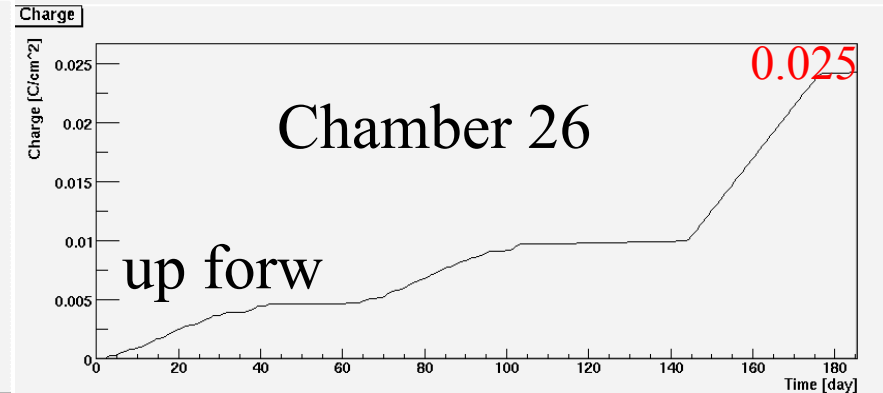
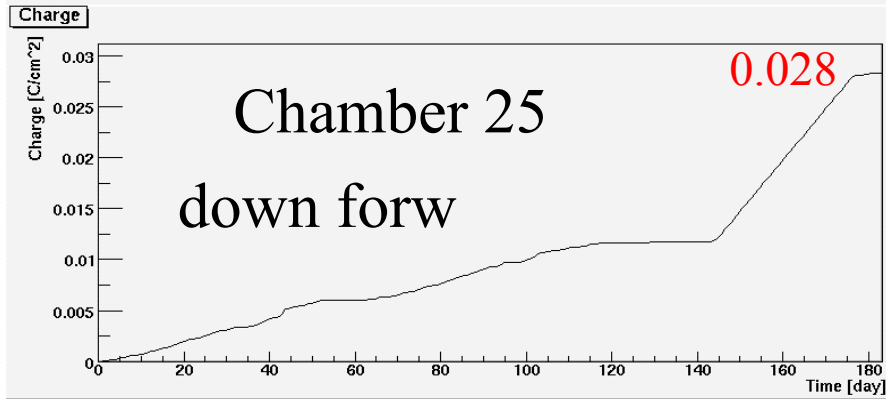


AGING TEST AT CERN GIF

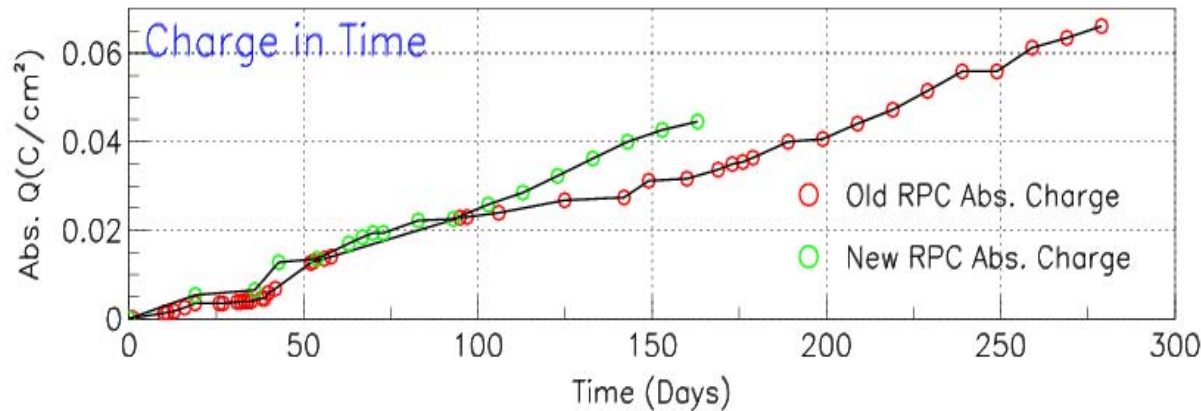
Integrated charge

The total expected charge in 10 CMS years is $5 \cdot 10^{-2} \text{C/cm}^2$

Accumulated charge by the two RB1



Accumulated charge by small gaps



Old gaps :

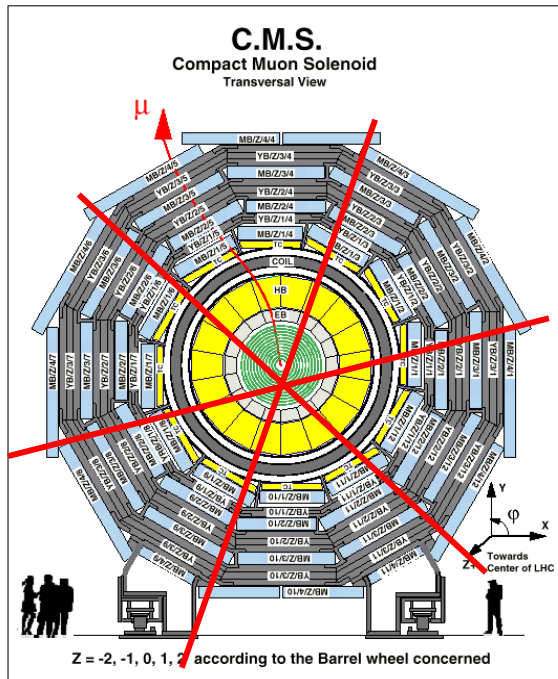
> 10 years LHC equivalent reached in the OLD gaps

New gaps:

~ 10 year LHC equivalent

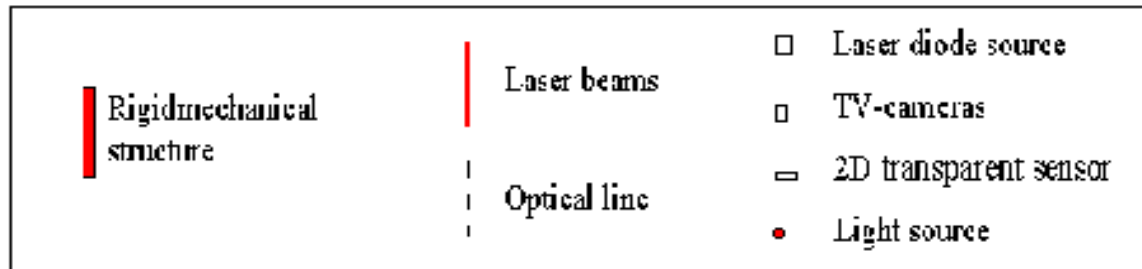
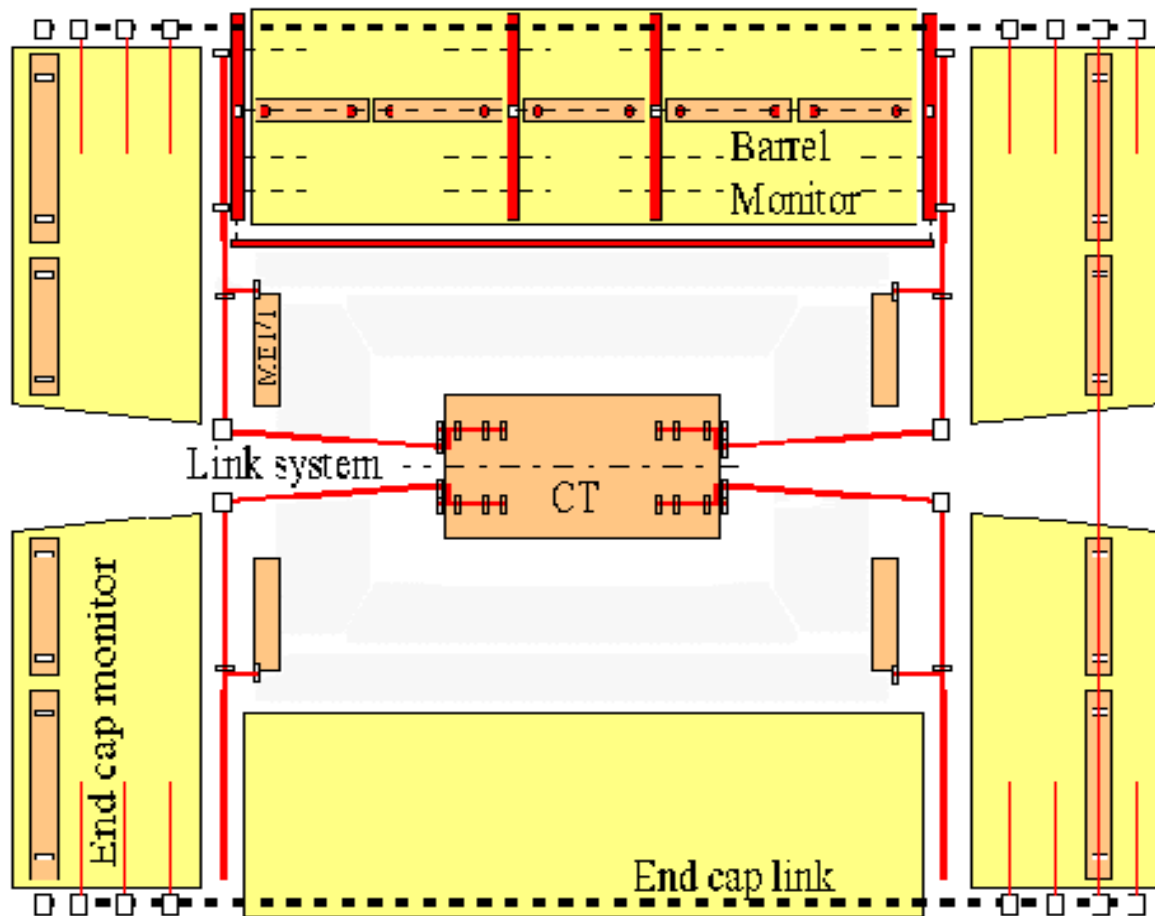
Test of closed gas loop started in November

The CMS Alignment System

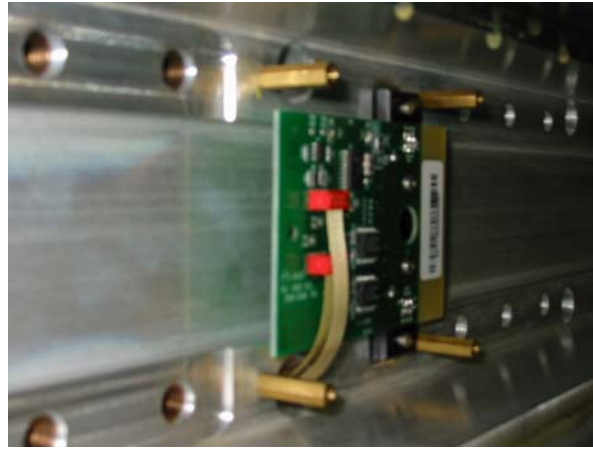


3 alignment planes

And the DT chambers
Alignment Bench at ISR



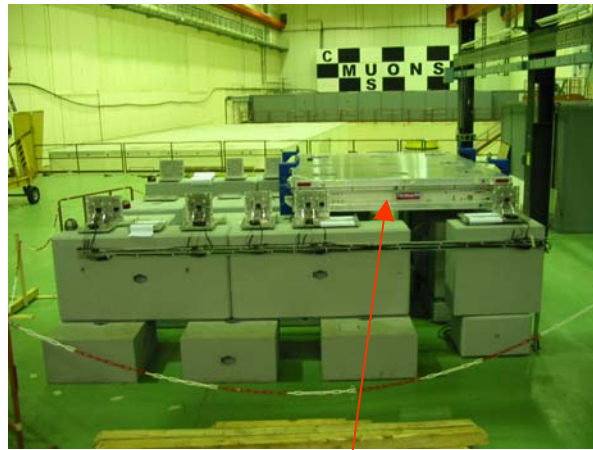
ALIGNMENT: Chamber calibration at CERN-ISR lab



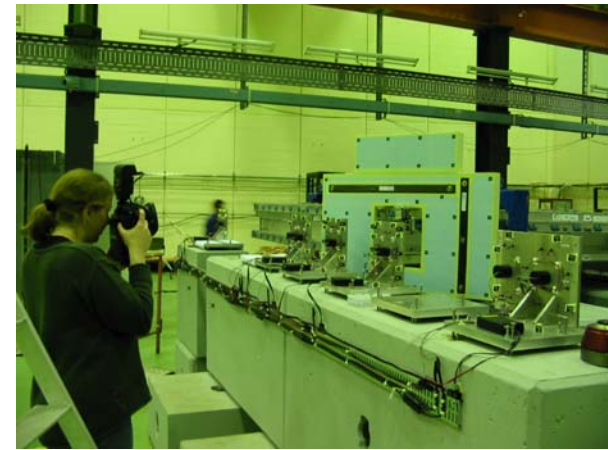
Installation on the chamber: fork, cabling, cover



Positioning of the chamber on the bench



Chamber on the bench (MB1)



Photogrammetry+camera measurement

Total quantity to be calibrated:
269 (250 in CMS, 19 spare)

Total calibrated : 66

ALIGNMENT: MAB production status

Manufacturer: IMMIG*/HELCO (Greece)

Sample

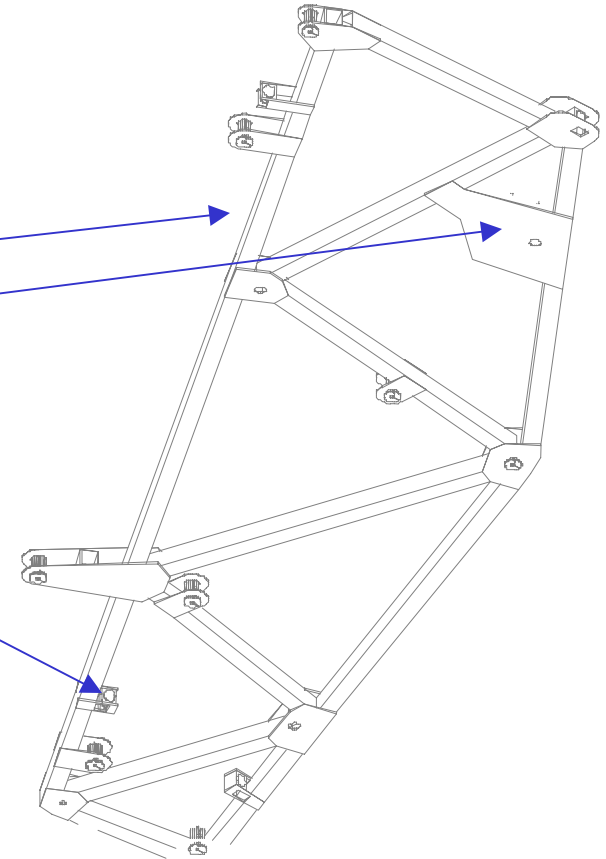
tubes,
plates,
diagonal camera boxes

have been made and of good quality,
good glue is found.

The bonding table flatness has been
measured by the CERN survey group.

Detailed report:

<https://edms.cern.ch/comment/413238/1>).

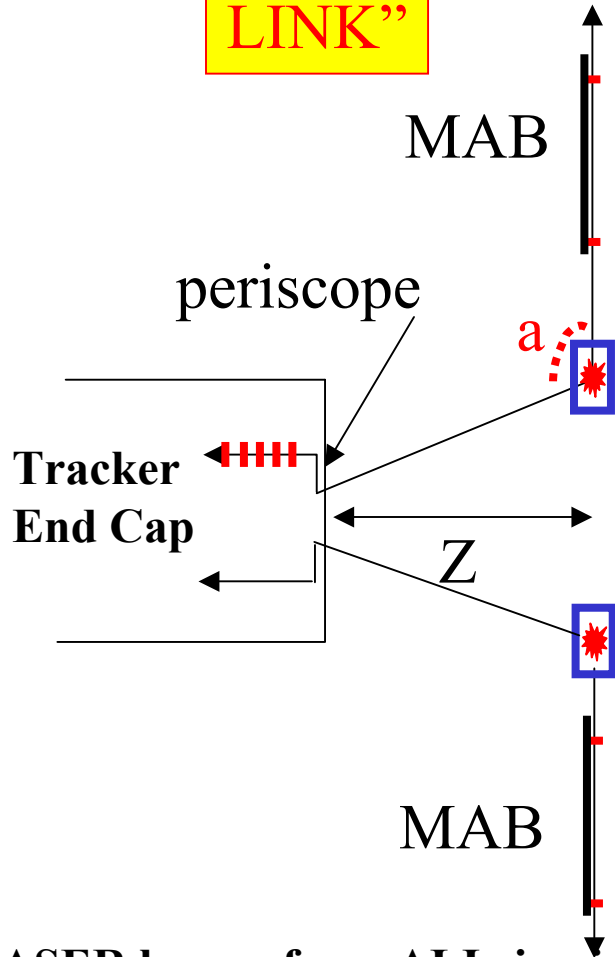


First MAB is expected soon.

LINK SYSTEM

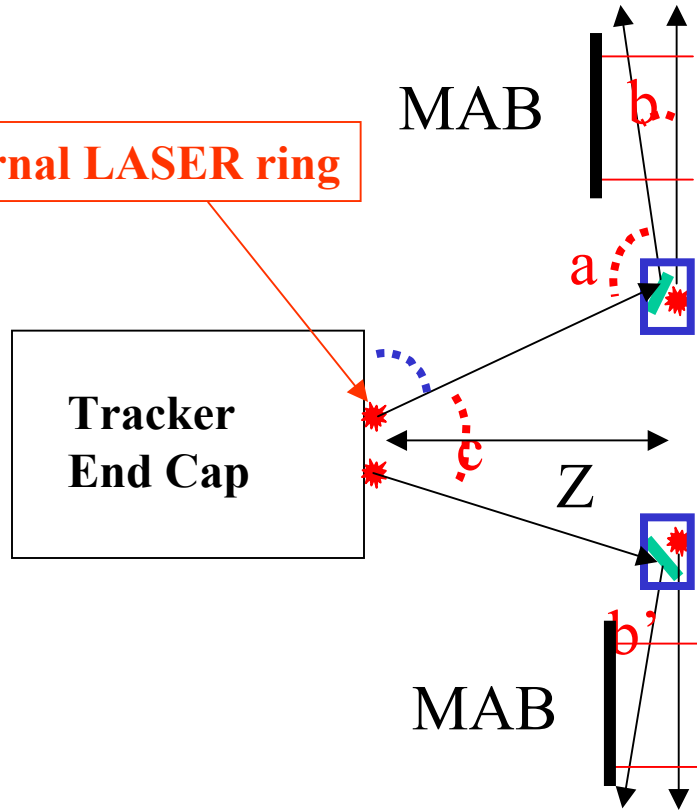
“OLD LINK”

“NEW LINK”

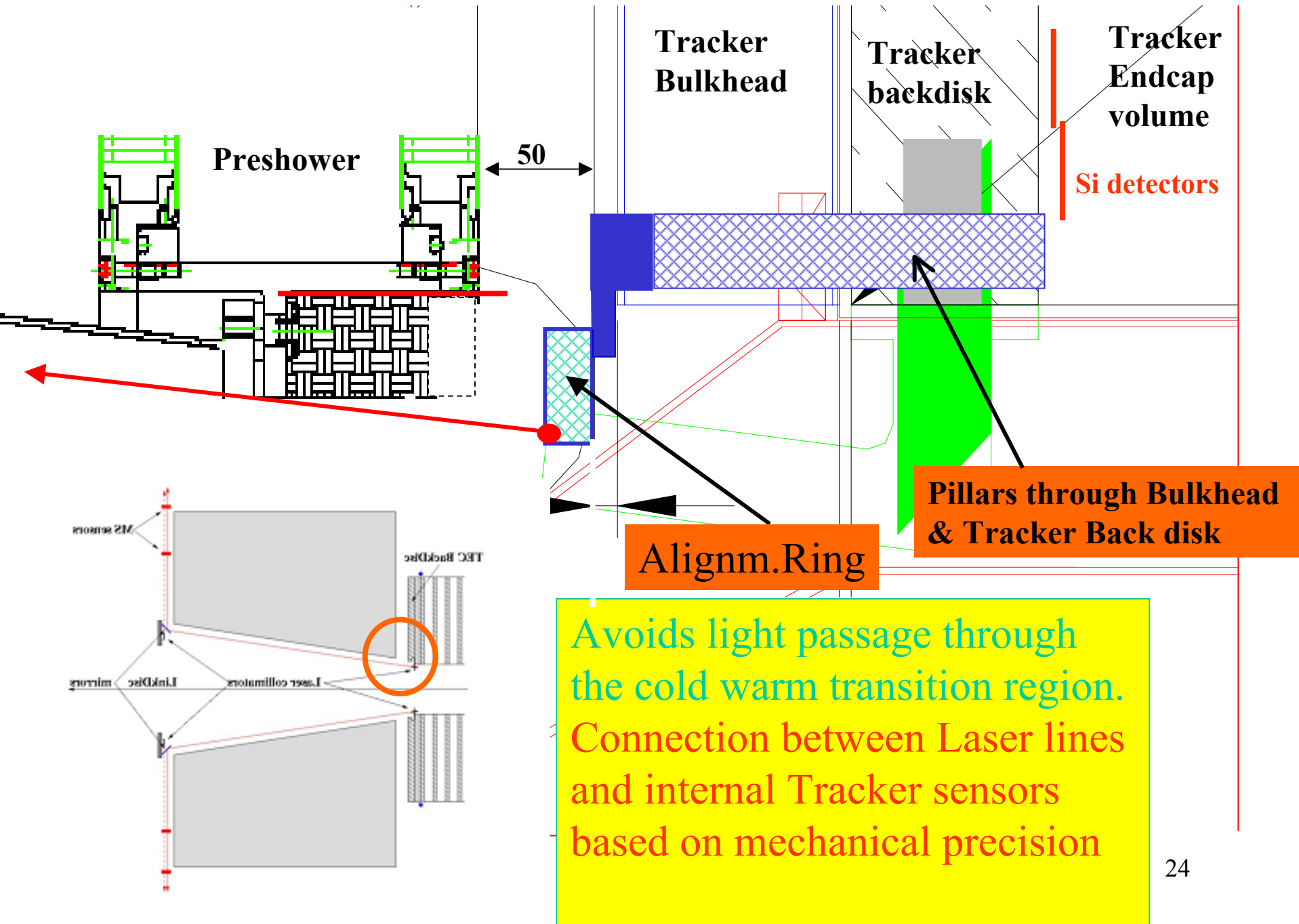


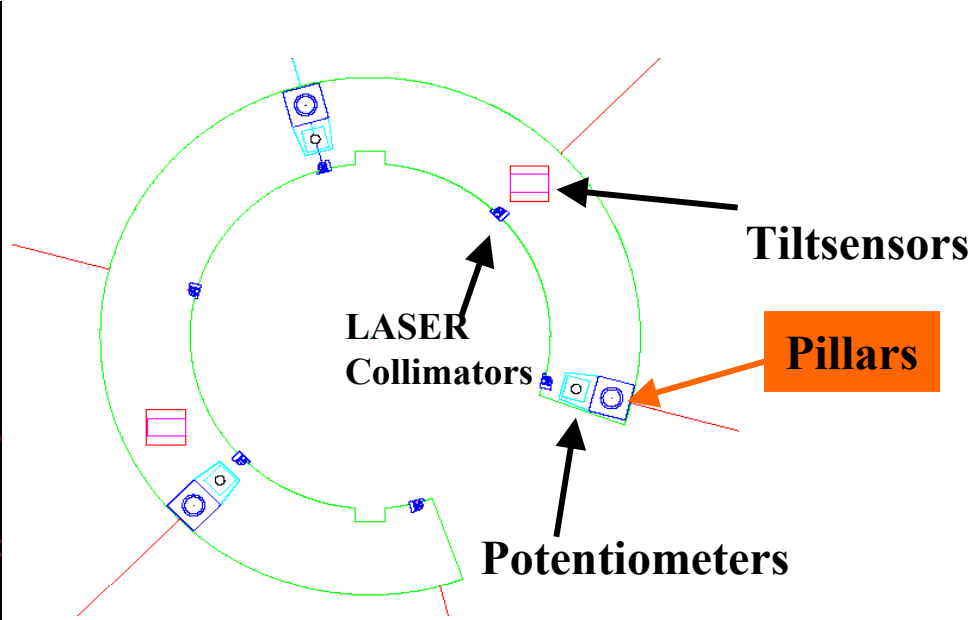
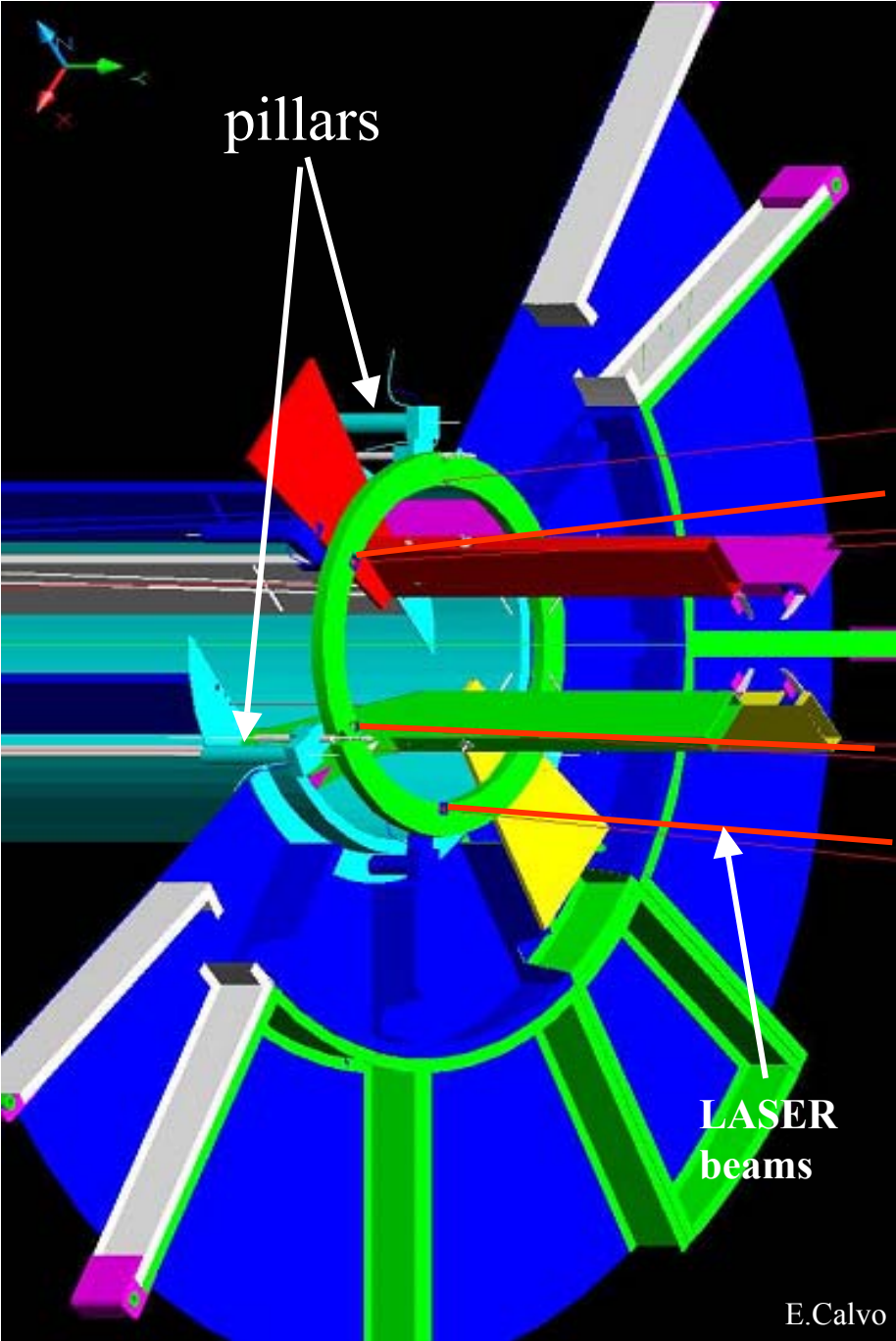
LASER beams from ALI ring in the Endcap measured inside the Tracker

External LASER ring



LASER beams from the Tracker reflected by the ALI Ring in the Endcap and measured in the MABs





Horse shoe shaped ring for easy removal

Workshop in Nov.03:
The design looks viable
Integration is feasible
No “show stoppers”
Several aspects to be worked out
EDR spring 04