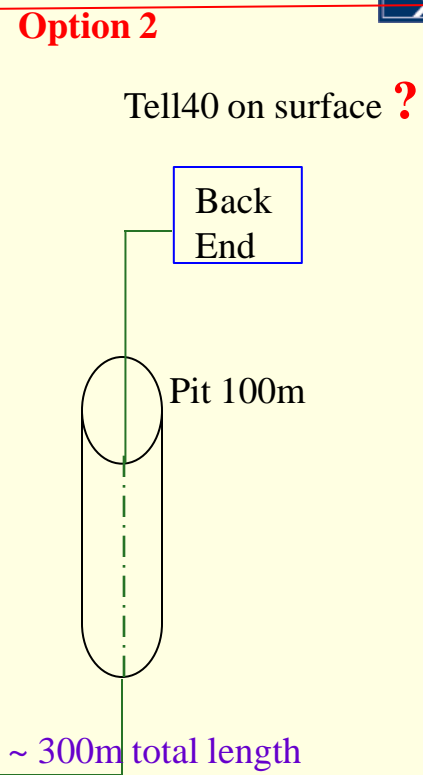
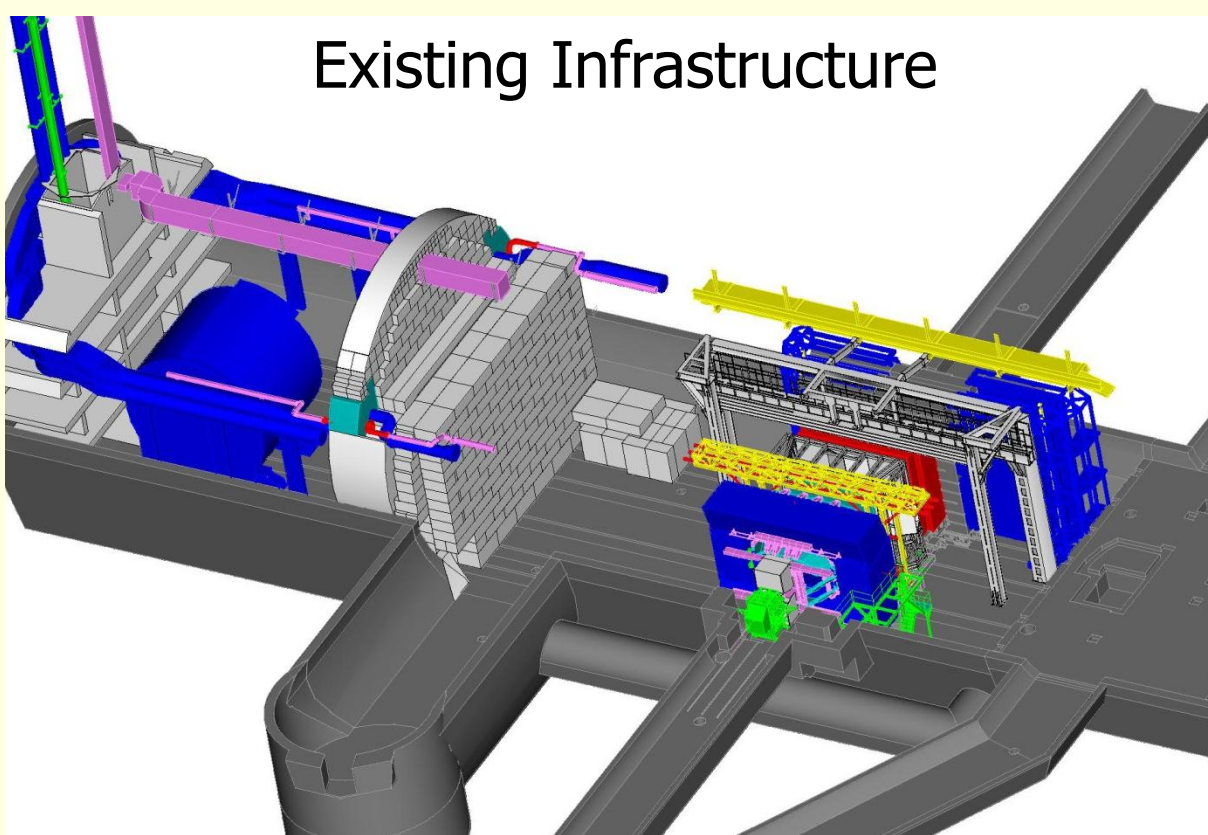


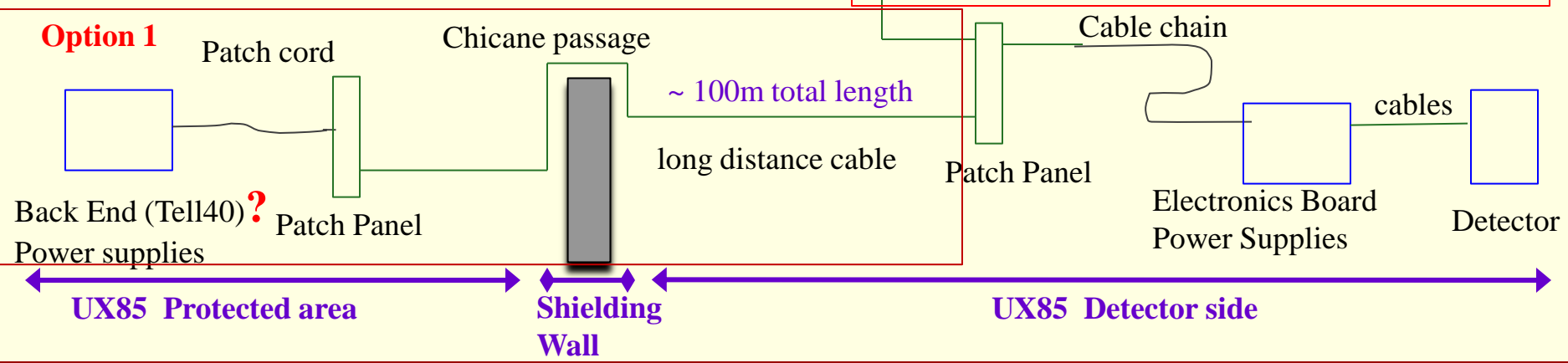
Infrastructure / Electronics Upgrade

- Cabling (long distance)
- Rack and Crate (space, electrical distribution, cooling)
- Detector power supply

Existing Infrastructure



Chain between detectors and FE

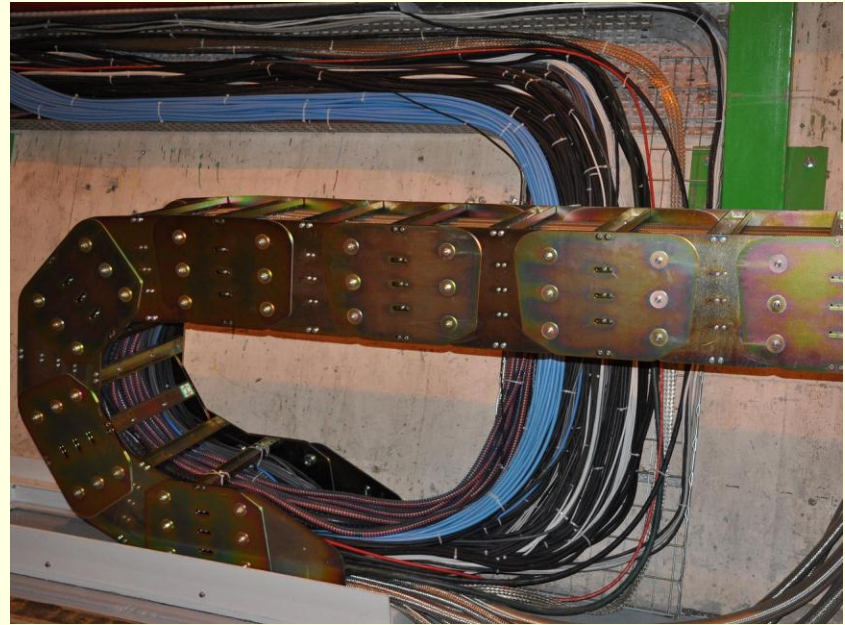


Detectors cable chains

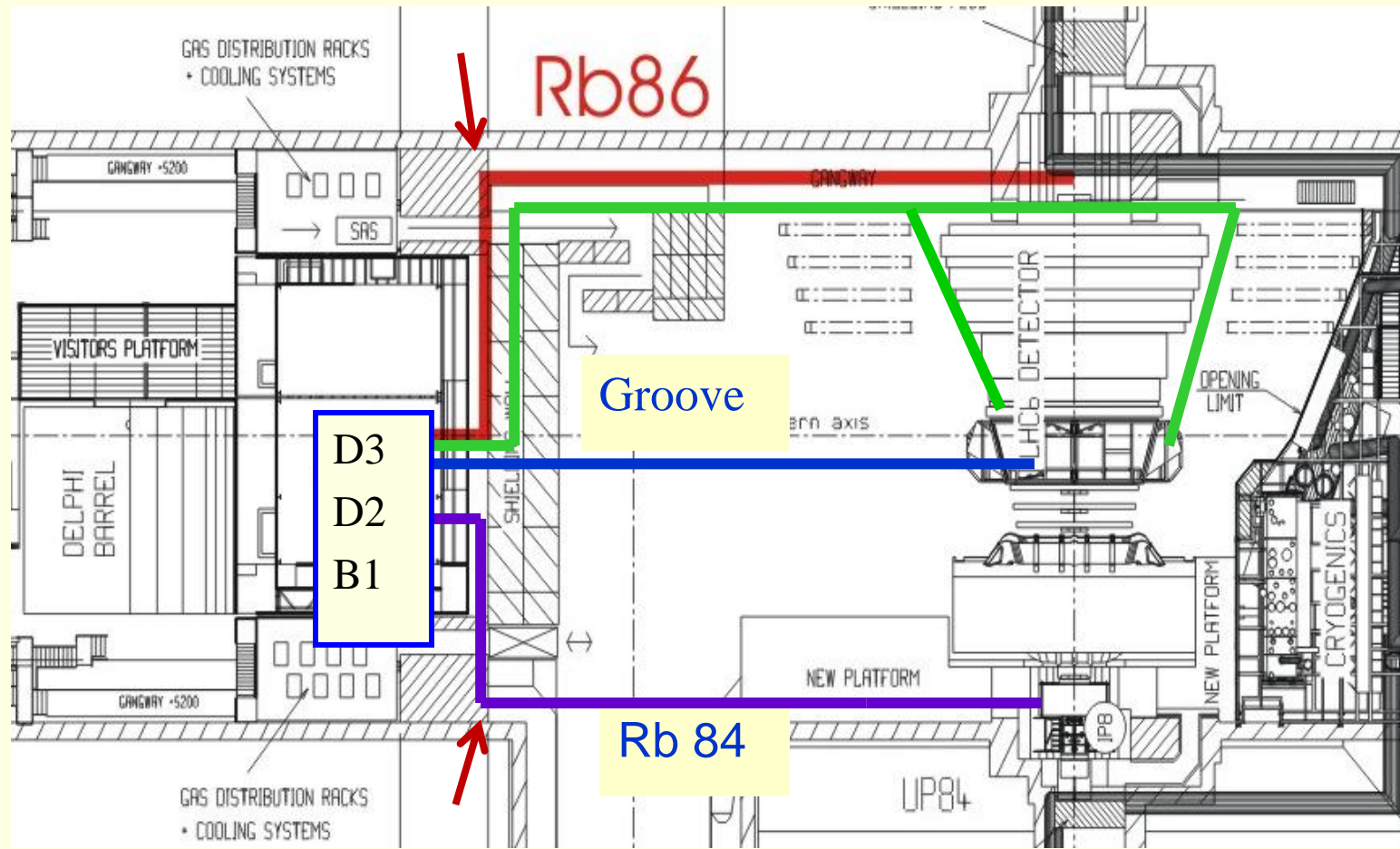
Used by Silicon Tracker, Outer Tracker, Calorimeters and MUON.

→ Space to check

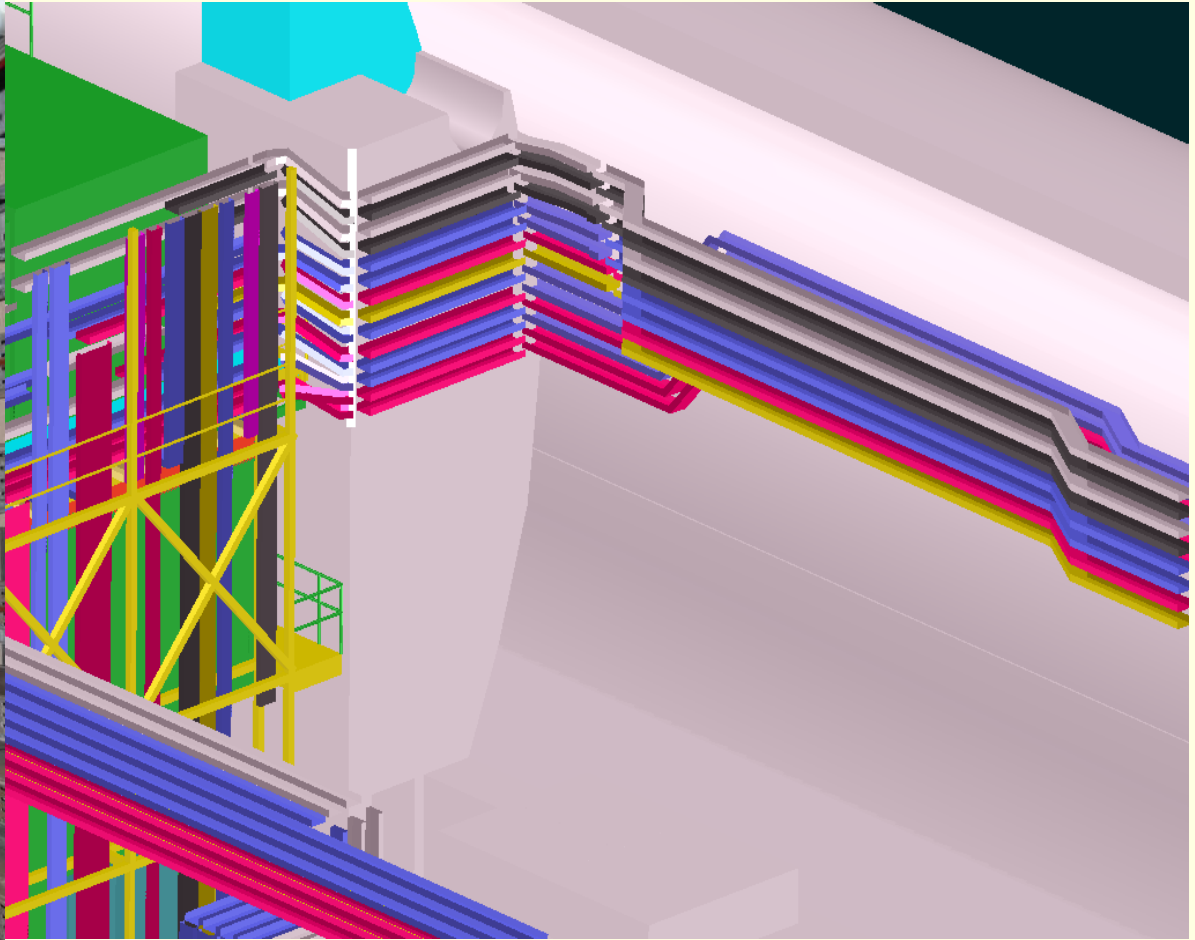
(change, install new ?)

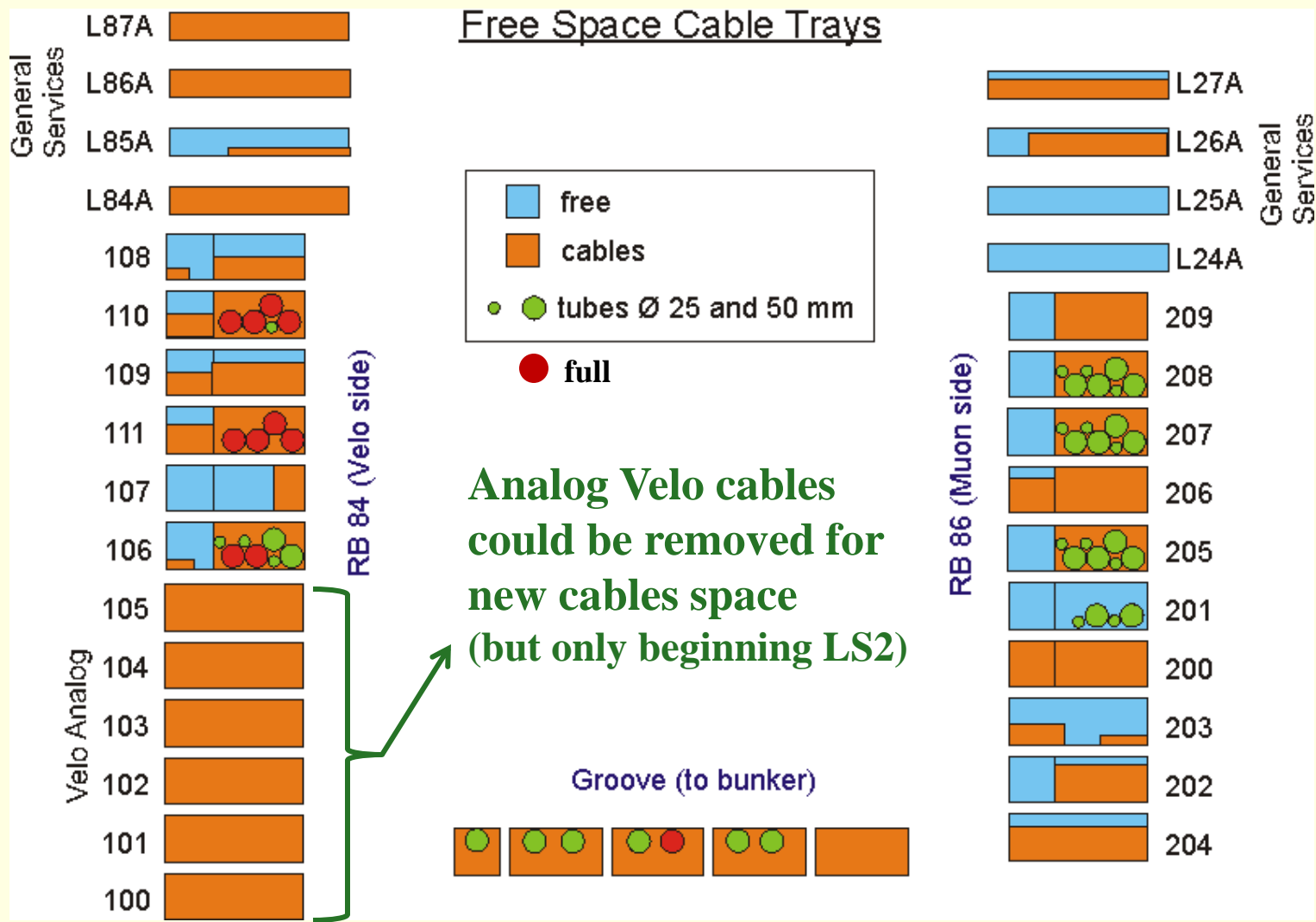


Actual 'long distance' cables path



- 2 'chicane' passages (one of each side of the wall)





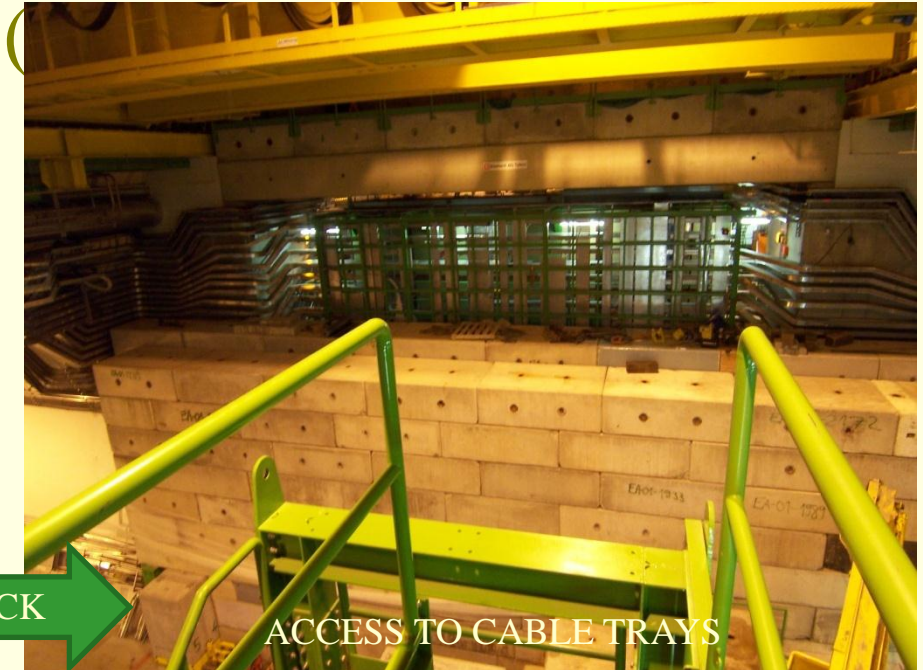
- few tubes could be used for few additional cables (but not for optical fibers)
- 6 trays could be available by removing the analog velo cables → shielding wall to dismantled



CURRENT SITUATION



BACK



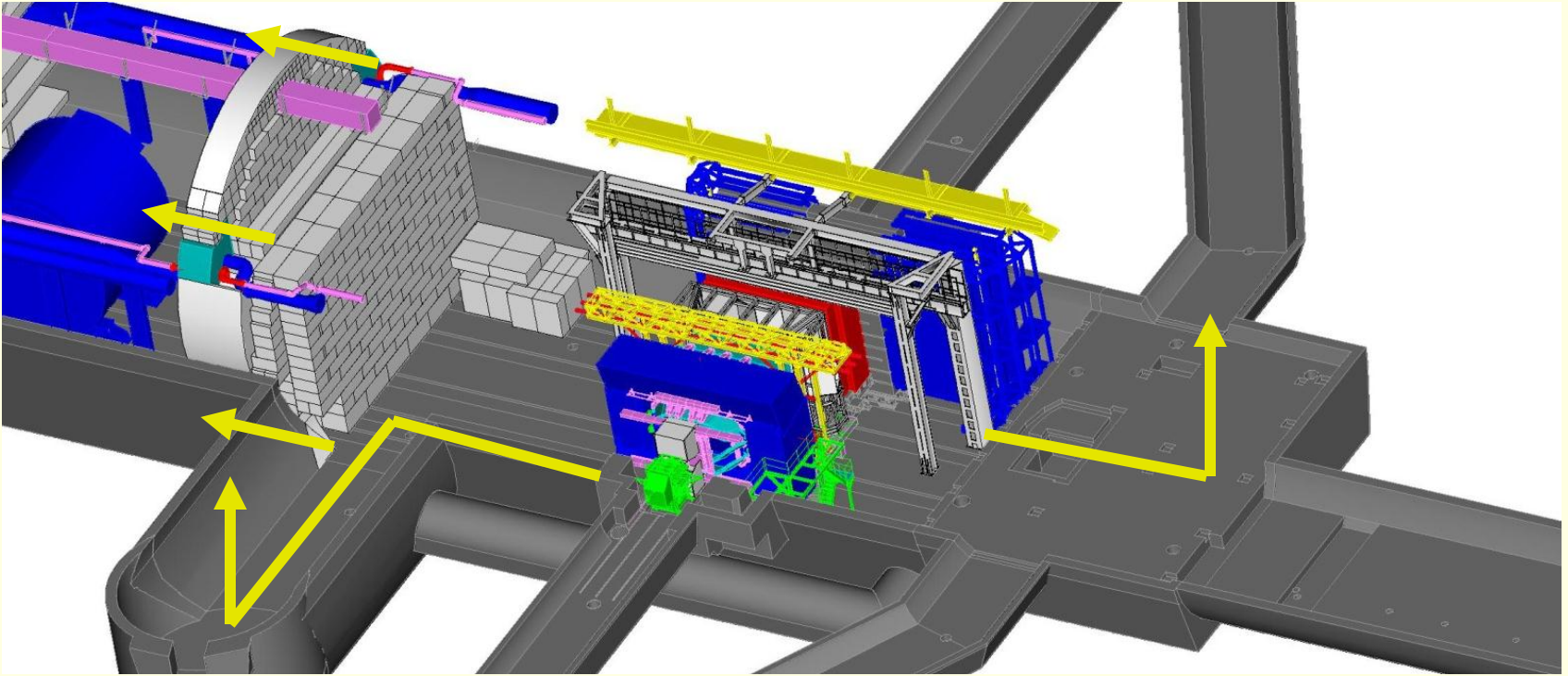
ACCESS TO CABLE TRAYS

- 1 - DETECTOR CLOSED - DUST PROTECTION USING PLASTIC FOILS – NO WORKS ON DETECTORS
- 2 - DISMANTLING METALLIC STRUCTURES (such as ladders, gangways, stairs,...)
- 3 - DISMANTLING 3 or 4 LAYERS (~ 50 concrete blocks of 7.5 t) ⇒ new lifting tools + platform
- 4 - REMOVING CONCRETE BLOCKS TO SURFACE (via PX84 shaft) – CLEANING
- 5 – SCAFFOLDING FOR CABLING – **CABLING WORKS**
- 6 - REMOVING PLASTIC FOILS – OPEN DETECTOR – WORKS ON DETECTORS
- 7 - DETECTOR CLOSED - REINSTALLATION PLASTIC FOILS FOR DUST PROTECTION
- 8 – RE-CONSTRUCTION OF UPPER PART OF SHIELD
- 9 – FINISHING WORKS (joints, painting, cleaning)

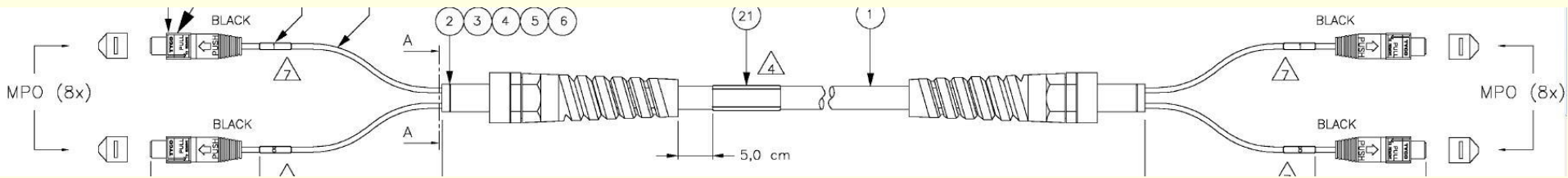
↑ 4-5 weeks ↓

↑ 4-5 weeks ↓

other possibilities for cables installation



- to avoid to dismount the wall:
- possibility to pass cables on the top of the wall (vault of the cavern)
- possibility to make a second groove on the concrete floor below the concrete plug
- If Tell40 on the surface:
 - pass through PM85 pit (platform used for Cryo PLCs free now -> for Patch panel racks ?)
 - or through PX85 pit

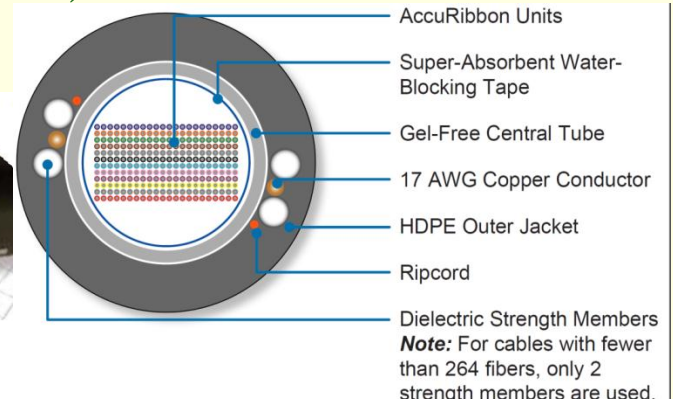
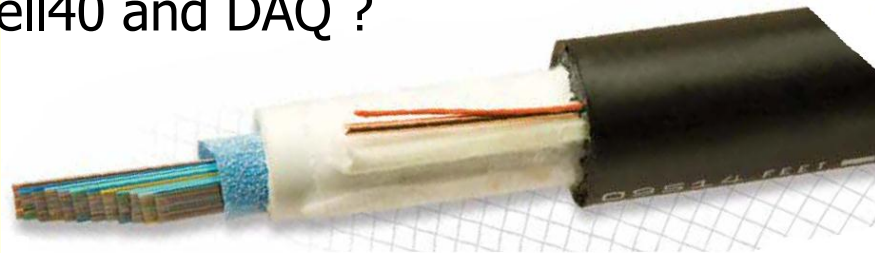


multimode – 50/125 μm – OM2 (500Mhz.km)
 Operation wavelength 850 nm
 96 fibers (8 ribbons of 12) - MPO connectors

Total: 87 installed (8350 fibers) - length mini: 43m – maxi: 65m
 space in cable tray ~2cm²/cable

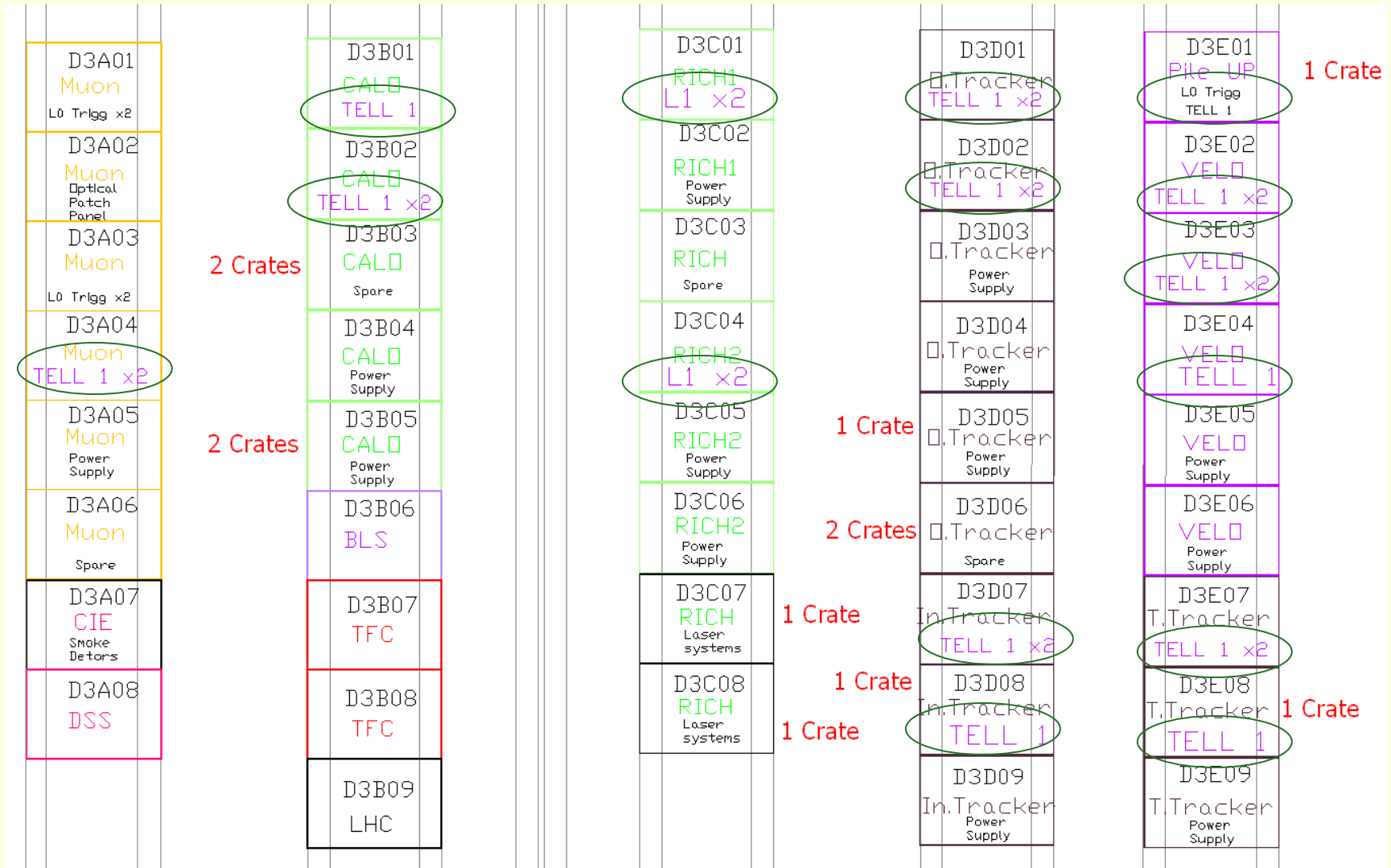
→ Need new fibers for LHCb upgrade (OM4 ?)

- between detector and Tell40
- between Tell40 and DAQ ?



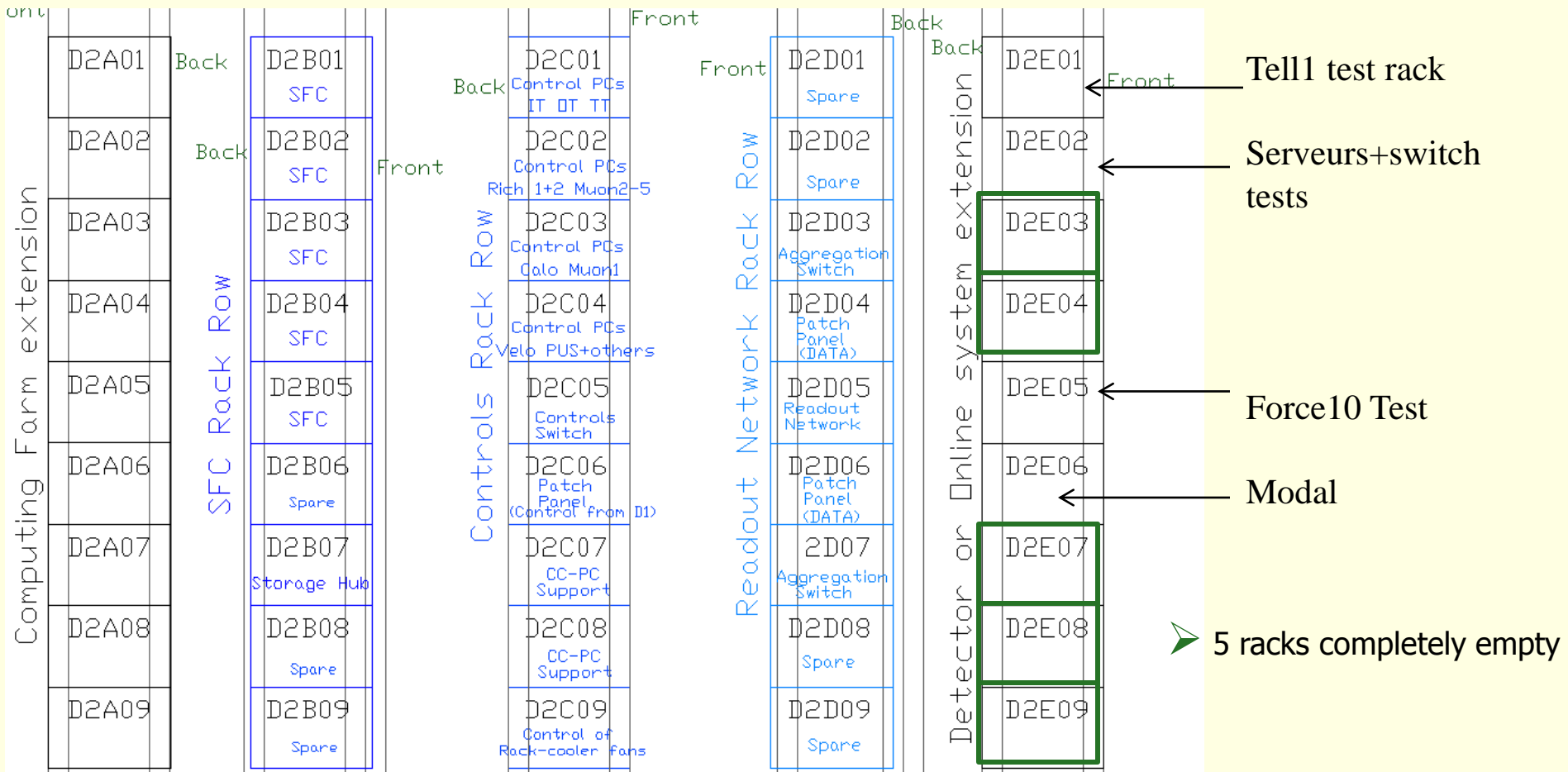
Example: Optical cable (up to 18x12=216 fibres or 18x24=432)

Space for additional electronics in D3 (12 space available for crates)



➤ today 25 VME Tell1 crates installed -> could be replaced by new ATCA crates

Possibility to install also electronics in D2



➤ Row E "Detector Extension" powered by same transformer as D3

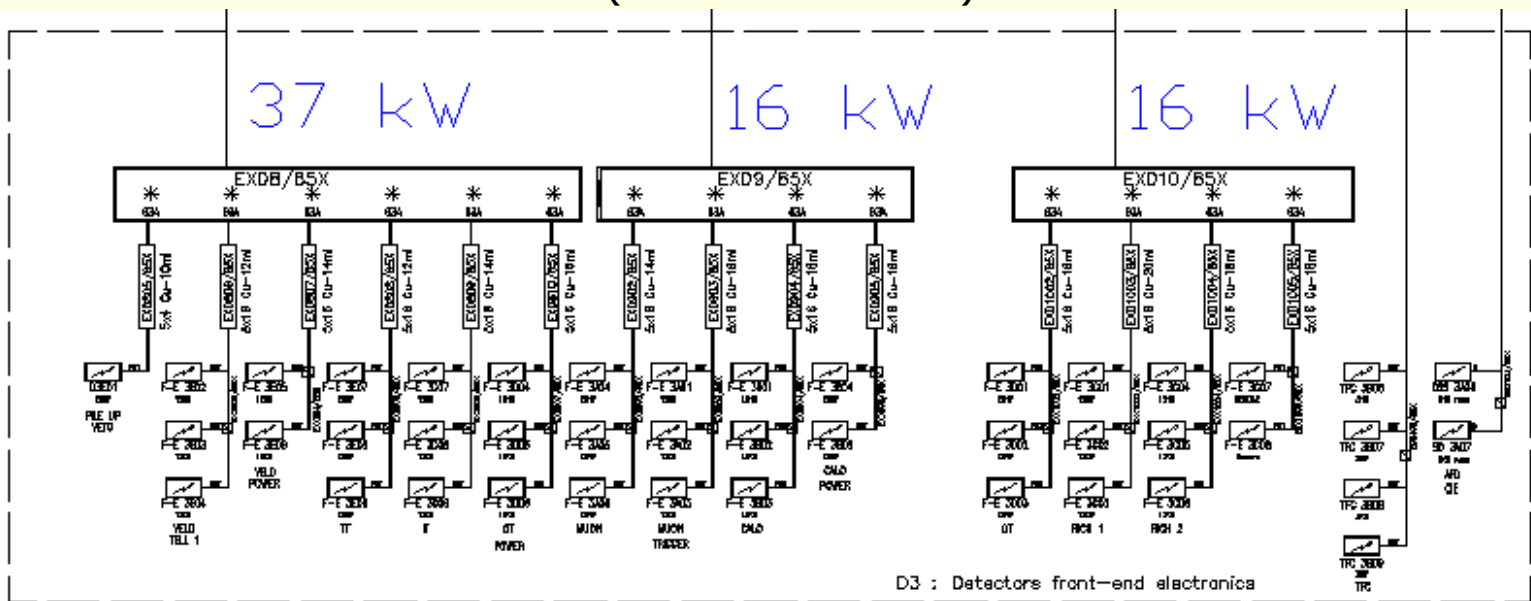
- Electrical power available per rack
distribution designed for **11 kW/rack max.**

When equipped with distribution box:
→ 7 single phase power outlets, **16 A** circuit breakers
(one use for air ventilation unit)

- Cooling power (mixed water): enough for this electrical power / rack



Front End racks in D3 consumption: **~ 70 kW** (~ 300 kW available in total)
D2 'Detector extension' row: **~ 4 kW** (~ 80 kW available)

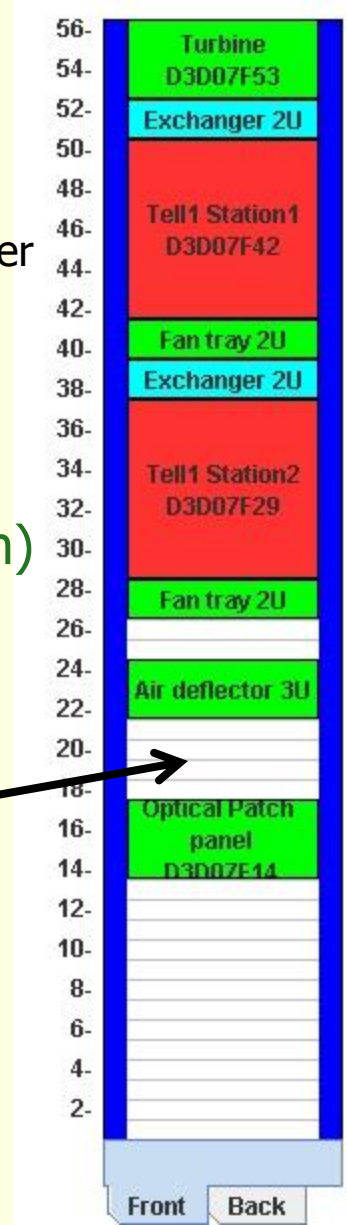


Rack in D3 dimensions: 2m54 x 60 cm x 90 cm

- Useful space :
height 56U (2m49) ~10U need to be free at the bottom for cabling and water valve access / width 19" (48,3cm) / depth ~73cm

- Level1 crates : 11U (9U+2U Fan) x 19" x ~72cm

→ replaced by new ATCA crate: 13U? (mechanical adaptation)
→ 48V DC Power supply put below the air deflector ?

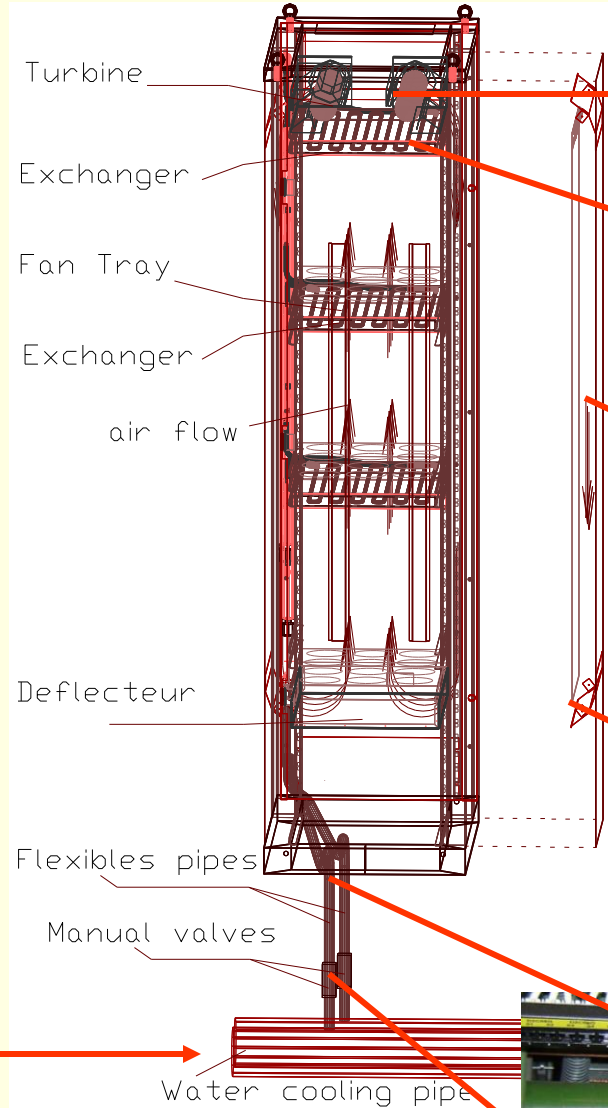


ATCA crate: maxi 14 boards x 250W = ~3.5 kW
→ total for 2 crates = ~7.0 kW maxi /rack (4 times more than now !)
→ Install an additional 2U exchanger or try to install only one crate per rack maximum.

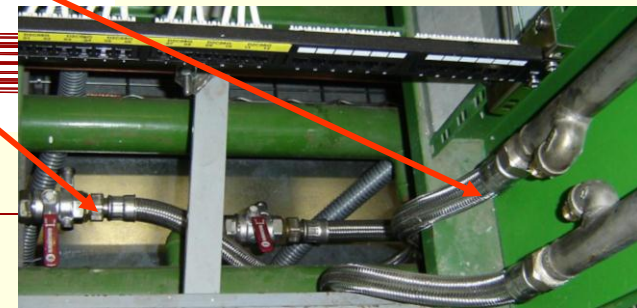
- Cooling:
vertical air flow
mixed water exchanger
Air temperature inside the rack
with 2 exchangers: ~ 18-19 °C

- Safety aspect (DSS):
Thermo switch: 40 °C (increase to 60 °C possible), Smoke detection, CO2 automatic triggering.

→ ATCA Crate need to be adapted (by the company?) to be compatible with vertical air flow.



water: 16 °C



➤ LV (Maraton): Possibility to install additional AC/DC Wiener module in existing crates

Sub-detector	AC/DC crate (6 slots)	Total slot available
Velo	1	4
RICH1	1	3
RICH2	1	2
Trigger Tracker	1	2
Inner Tracker	1	1
Outer Tracker	1	0
Calorimeter	6	4
Muon	5	12

➤ Additional crate can be installed for HV (except Muon)

Sub-detector	HV crate	Space for new crate
Velo	1 CAEN HV+1 ISEG HV+ (+1 LV CAEN)	1
RICH1	1 HV ISEG	1
RICH2	1 HV ISEG	1
Trigger Tracker	1 HV CAEN	1
Inner Tracker	1 HV CAEN	1
Outer Tracker	2 HV CAEN	3
Calorimeter	1 (400V) HP	4
Muon	2 HV CAEN +1 HV PNPI +1 HV GEM	0



CONCLUSION

Electrical power: no big modifications needed (in UX85)

Additional transformers to install at the surface for new PCs Farm.

Cooling and Ventilation: enough power but mechanics adaptation in racks needed

Enough Space for new electronics crates in the barracks (racks to be adapted).

Cables: few solutions exist for new 'long distance cables' installation

But heavy work (dismount wall?, groove in the concrete?,...) necessary

Cable chain to be replaced?

→ Existing infrastructure not incompatible with electronics Upgrade.

But preparing work not to be underestimated

spare slide

