DT in Magnet-Test&Cosmics-Challenge (MTCC)

(Aachen, Bologna, Madrid, Padova, Torino, Vienna)

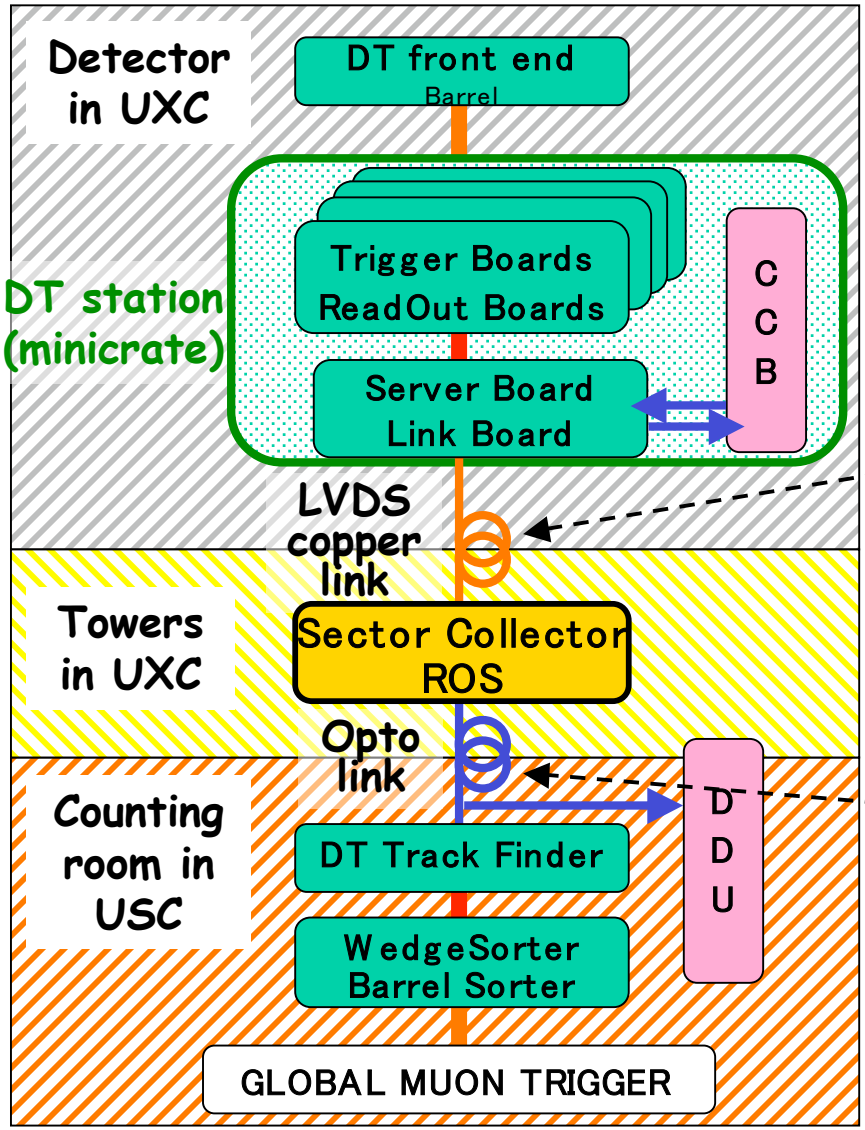
Report prepared by Marco Dallavalle, presented by Carlos Willmott

- four DT workshops:

focus and monitor the work in preparation of Cosmics Challenge and Magnet Test:

Bologna, Jan 24
Padova, Apr 4
Bologna, May 27
Padova, Sep 9

- next in Oct (28th in Madrid)



LVDS links:

- 4 Ethernet cables/minicrate FTP cat.6
- TX rate @ 480 Mbps (< 50 m), with *National Semicond.* chipset:
  - a) serializer 10-1 DS92LV1021 (8 IC/link)
  - b) cable equalizer CLC014 (8 IC/link)
  - c) deserial. 1-10 DS92LV1212A (8 IC/link)

Opto links:

- 6 multimodal fibers (*Ericsson*)/SC (< 100 m)
- TX rate @ 1.6 Gbps, with GOL serializer (32 bits @ 40 MHz), and Honeywell opto-ICs:
  - a) VCSEL trasmitter HFE4190-541
  - b) Pin Diode receiver HFD3180-102

4th DT Cosmics Challenge workshop

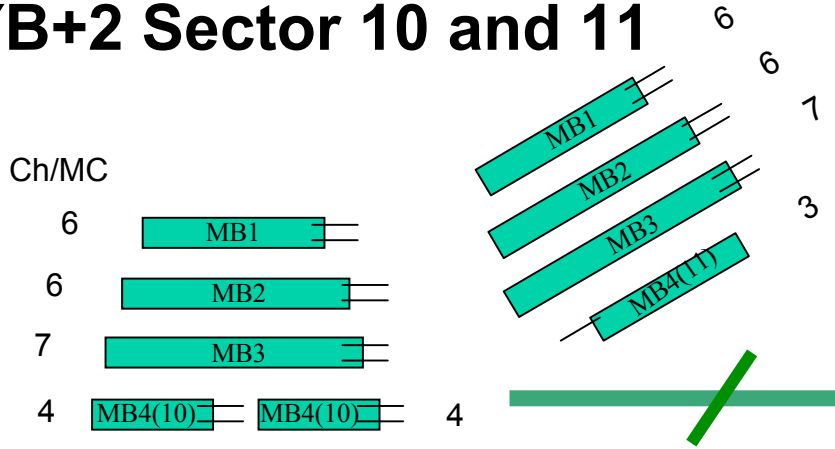
Date/Time: Friday 09 September 2005 from 10:00 to 17:00
Location: Dipartimento di Fisica, Universita' di Padova,
Room: viale-Marzolo-8, room S
Chairperson: Pierluigi Zotto, Marco Dallavalle
Material: more information

Friday 09 September 2005

10:00	**ROS** (15') (transparencies)	**Cristina Fernandez Bedoya**
10:30	**DDU** (20') (more information)	**Giulio DellaCasa**
10:50	**DAQ/DCS** (20') (transparencies)	**Sandro Ventura**
11:50	**SectColl** (20') (transparencies)	**Fabrizio Odorici**
12:10	**DTTF** (20') (transparencies)	**Janos Ero**
12:30	***lunch break*** (1h30')	
14:10	**WS, BS** (20') (more information)	**Luigi Guiducci**
14:30	**LTC** (30') (transparencies)	**Tim Christiansen**
15:00	**Muons for Tracker** (30') (more information)	**Michele Pioppi**
15:30	**Integration** (30')	**Marco DallaValle**
	• **planning at may27** (document) the schedule should be revised. More time allocated to integration tests	**all**
	• **cables & fibers: procurement, responsabilities, ...** (document)	**Enrico Conti**

YB+2 Sector 10 and 11

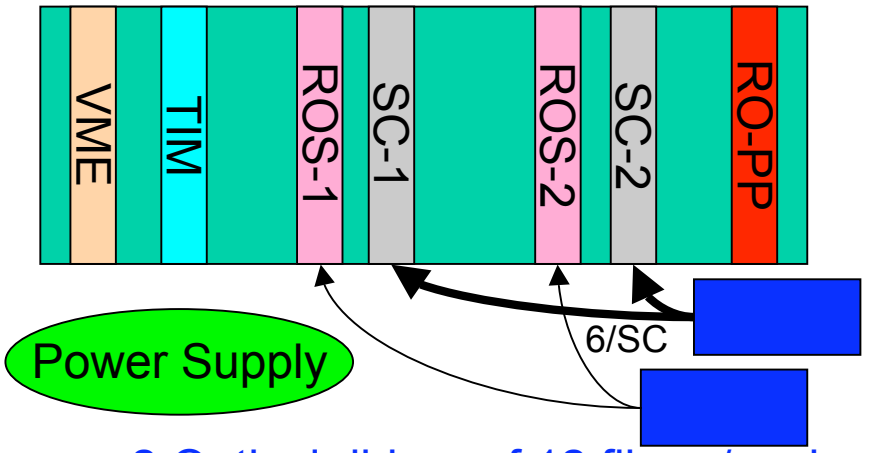
(Cristina F B /CIEMAT)



10 + 7 = 17 RO-FTP cables
(49 RO-channels)

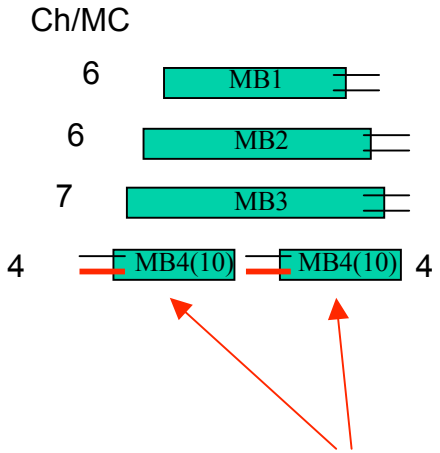
10 + 8 = 18 SC-FTP cables

Sector Collector Rack YB+2



2 Optical ribbon of 12 fibers/each
2 for RO + 12 for SC

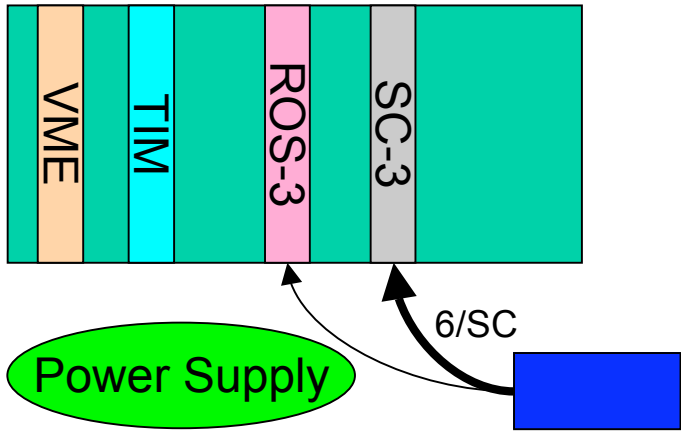
YB+1 Sector 10



10 RO-FTP cables
(27 RO-channels)

10 SC-FTP cables

Sector Collector Rack YB+1

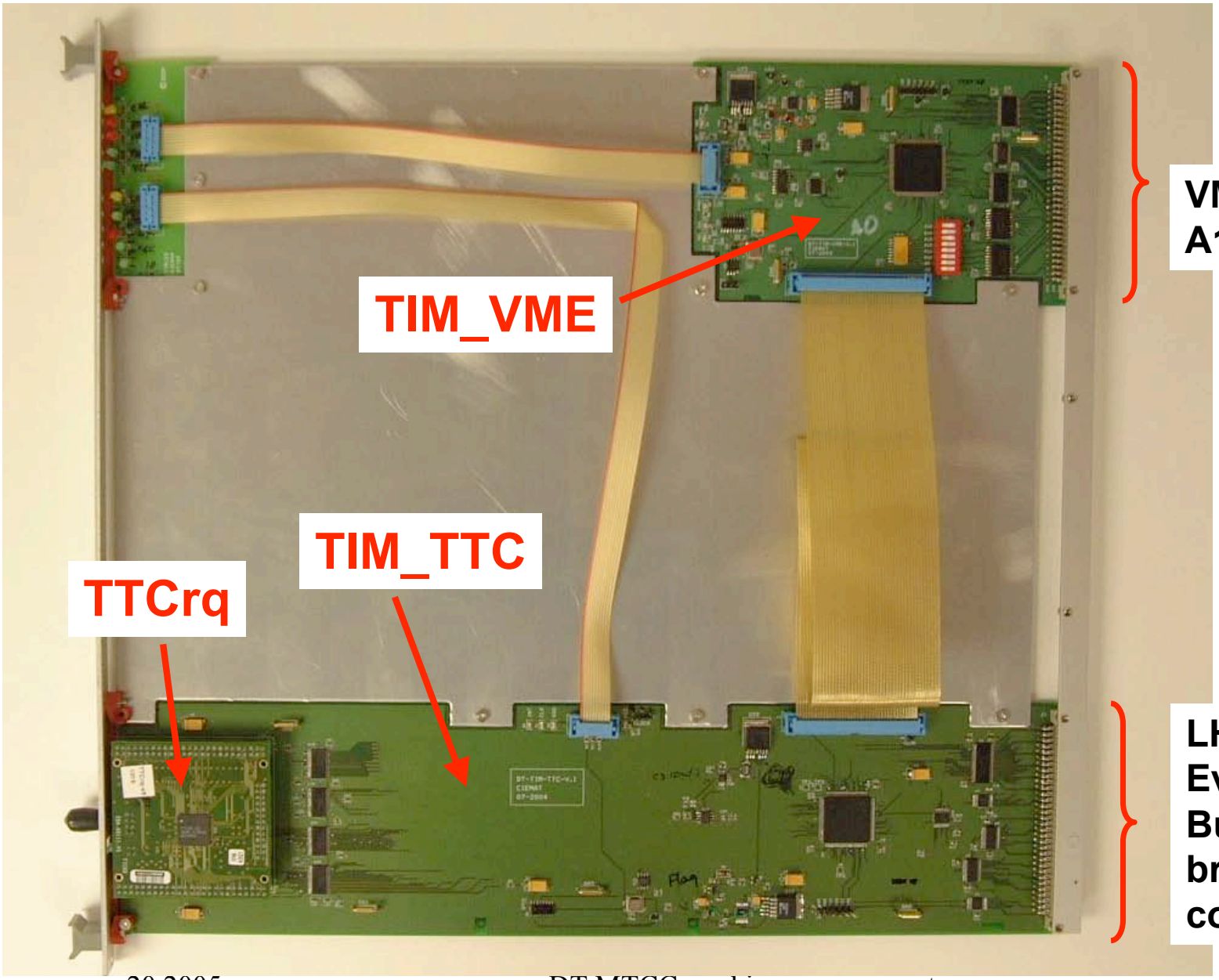


2 ROBs at MB4(10) CANNOT be read,
Which ones do you prefer?

Optical ribbon of 12 fibers
2 for RO + 6 for SC

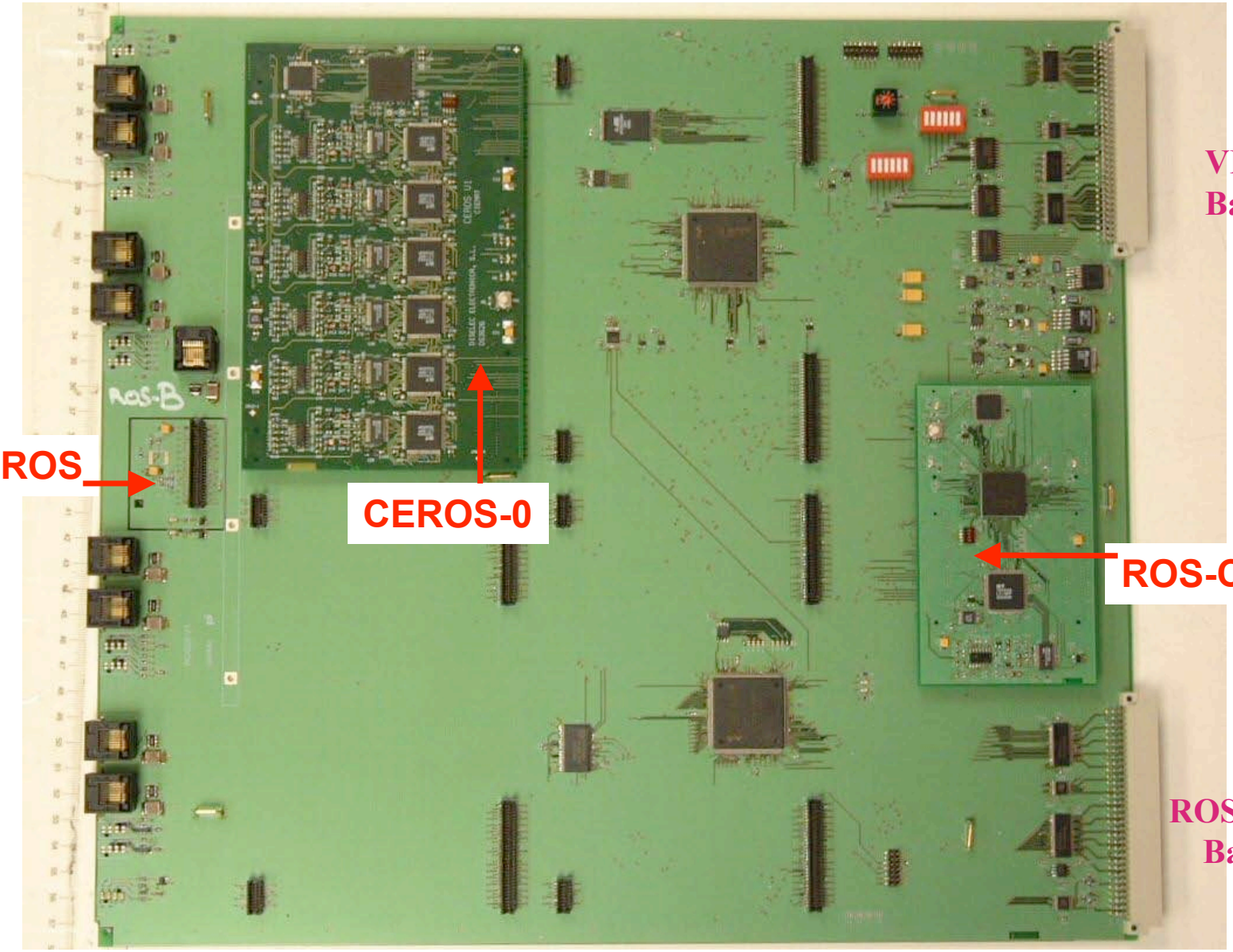
TIM board

(Cristina F B /CIEMAT)



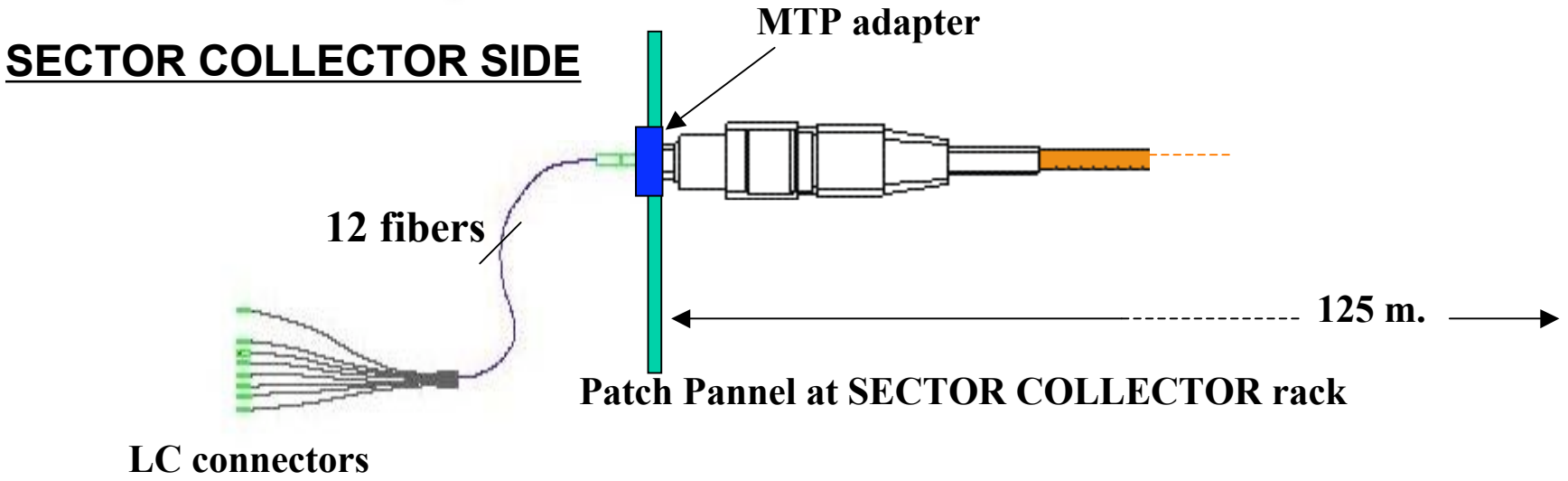
ROS-25 board

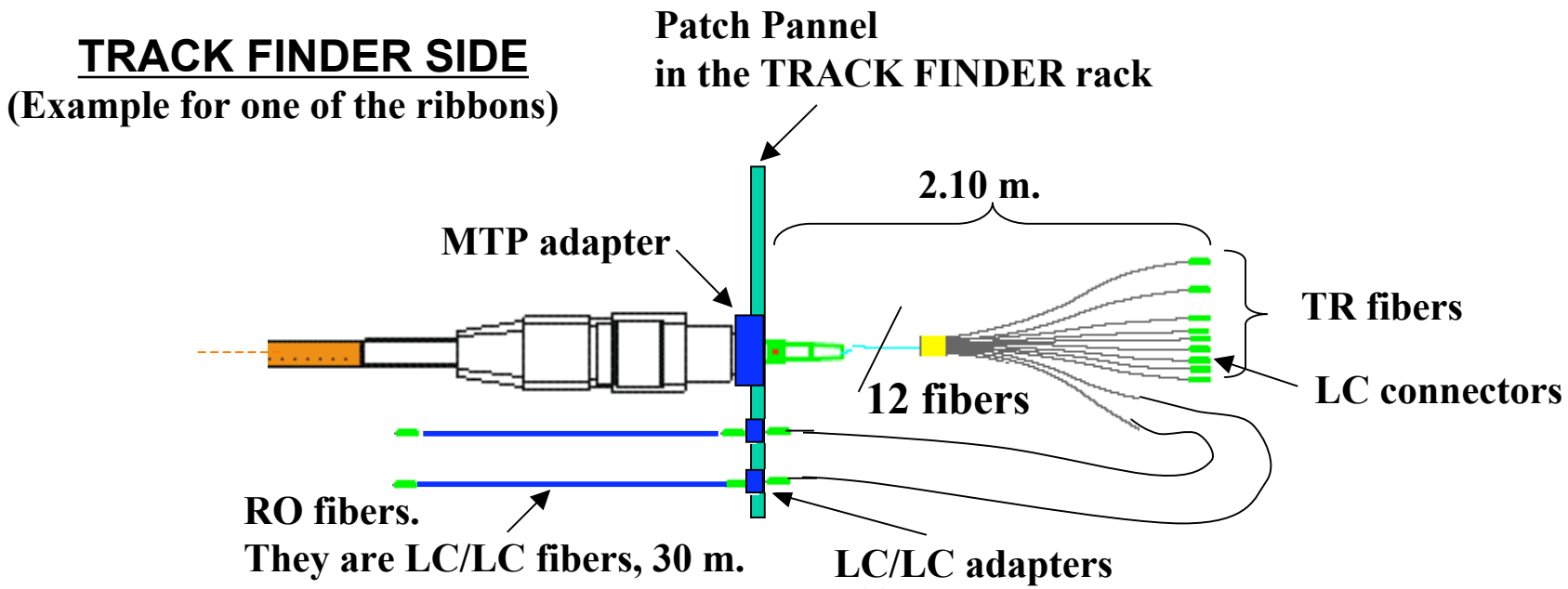
(Cristina F B /CIEMAT)



Optical Patch Panel

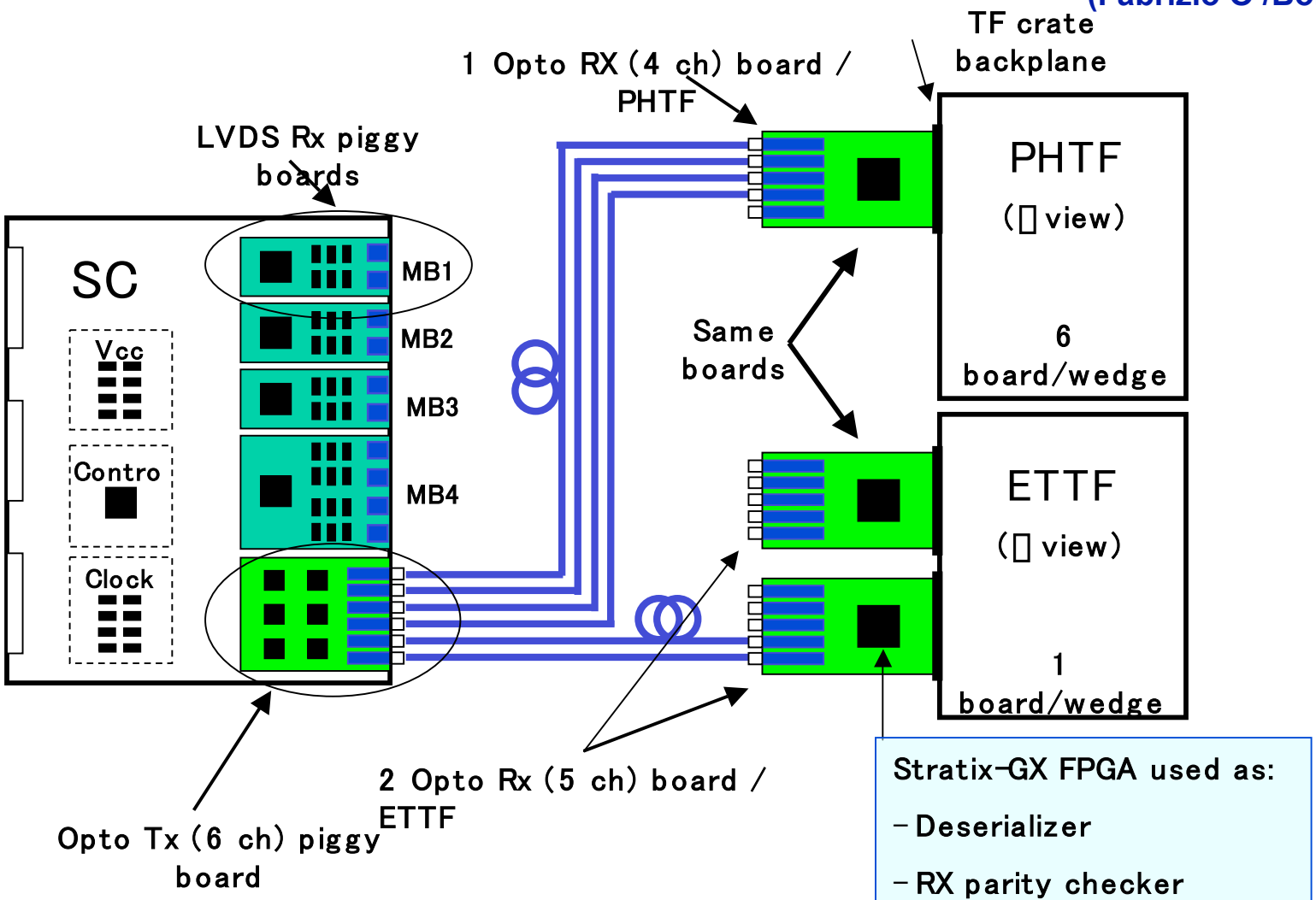
(Cristina F B /CIEMAT)





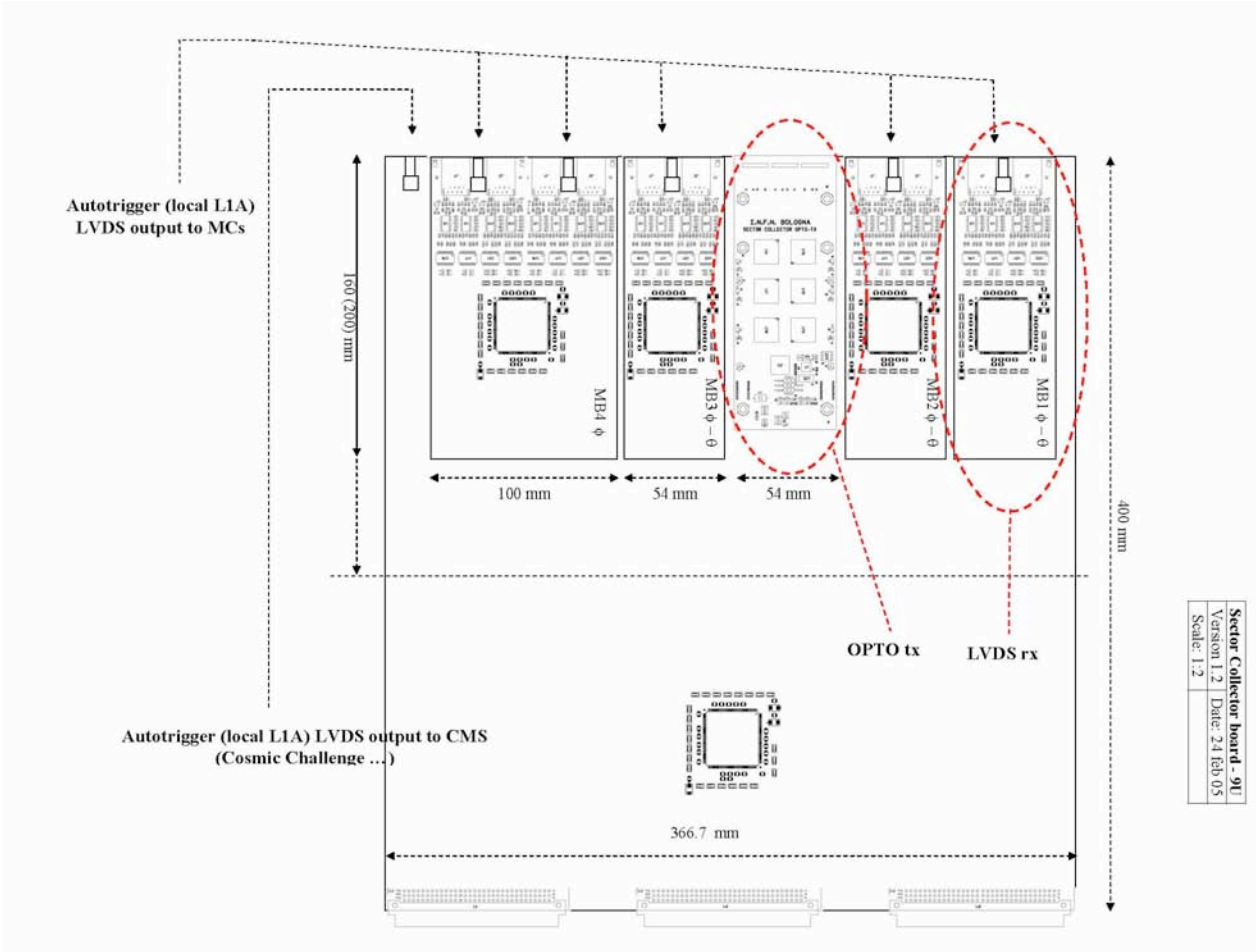
Sector Collector to Track Finder opto-link

(Fabrizio O /Bologna)



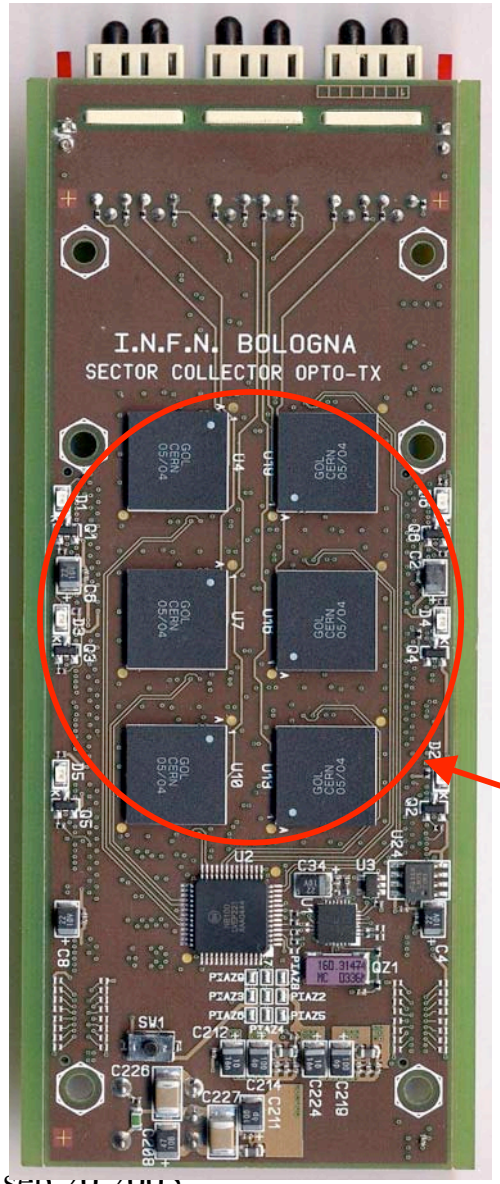
Sector Collector 9U-board layout

(Fabrizio O /Bologna)



(Fabrizio O /Bologna)

Sector Collector Opto-TX

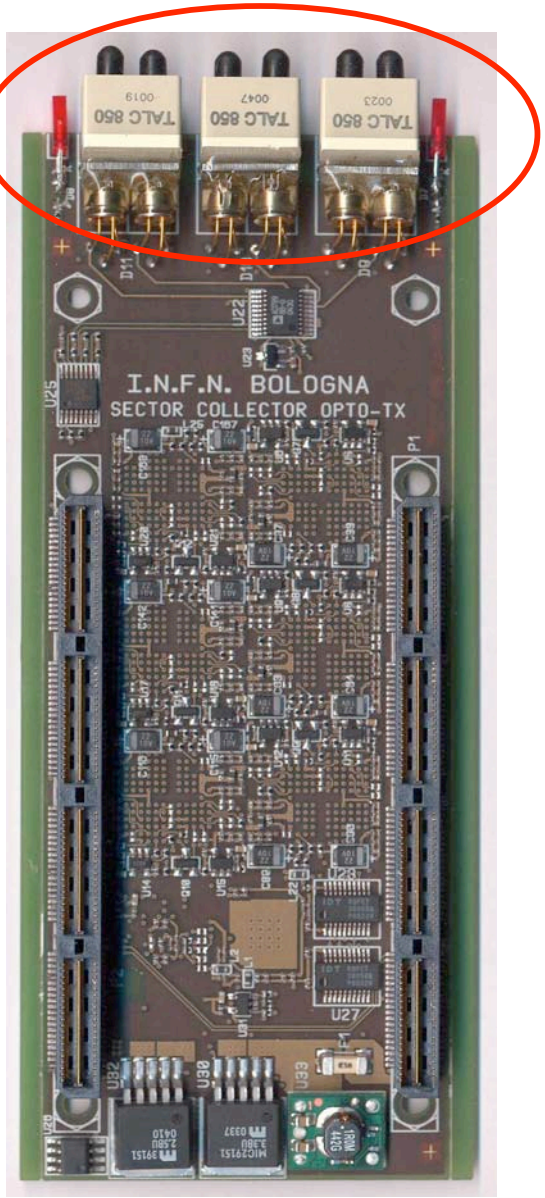


TOP

BOTTOM

6x VCSEL

6x GOL serializer
32 bit @ 40 MHz



DTTF:

(Janos Ero /Vienna)

Magnet Test preparations

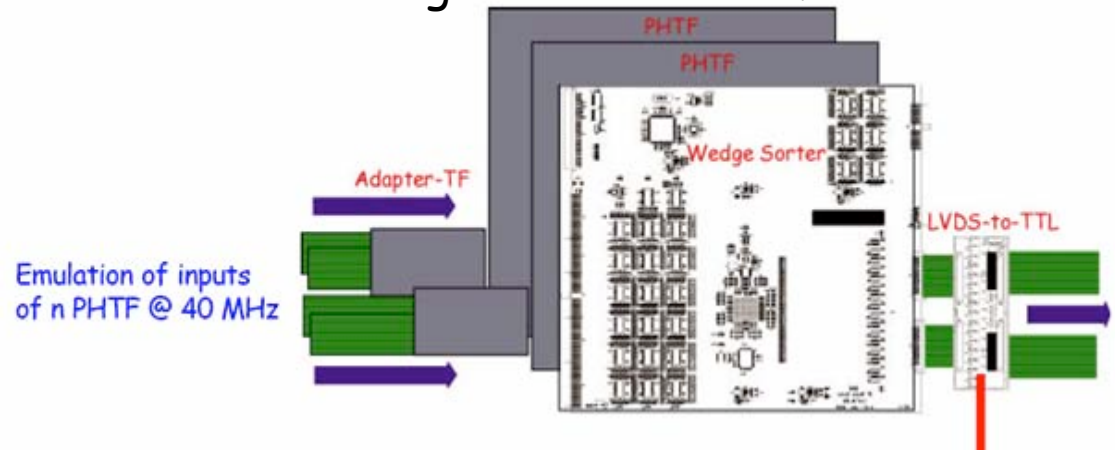
- Use the same outfit as for the Integration Test (Bt.904)
  - 2 Crates available
  - Test PC available
    - FED-kit readout equipped
  - Several readout options
    - Spy memory readout
      - accelerated by 16-bit JTAG access but no speed data yet
    - DCC VME readout
    - DCC FED-kit readout
    - DCC DAQ readout
- Open questions
  - Optical input to connect
  - CSC Connection
    - Cable length not yet checked
  - Common TTC necessary
    - TIM Module available soon
  - LTC output
    - TTL level for the moment being
      - add TTL => NIM converter
    - Need for Output Quality Cut
      - see slide #2 last entry

Magnet Test Meeting - Padova 09.09.2005

Jorge Fernandez de Trocóniz, Janos Erö

Wedge Sorter:

WS board was integrated with PHTFs in Vienna setup @ CERN (March05):



Read back the output through WS

(Luigi G /Bologna)

✓3 PHTFs + WS: sorting @ 40 MHz *OK*

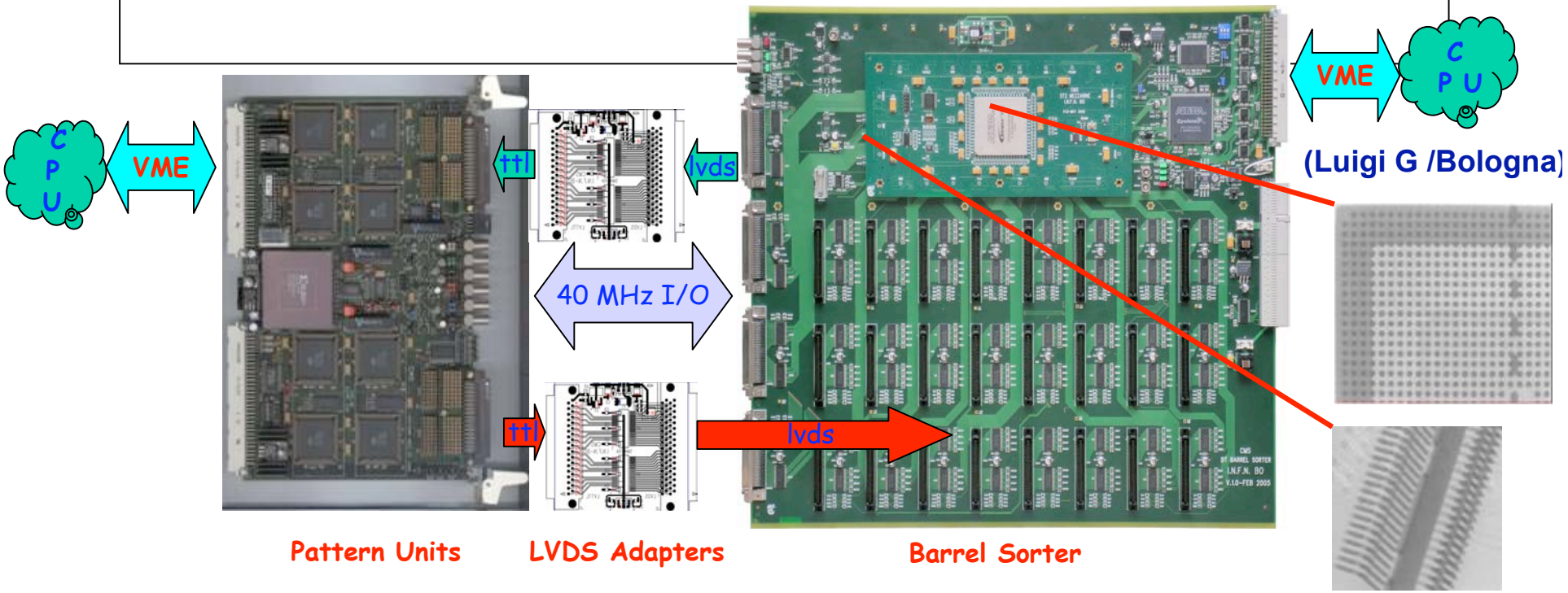
✓ 1 PHTF + ETTF + WS: sorting @ 40 MHz *OK*

Design validated

Full production (12 boards + 6 spares) finished !!

(All boards *fully tested* with dynamic patterns with
our test jig: all boards *OK* with full functionality)

Barrel Sorter



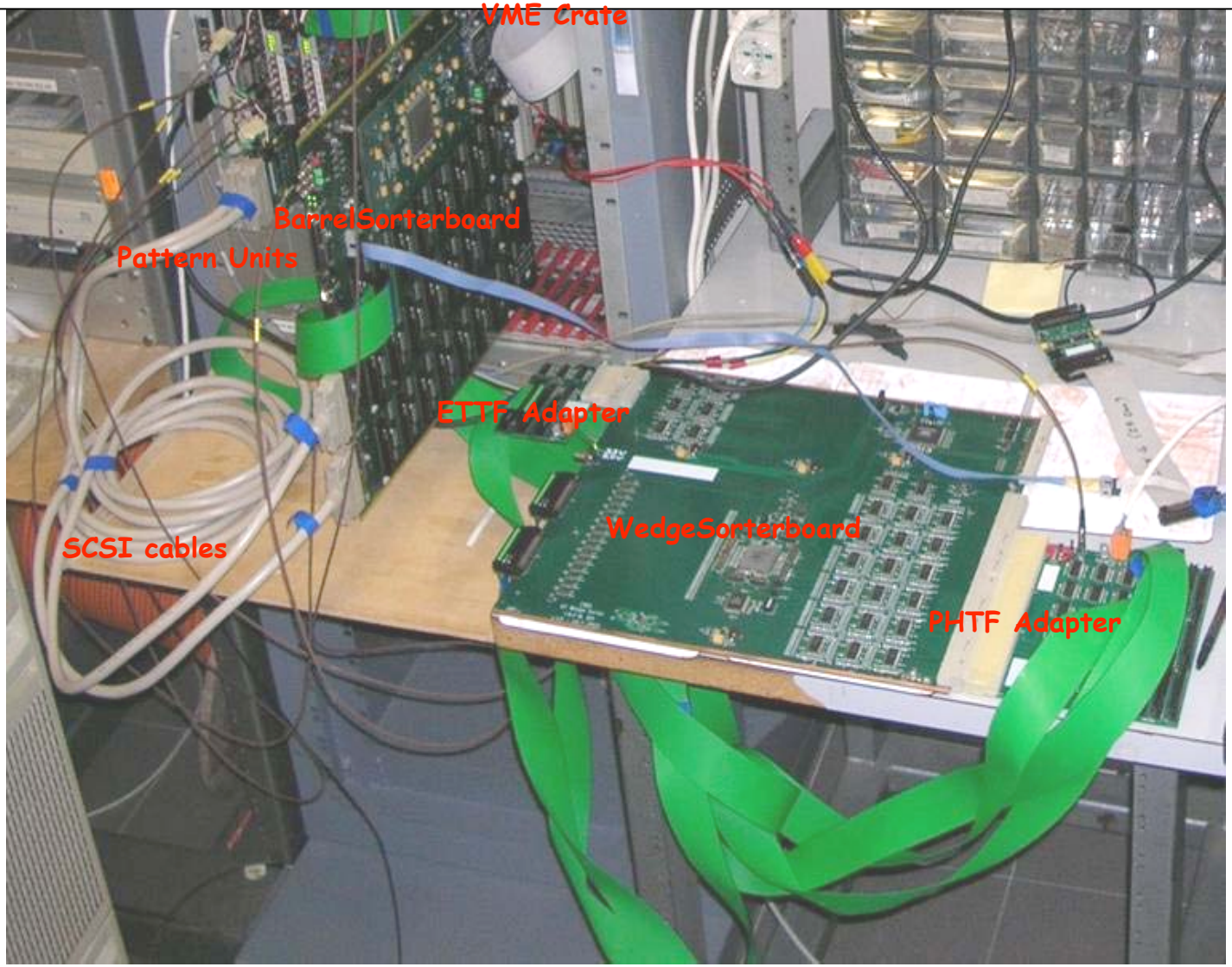
Full test setup based on Pattern Units and bidirectional LVDS-TTL adapters

Production (1 board + 2 spares) finished !!!

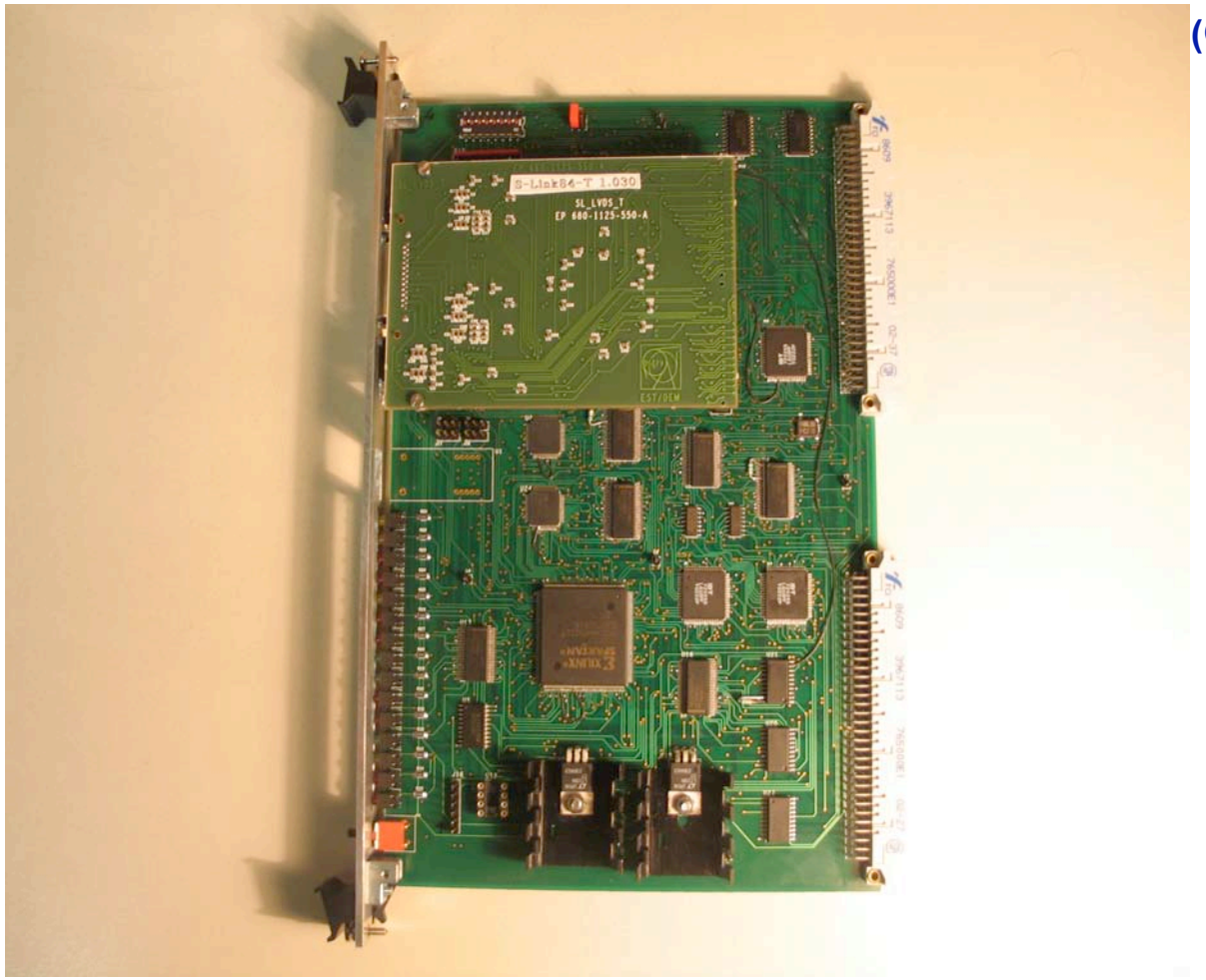
(All boards *fully tested* with dynamic patterns with
our test jig: all boards *OK* with full functionality)

WS – BS transmission test

(Luigi G /Bologna)



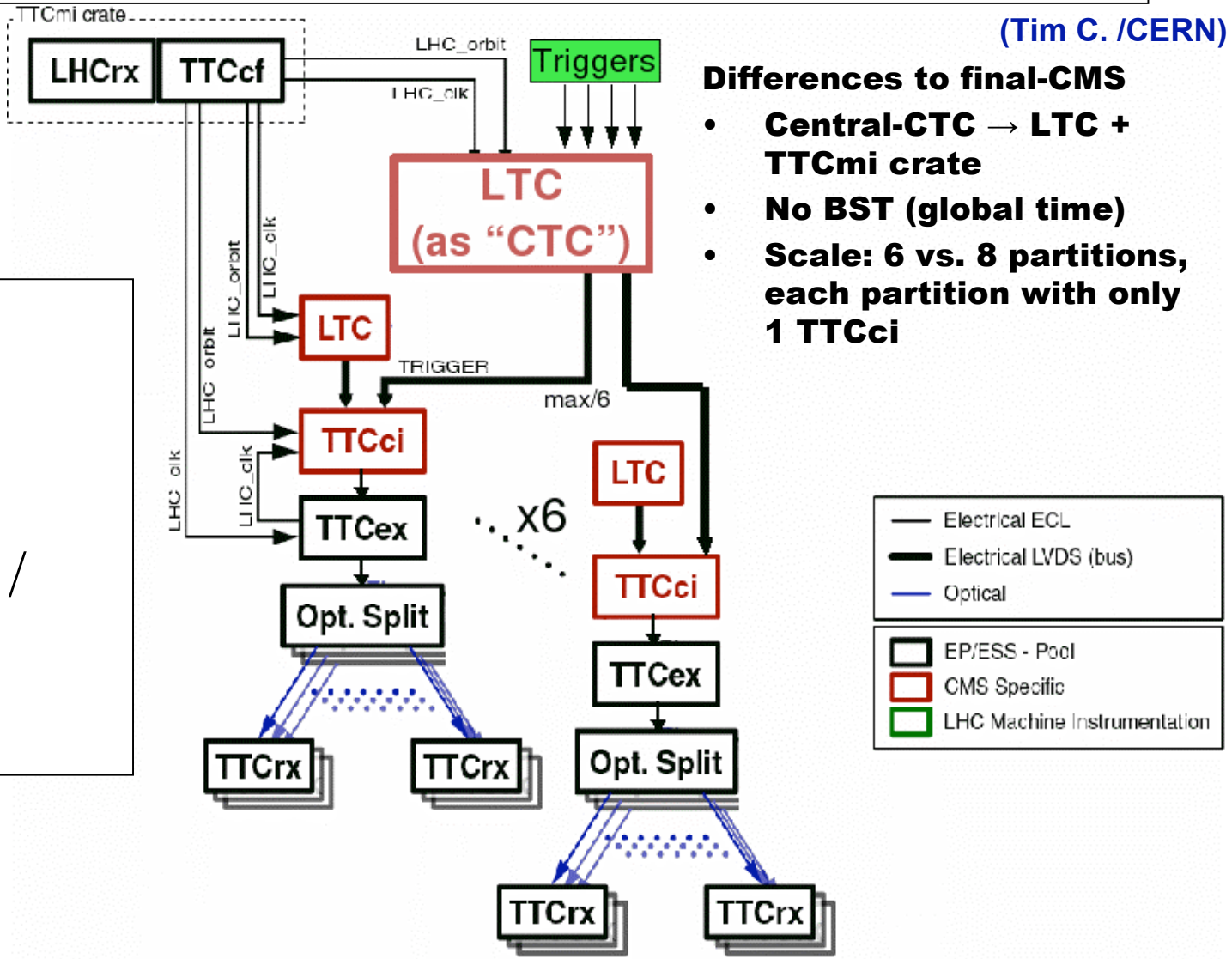
Prototype DDU 3.2



(Giulio DC /Torino)

TTC for MT/CC

LTC-based TTC system for the Magnet Test / Cosmic Challenge



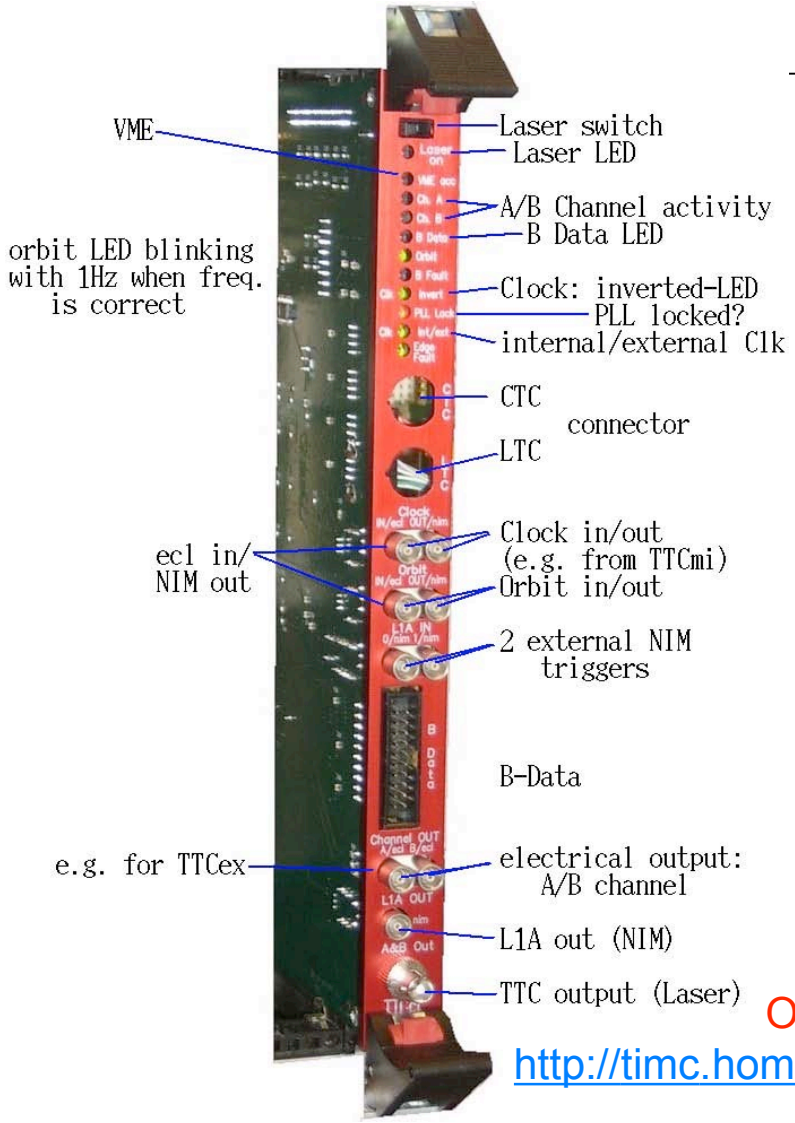
(Tim C. /CERN)

Differences to final-CMS

- **Central-CTC → LTC + TTCmi crate**
- **No BST (global time)**
- **Scale: 6 vs. 8 partitions, each partition with only 1 TTCci**

TTCci

(Tim C. /CERN)



Online documentation:
http://timc.home.cern.ch/timc/cms/ttcci/index.html

(Tim C. /CERN)

TTCci Status

- **15 pre-production boards @ CERN: first boards with software already delivered to detector groups**
- **Major breakthrough: Firmware is in a state where SW development is quite advanced (Tony Rohlev & Magnus Hansen)**
  - **Configuration of interfaces & BGO commands**
  - **XDAQ application**
- **Found only very few "features" to be improved/added in/to the firmware/software. Software + board is ready to be used.**

- **Tested so far:**
  - **VME access**
  - **Electrical outputs: L1A, BGO, clock/orbit etc.**
  - **Inputs: locking to TTC clock & orbit signals, QPLL**
  - **Internal triggers, counters etc.**
  - **VME BGOs ("verified" with optical display of TTCex output)**
  - **internal BGOs (free running mode)**
  - **Connected LTC → TTCci: receiving L1A, BGO; locking of TTCci-clock to LTC-clock**
  - **…**

(Tim C. /CERN)

LTC Status

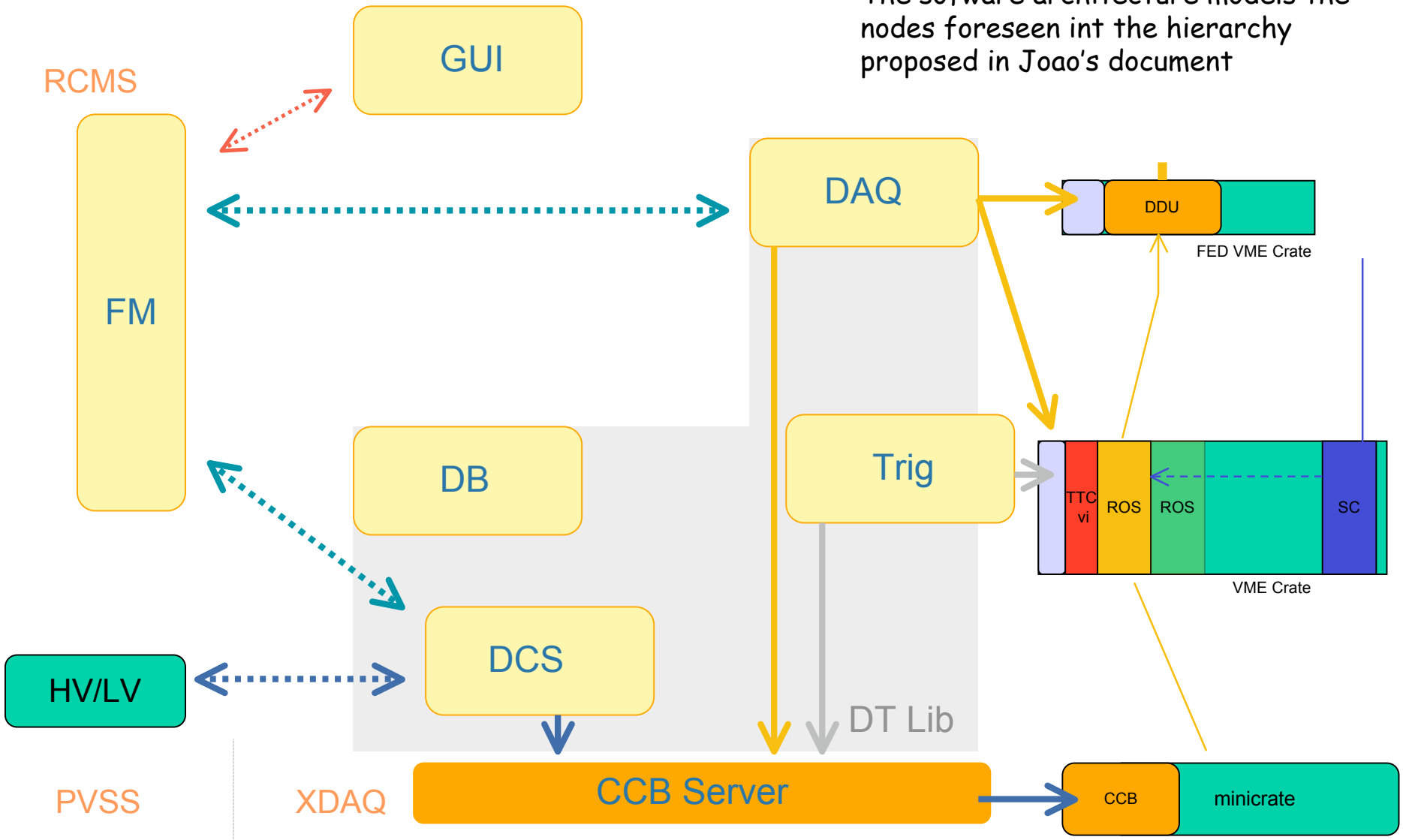
- **12 pre-production boards have arrived @ CERN**
  - **Firmware problems: Y. Kojevnikov (who designed board) is working on this, although he does not belong to the TTC group and is only "borrowed out".**
  - **HW of all 12 pre-production boards appears ok. 2 prototype boards with working FPGA/PROM available for software development and HW/FW/SW verification.**
    - **Big fraction of the software is written and also available as X-DAQ application, but: a few problems (probably firmware) slow down the verification of external triggers. Also need to add a few minor things to LTC firmware, progress is ongoing…**
    - **More-or-less tested/implemented: VME access, pattern & orbit bank, VME triggers, configuration**
    - **Still missing: S-Link output, L1A-Disable/ Enable (FW), spying on previous BXs (for synchronization), etc … and of course TTS (not yet started)**
    - **Plugs, cables and tests for LTC → TTCci interface**

TTC Outlook

- Cosmic Challenge (data taking at stable field) is slightly delayed, but integration into central systems (e.g. Trigger) for all detectors may start in January 06, for some (DT system?) even earlier. This is tight but not unrealistic from the trigger system point-of-view.
- TTC bottle neck is the LTC where most of the efforts is currently being focused on.
- Single-partition integration at SX5 or 904 can already start using the TTCci (but w/o internal logic to combine multiple external triggers).

DAQ/DCS Sofware Components (Sandro V. /Padova)

The sofware architecture models the nodes foreseen int the hierarchy proposed in Joao's document



- Project schedule being revised
  - parts delivery dates less uncertain
  - starts defining integration plan (what, who, where)
  - compatibility with CMS activity at Cessy
  - main issue: resources
    - should not jeopardize top priority activities, i.e. minicrate production and test, chamber installation and commisssioning, off-chamber electronics production, etc...

1	YB+2 S10,11 chambers commissioned
2	YB+1 S10 chambers commissioned
3	YB+2 S10,11 cabled
4	YB+1 S10 cabled
5	HV
6	LV
7	cooling
8	gas
9	**SECTOR COMMISSIONING**
10	second ROS8 in VME crate of commissioning set-up
11	DAQ synch with 4 chambers
12	data monitoring
13	**SECTOR TEST local mode**
14	Sector Collector Crate
15	TIM
16	ROS 25
17	DAQ system
18	DCS, DSS system
19	data monitoring
20	trigger Sector Collector
21	test ROS-trigger Sector Collector in Legnaro
22	tower racks
23	move set-up at CERN (using 2nd Sector Collector crate)
24	Sector syncronisation for cosmics data taking
25	**SECTOR TEST regional mode**
26	TTCci
27	TTC system at cern (cabling, fanout)
28	DTTF crate and DTTF boards
29	integration with Wedge and Barrel Sorters at CERN
30	test SectColl-DTTF optical transmission at CERN
31	integration with LTC / LV1A distribution
32	regional trigger / DAQ integration and synchronisation
33	**3-SECTOR TEST**
34	3 ROS25, 3TrigSectColl, 3DTTF
35	3 sector synch & cosmics trigger logic
36	**FED integration**
37	DDU
38	test ROS-DDU optotransmission in Legnaro
39	DDU integration at CERN

DT MTCC Task List

- DT MTCC project ramp-up in steps:

Sector Commissioning

- goal: autotrigger on one chamber and acquire data from 4 chambers, DAQ synchronisation, first look at cosmics traversing a sector
- note: chamber commissioning electronics

•Sector Test –local mode

- goal: final tower electronics, local autotrigger logic with 4(5) chambers, read ROS25 with local DAQ (no FED)
- note: TTC system as in commissioning set-tup

•Sector Test –regional mode

- goal: provide trigger to CMS, integrate regional trigger, use final TTC system

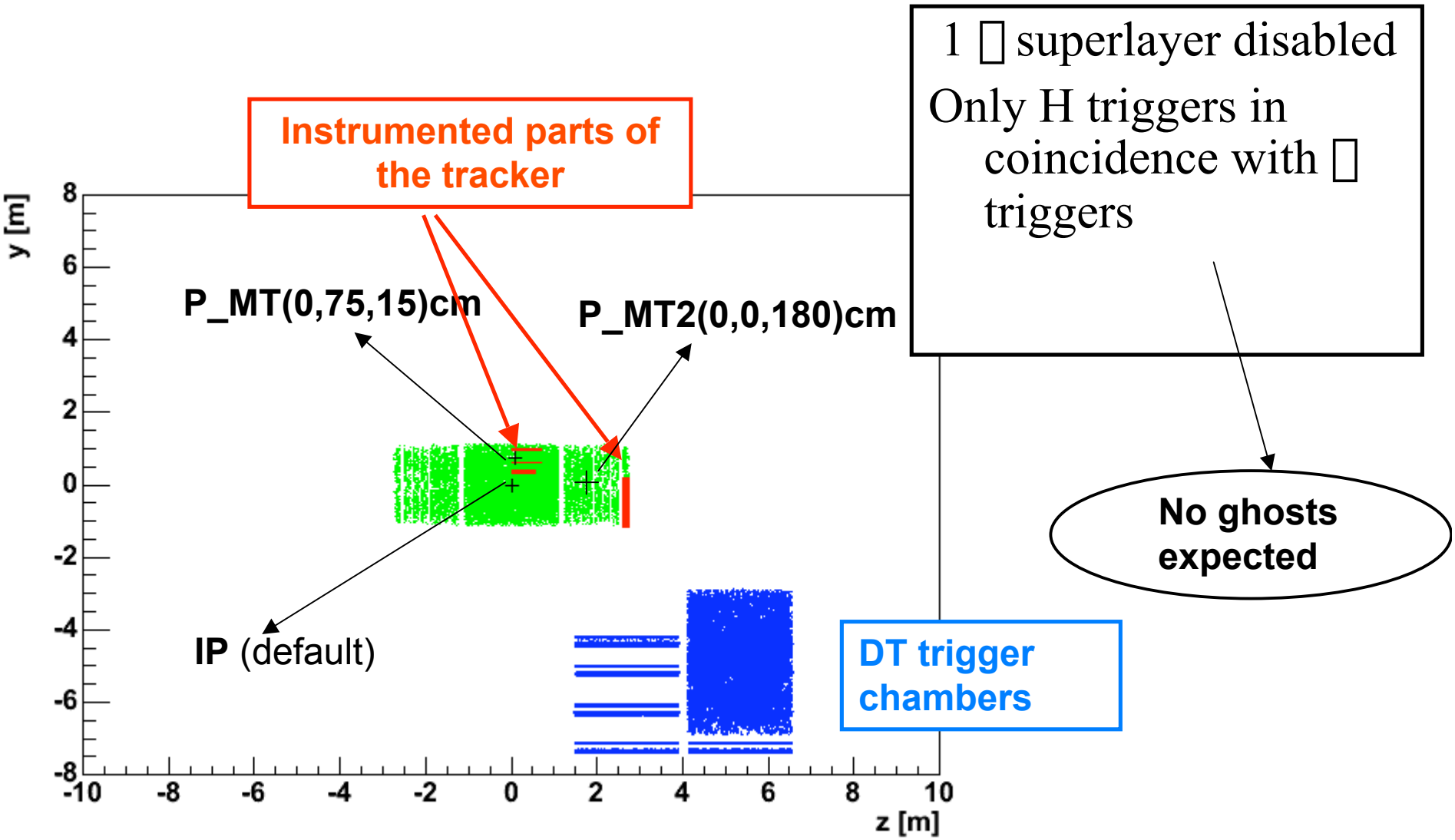
•3-Sector Test

- goal: cosmics trigger with three sectors

•FED Integration

- goal: data flow from ROS through DDU to global DAQ

Trigger server as pointing trigger



Results: Trigger request: Nts>0

(Michele Pioppi /Perugia)

TS configuration	Trigger eff.(1)	$\epsilon_{trig/tracker}/\epsilon_{tri}$(2)	(1)x(2)
•P_MT •Angular tolerance ~9°	**0.19%**	**4.40%**	**0.0085%** **4.0Hz**
•P_MT •Angular tolerance ~18°	**0.38%**	**3.24%**	**0.0121%** **5.7Hz**
•IP •Angular tolerance ~18°	**0.33%**	**3.60%**	**0.0119%** **5.6Hz**
•P_MT •Angular tolerance ~18° •L trigger allowed	**1.56%**	**1.23%**	**0.0191%** **8.9Hz**
•P_MT2 •Angular tolerance ~18° •L trigger allowed	**1.14%**	**1.99%**	**0.0226%** **10.6Hz**