BMU Magnet Test
Plans and Requirements

A. Benvenuti

CTF December 1st 2004

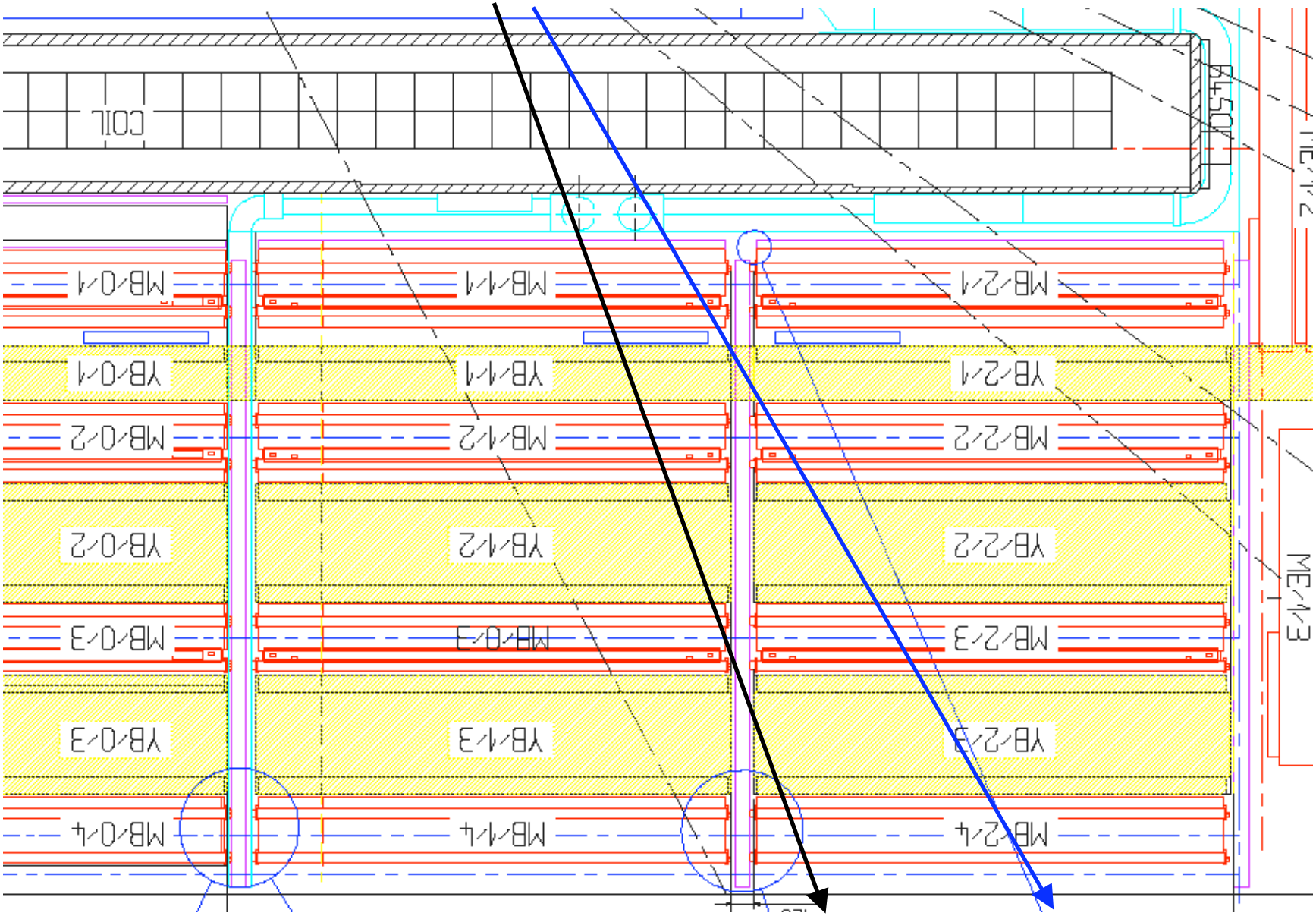
Magnet Test Scope

➢ Alignment (Barrel)

- Alignment system functionality test
- Monitor detector movements under magnetic field

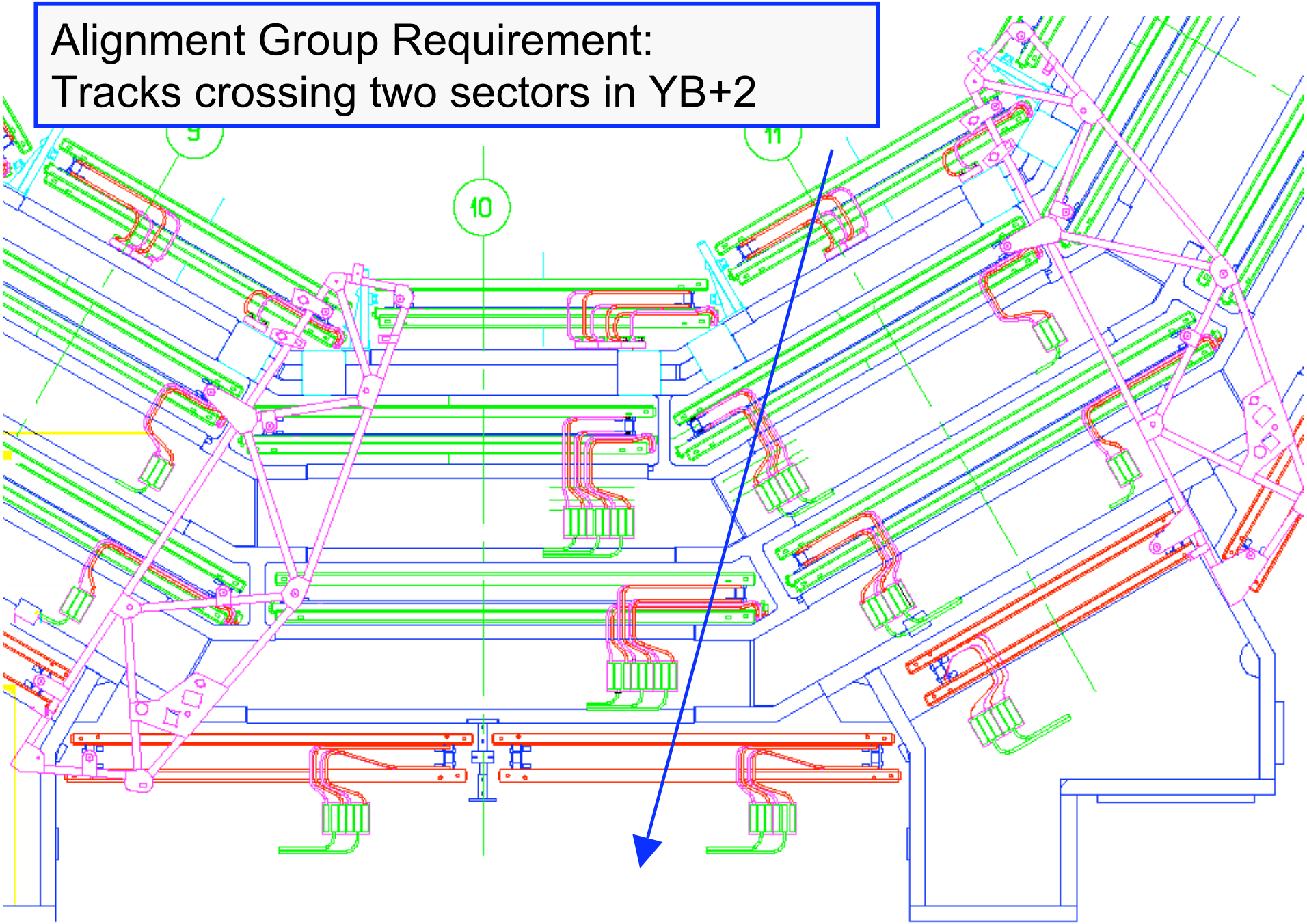
2 adjacent sectors (10,11) fully equipped with chambers in each wheel (aligned with photogrammetry?):

- 45 DT chambers (but MB4/11 installation conditional to cabling completion across foot)
- Only LED forks must be operational in all DT
- Plan for standalone LED forks control (it is not feasible to keep 45 minicrates operational)
- Aim for ≥ 2 sectors fully operational



Alignment Group requirements:
Tracks crossing two sectors in two wheels

Alignment Group Requirement:
Tracks crossing two sectors in YB+2



Magnet Test Scope

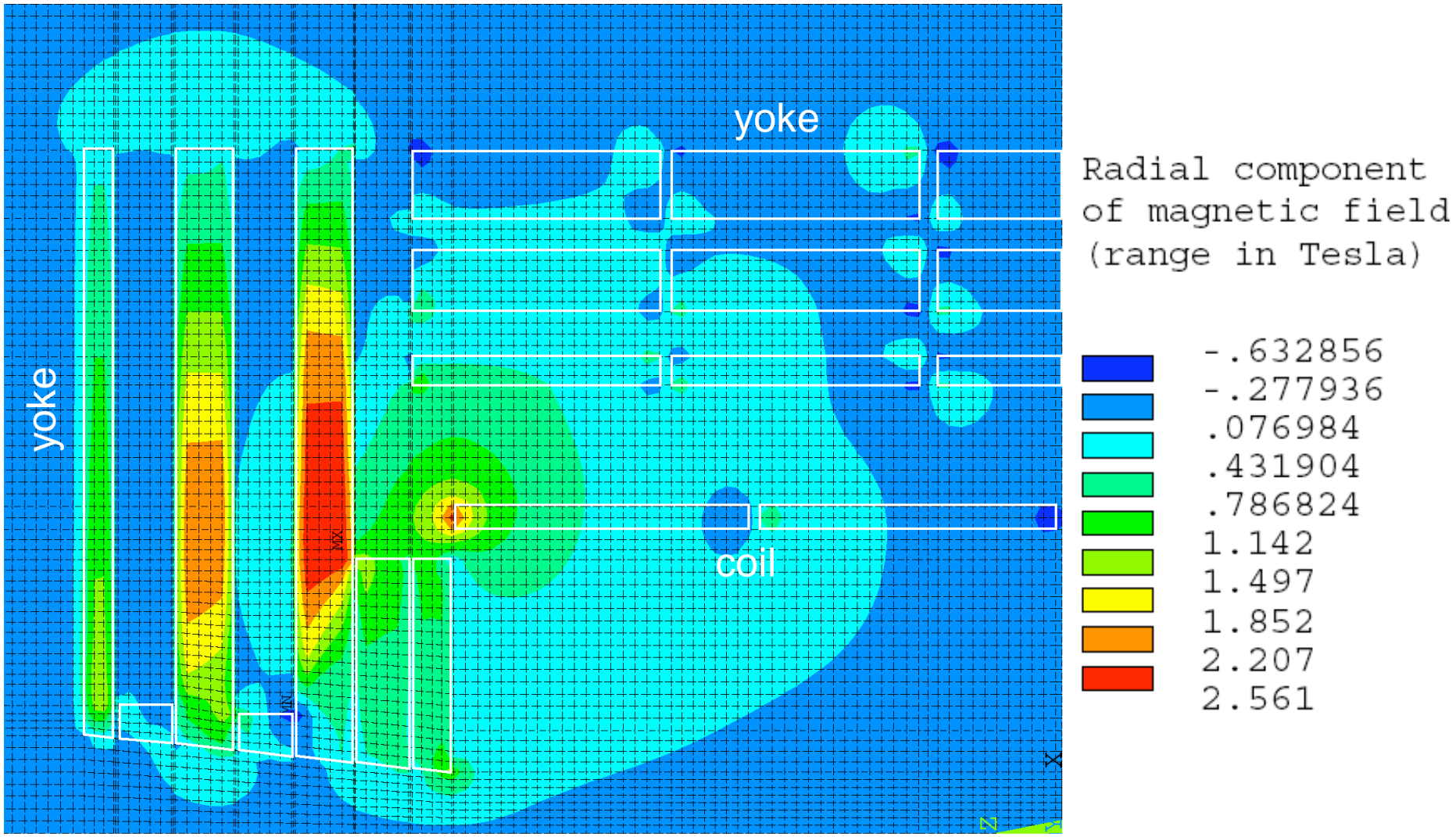
➢ DT Functionality

- Check effect of fringe field on chamber performance:
  - HV behavior
  - Vdrift
  - Resolution

- Check effects of fast/slow discharges on power supplies and electronics

Data taking from counting room in stand alone mode with self trigger and/or RPC trigger.

Choose fully operational sectors as 10 in YB+2 and YB+1



Fringe field most prominent for MB1. It induces longer trajectories (apparent Vdrift is slower) and might affect bunch crossing identification efficiency

Magnet Test Scope

- Slice test

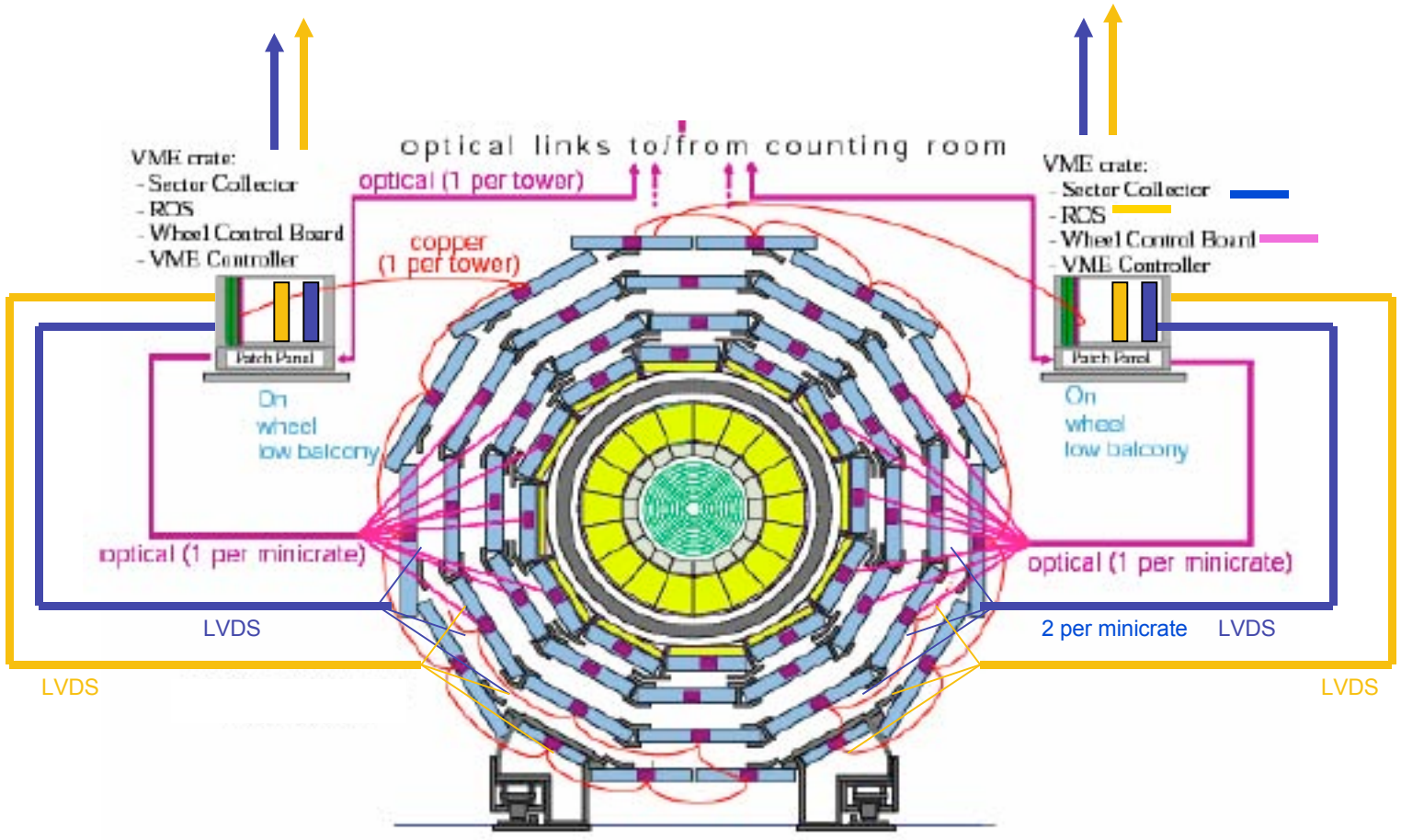
Data acquisition from counting room under self trigger and/or external trigger: RPC, HCAL, CSC

Sub detectors rough synchronization needed.

- Magnet Test specific software and/or hardware should be discouraged and limited to the indispensable.

- DCS,DSS, Run Control should be developed as Version 0.x for data taking in UX5.

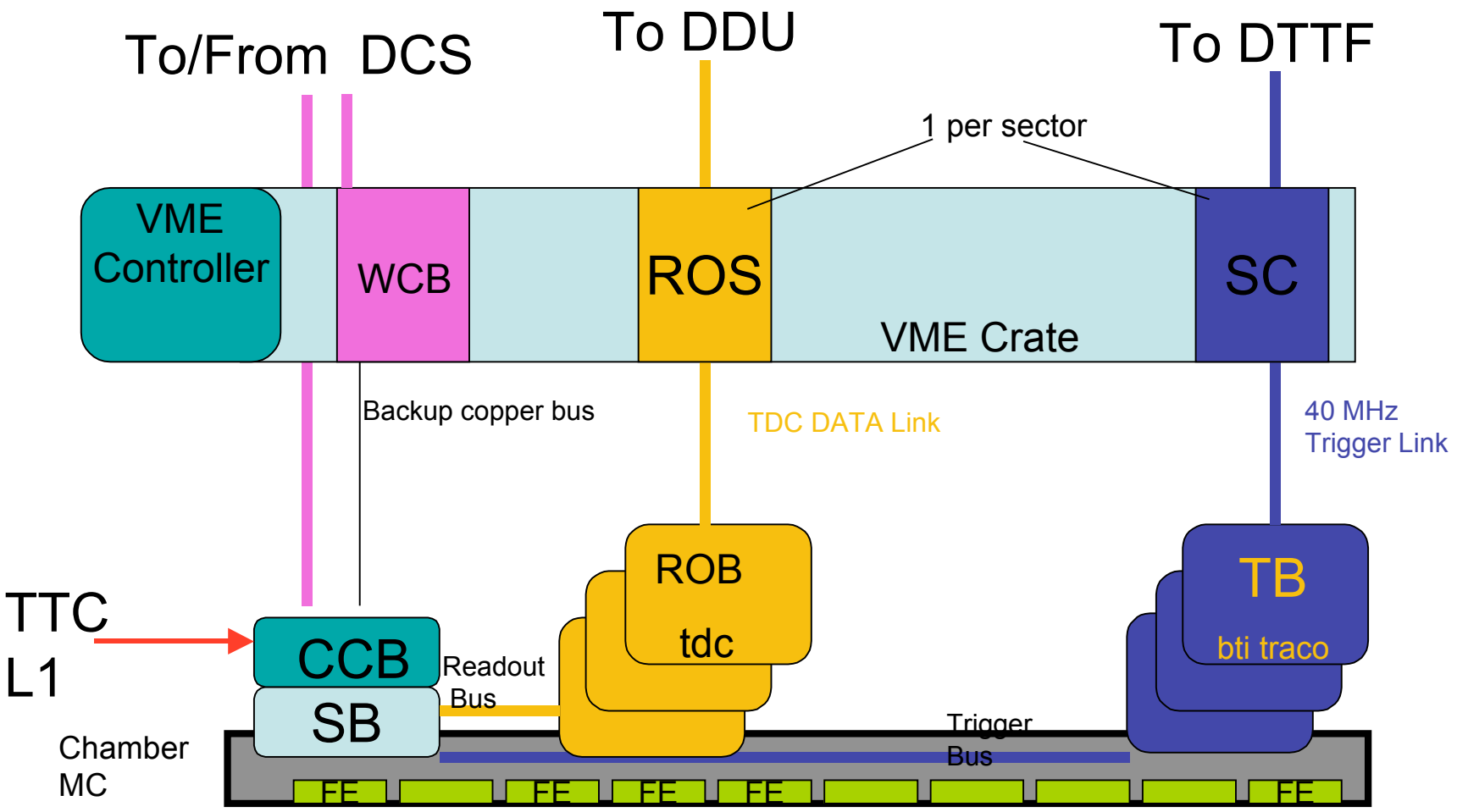
DT DAQ & DCS Layout



Three main data backbones: DCS, TDC Data, Trigger

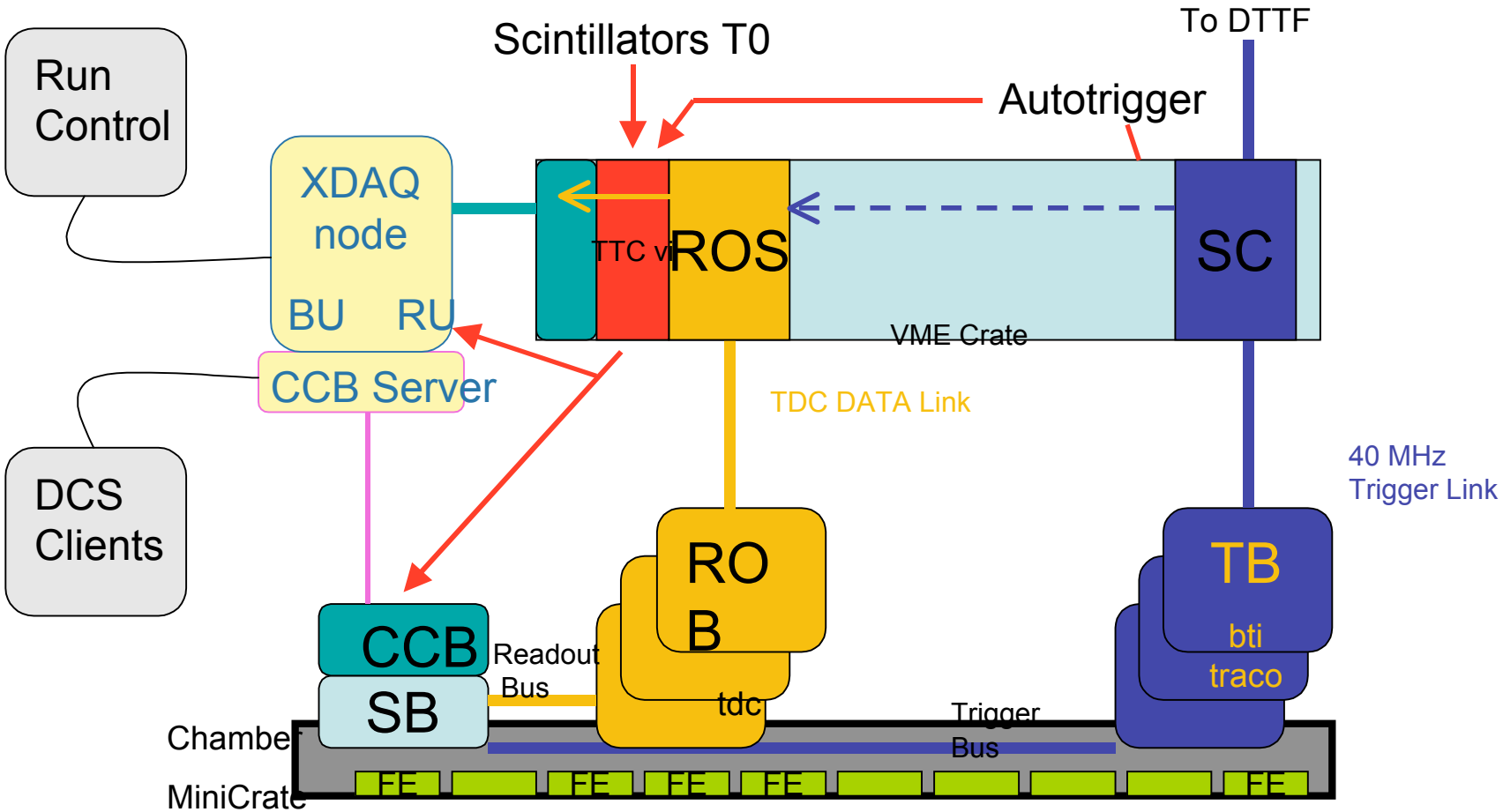
Marco Bellato, Marina Passaseo,….

DCS Trigger DAQ Data Columns



DT Local DAQ

A ROS compatible Sector Collector output is foreseen to feed trigger data directly into the DAQ dataflow



Critical Items (DT)

- New version of ROS and VME crate backplane for trigger data snapshot planned for beginning of 2005 (CIEMAT). One ROS serves the TDC readout of one sector.
- New Sector Collector planned for May with intermediate test beginning of January (Bologna). Transmits the trigger data to the DTTF (one module per sector).
- DDU (Torino) : 2 channel prototype (serves 2 Sectors) under test in Legnaro. It can be readout via VME (Local DAQ) or S-link (Global DAQ)

Alignment Test Requirements

- Data taking from YB+2 Sectors 10 and 11 and YB+1 sector 10 requires: 3 ROS, 3 SC, 2 VME crates, 2 DDUs and ad hoc module for trigger logic (to be designed). Can be carried out also with 2 ROS, 2 SC and 2 VME crates.
- The trigger logic module is mandatory for data taking across two wheels.
- Data taking across adjacent sectors can be achieved by cabling chambers from different sectors in the same SC and using the trigger logic within the SC. Minimal configuration is one ROS and one SC in a new VME crate. It can be done also in stand alone mode with test beam modules (rock bottom configuration).

Infrastructure Requirements

- Sector 10,11 in YB+2 and Sector 10 in YB+1 fully cabled and tested
- DSS system
- Gas and Cooling for Sector 10,11 in YB+2 and Sector 10 in YB+1
- LV + Trigger/Readout: 1 rack in YB+2 and YB+1
- HV: 1 Rack in YB+2 and YB+1

Hardware Requirements (DT,3 Sectors)

- Low Voltage (Final Modules):

  Minicrate: 30A at 3V, 2A at 5V
  Front-End: 4A at 2.5V, 3A at 5V

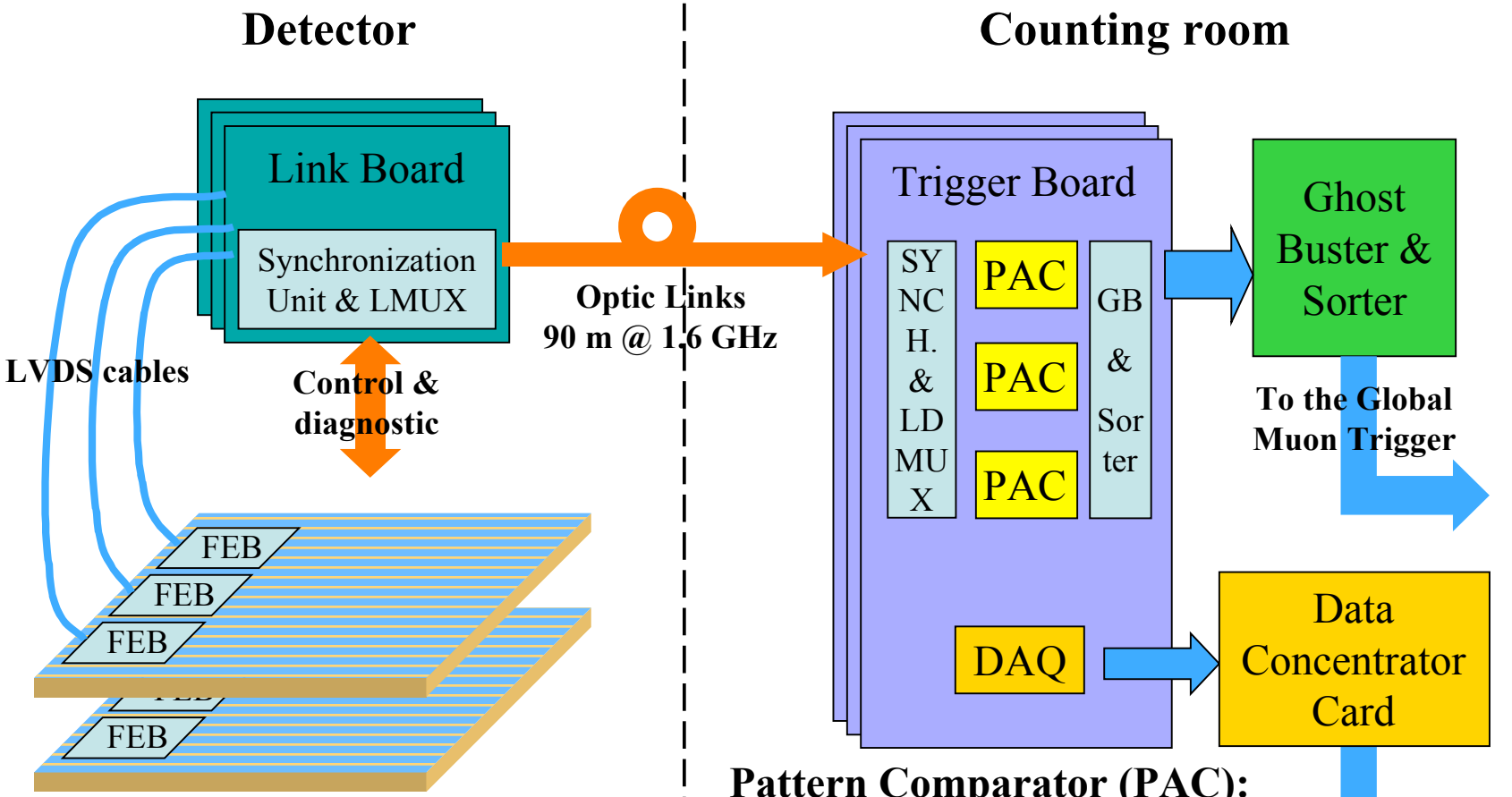
  Total = 125W/minicrate, 600W-725W/Sector
  = ~2kW

- Cable Plant:

  Fibers: 3 Data, 3 Trigger, 14 DCS, 1 TTC
  Copper: 1 Ethernet link for DCS

- 2 Racks in Counting Room

RPC Muon Trigger overview



Resistive Plate Chambers
Up to 6 layers
Strips: width: 0.5 – 4 cm, length: 1 m

Pattern Comparator (PAC):
hits are compared to the predefined patterns corresponding to various pt

Realistic plan of what is reasonable to expect for MT to be defined during t he next CMS week

Infrastructure Requirements (RPC)

- One rack/wheel (YB+2, YB+1) primarily for LV, HV and Link crate
- Gas system operational ($C_2H_2F_4$ + I-C_4H_{10})
- Two racks in counting room for Trigger, readout, DCS and monitoring

Cable plant from wheels to counting room:

- 24 fibers for readout and DCS
- 3 trigger cables to DT Sector Collector
- 48 HV cables
- 2 flat cables for HV control

Power requirement not significant

Critical Items (RPC)

- The availability of link boards for the Magnet Test looks doubtful (discussion in Torino Meeting)
- Link boards configurations for data taking with cosmics is very time consuming and interferes with other work for the standard setup
- Ad hoc trigger module should be developed for the MT
- Final LV supplies (48V) are needed for the MT (~ 1 month earlier for de-bugging/setting up). This is true also for the DT.