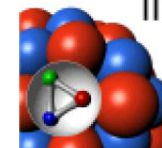




MVD Mechanics Update

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Outline

- MVD services update
- Services tables

MVD services – old design

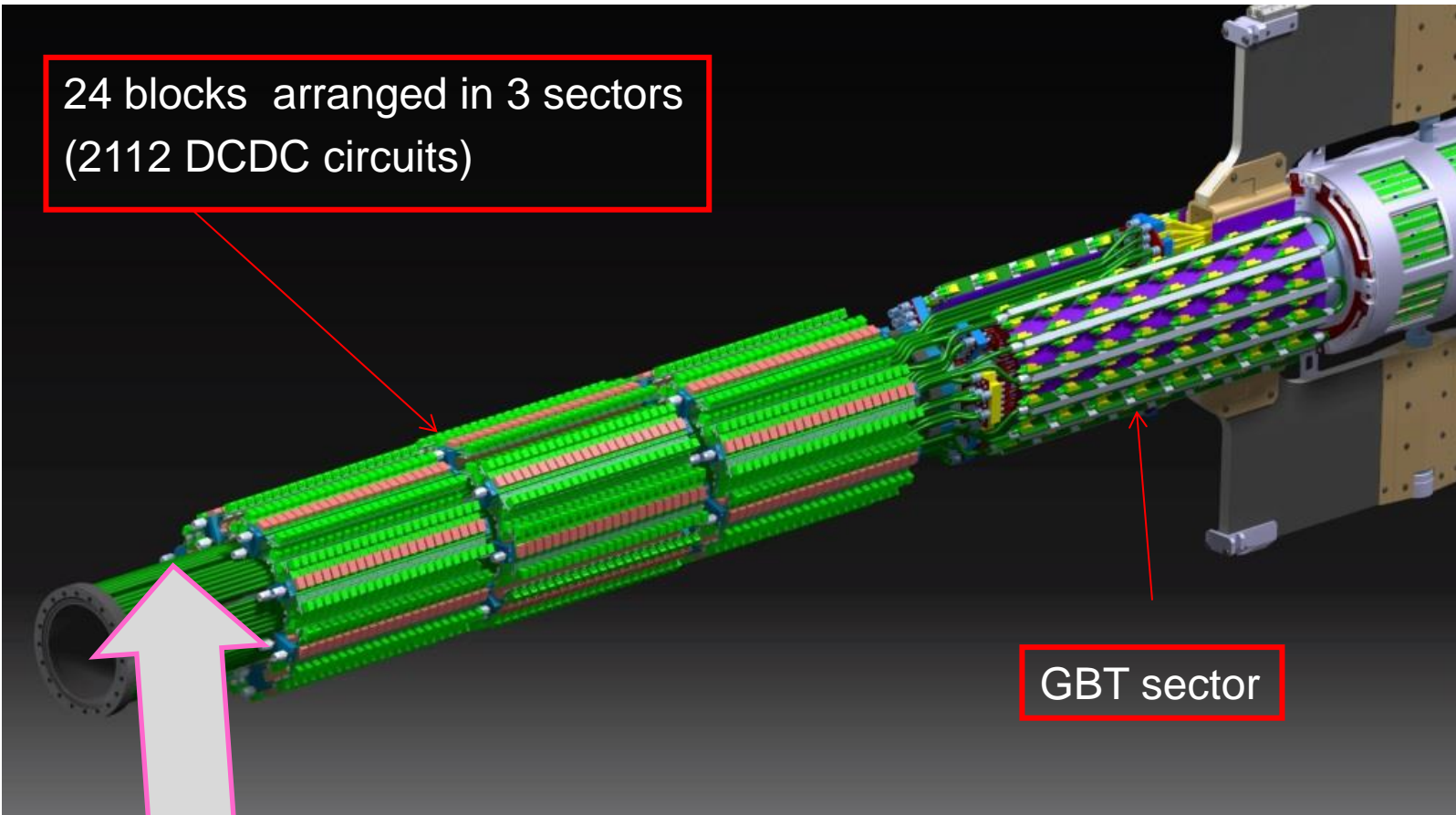
24 blocks arranged in 3 sectors
(2112 DCDC circuits)

MVD

GBT sector

- Space for intermediate connectors
- Space for cooling manifolds

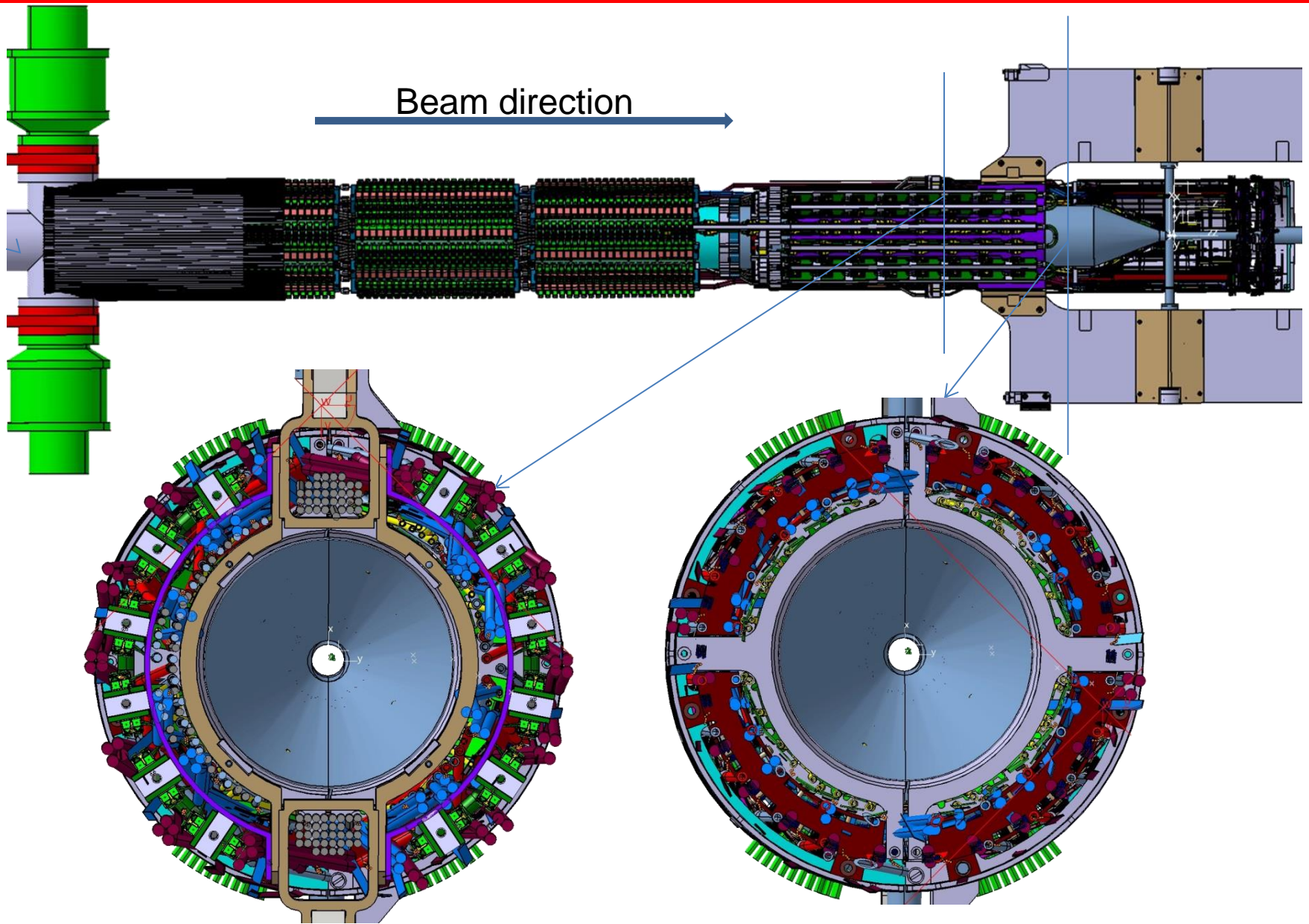
Shift backward of the pump
20 cm already requested
Answer → YES (Sep. 2016)



Open points

- Design and FEM analysis of central tracker (STT+MVD) support done without MVD services (80-90 kg hanging around the beampipe). Further analysis/variations certainly needed.
- Material budget and coverage simulations of MVD must be updated, e.g. to check whether the use of metallic connectors for the strip staves is acceptable.
- Pixel disks supported by the strip disks, but how? To be solved.
- The additional GBT cards problem must be solved.

Cable and cooling at various sections - GBT

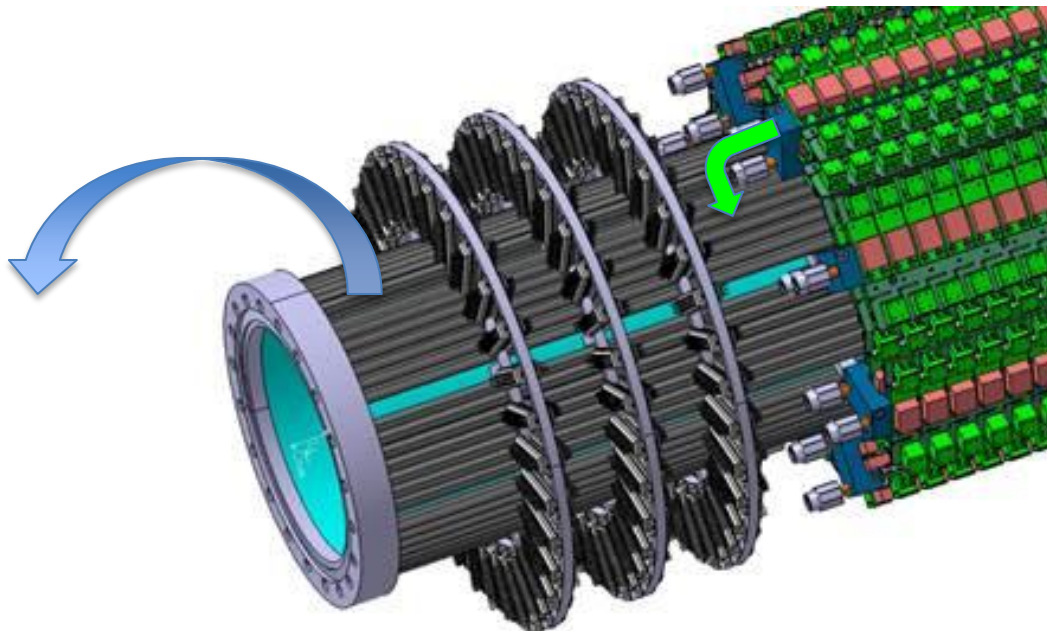


Section GBTs behind cooling distributor

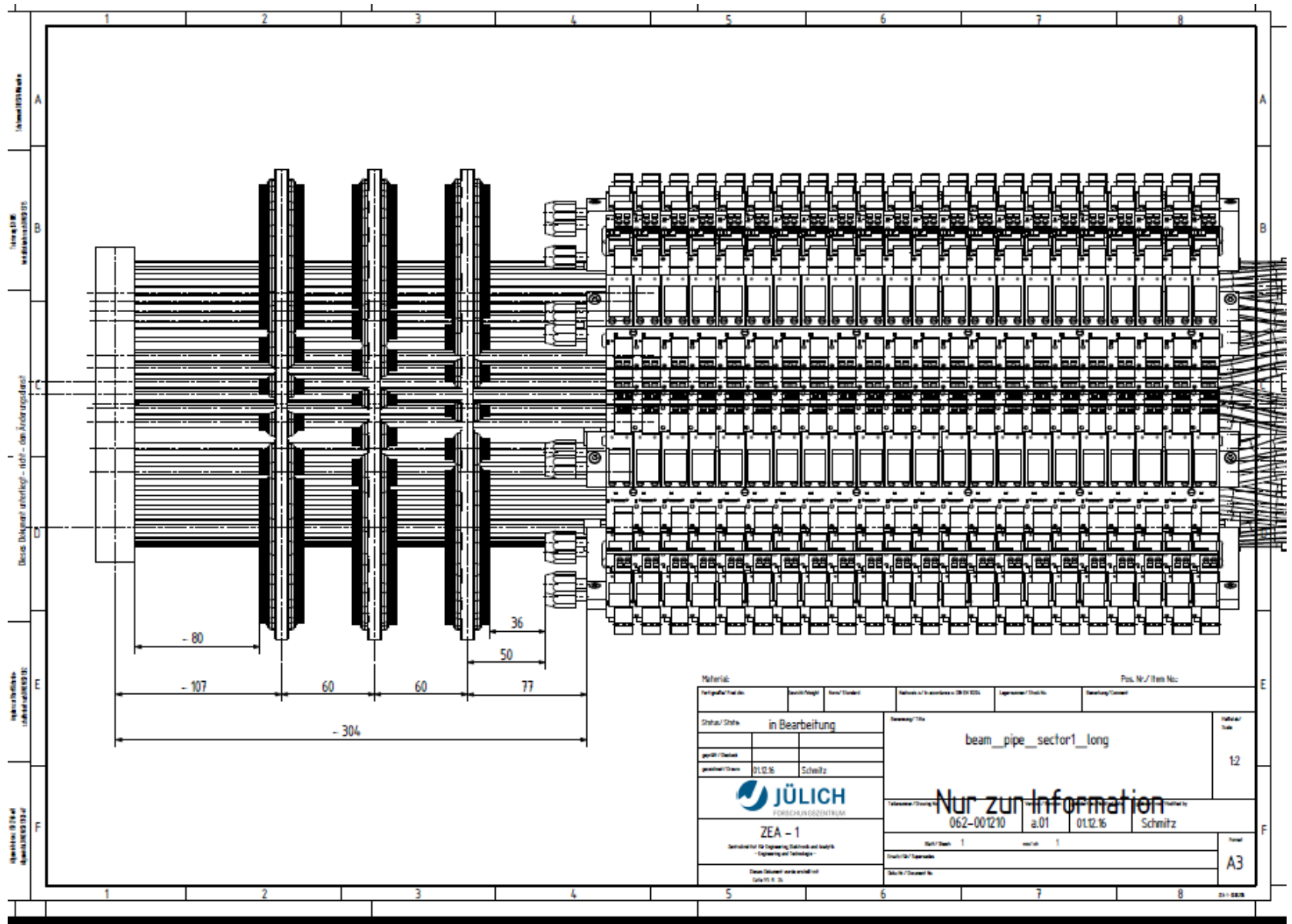
Section behind GBTs in front of MVD

MVD services

- 96 connectors in front of the first block of DC-DC converters -?
- The interruption here avoid the patch panels.
- Simplifies installation.
- 160 cooling pipes must be bent towards outer radius → the discs must be placed nearer to the DC-DCs and more spaced.



detail



Services tables

1. End of Services Support

1. End of Services Support						
1.1	Positions (<i>Coordinates, add comments</i>)	x	y	z	Type (model, series)	Comments
1.1.1	HV connector				Under study	to PP
1.1.2	LV connector				Under study	to PP ? /connector ring around the beam pipe
1.1.3	Signal connector					Signals via optical fibers
1.1.4	Cooling channel connector					Naked pipes to PP
1.1.5	Optical fiber connector				Under study	to PP, LC-LC Duplex OM3 P'cord , 2 mm LSZH cable
1.1.6	...					
1.2	Cross sections	ction of ur	Units	Total		
1.2.1	HV cable	1,69	768	1300 + 10% SF		
1.2.2	HV connector			to be verified		
1.2.3	LV cable			22790 +10% SF		
1.2.4	LV connector			to ve verified		
1.2.5	Signal cable			see optical fibers		
1.2.6	Signal connector			see optical fibers		
1.2.7	Cooling channel	16	150	2400 + 10% SF		
1.2.8	Cooling channel connector			to be verified		
1.2.9	Optical fiber cable	9	428	3900 + 10%SF		
1.2.10	Optical fiber connector			to be verified		
1.2.11	...					

Services tables

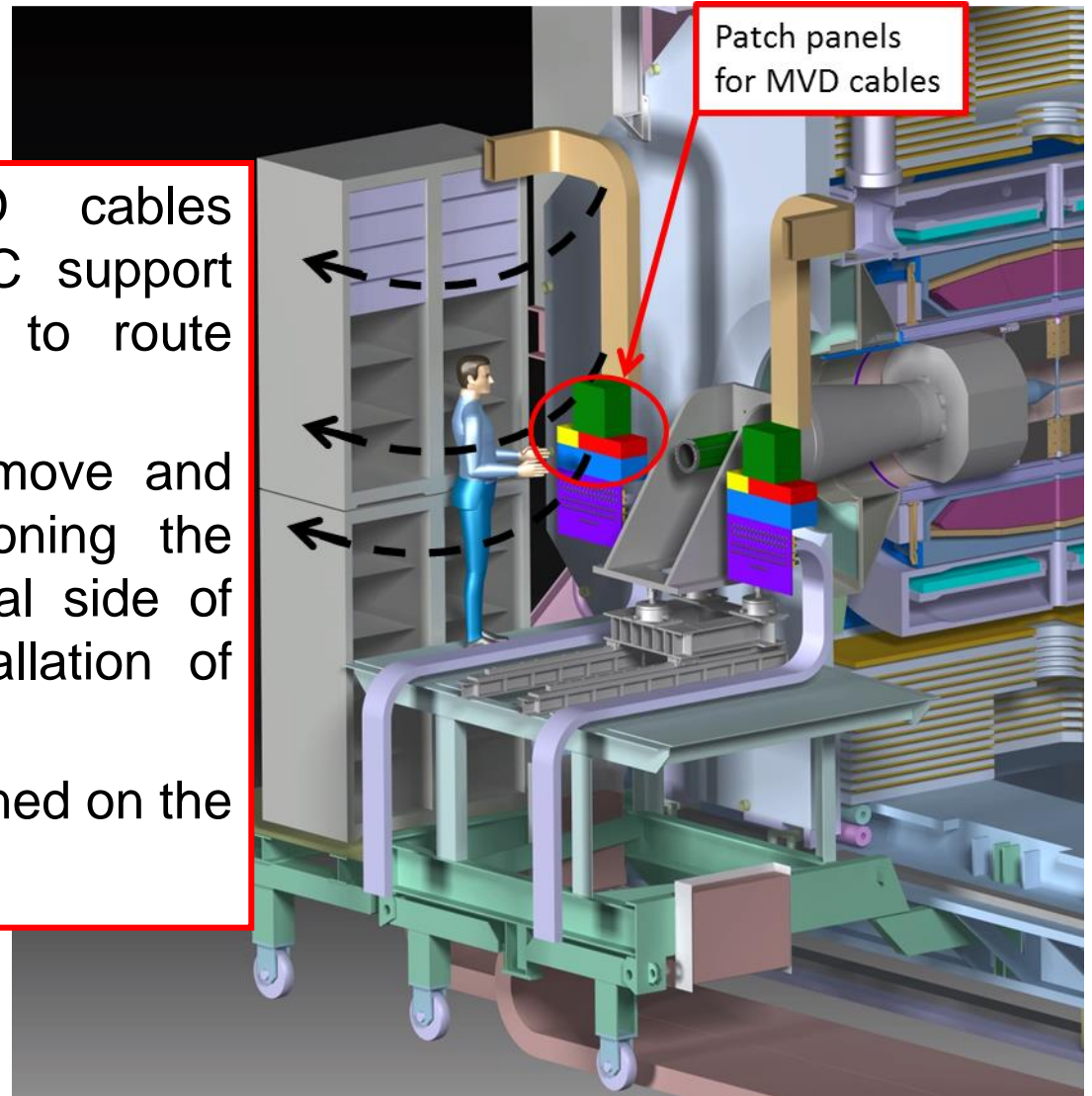
2. Patch Panels				
2.1 Positions (<i>Describe the preferred position</i>)				
2.1.1	HV	In front of the Magnet door, beside the BWC support		
2.1.2	LV	Part of LV beside the HV PP, the other part on the connector rings along the beam pipe, between the dcdc and the pump		
2.1.3	Signal	See the optical fibers		
2.1.4	Cooling	In front of the Magnet door, beside the BWC support		
2.1.5	Optical fibers	In front of the Magnet door, beside the BWC support		
2.1.6	...			
2.2 Size (<i>in mm</i>)				
		Δx	Δy	Δz
2.2.1	HV	400	600	300, under study
2.2.2	LV	400	600	300, under study
2.2.3	Signal	see optical fiber		
2.2.4	Cooling	600	600	300, under study
2.2.5	Optical fibers	400	200	200, under study
2.2.6	...			
2.3 Weight (<i>in kg</i>)				
2.3.1	HV	To be evaluated		
2.3.2	LV	To be evaluated		
2.3.3	Signal	To be evaluated		
2.3.4	Cooling	To be evaluated		
2.3.5	...			
2.4 To be attached (<i>Where it will be supported</i>)				
2.4.1	HV	in front of the magnet, ? from the top of the rack and supported from floor		
2.4.2	LV	in front of the magnet, ? from the top of the rack and supported from floor /around the beam pipe ?		
2.4.3	Signal	see optical fibers		
2.4.4	Cooling	from the floor of the platform		
2.4.5	optical fibers	in front of the magnet, ? from the top of the rack and supported from floor		

Patch panels example

Patch panels for MVD cables positioned close the BEMC support (left and right) with duct to route cables from racks.

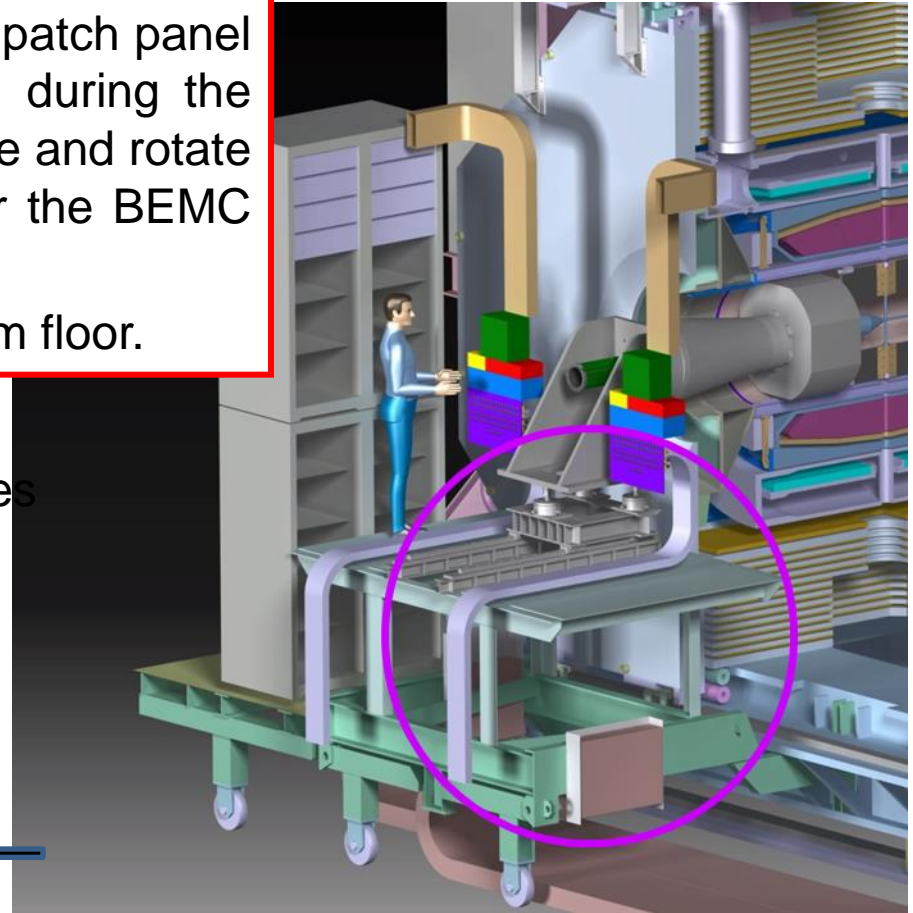
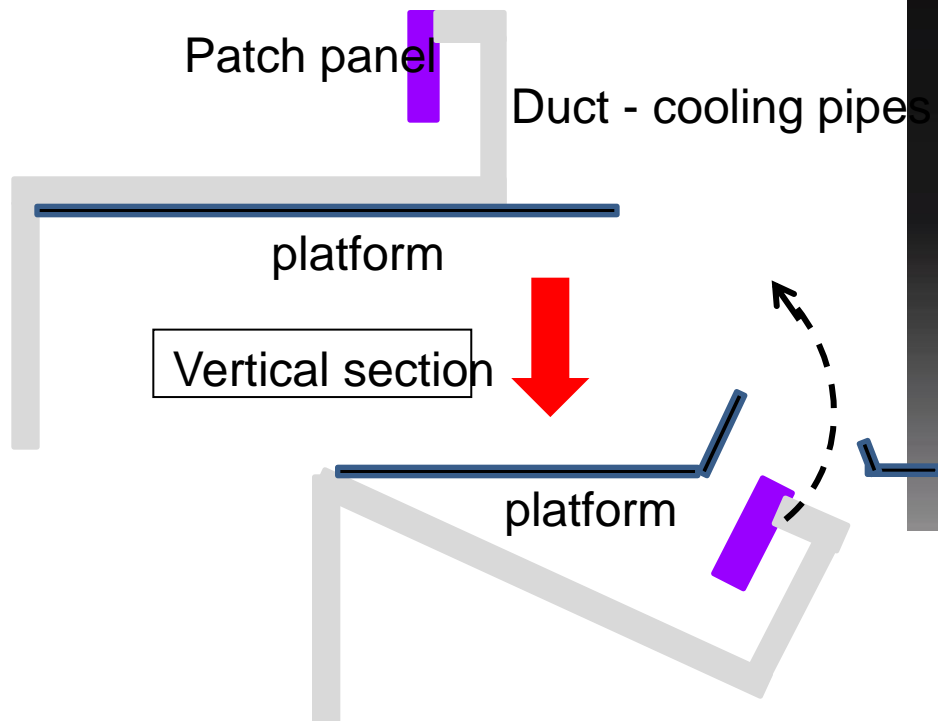
A specific system could move and rotate the duct for positioning the patch panels at the external side of the racks, during the installation of detectors.

The system could be positioned on the top of the racks



Patch panels example

The duct for the cooling pipes to the patch panels needs to be positioned under the platform floor
It should be a solution to foresee also the patch panel (for the cooling part) under the platform during the detectors installation. A system could move and rotate the patch panel to the final position, near the BEMC support.
But it is necessary to go trough the platform floor.



Services tables

3. Services from PP to Racks

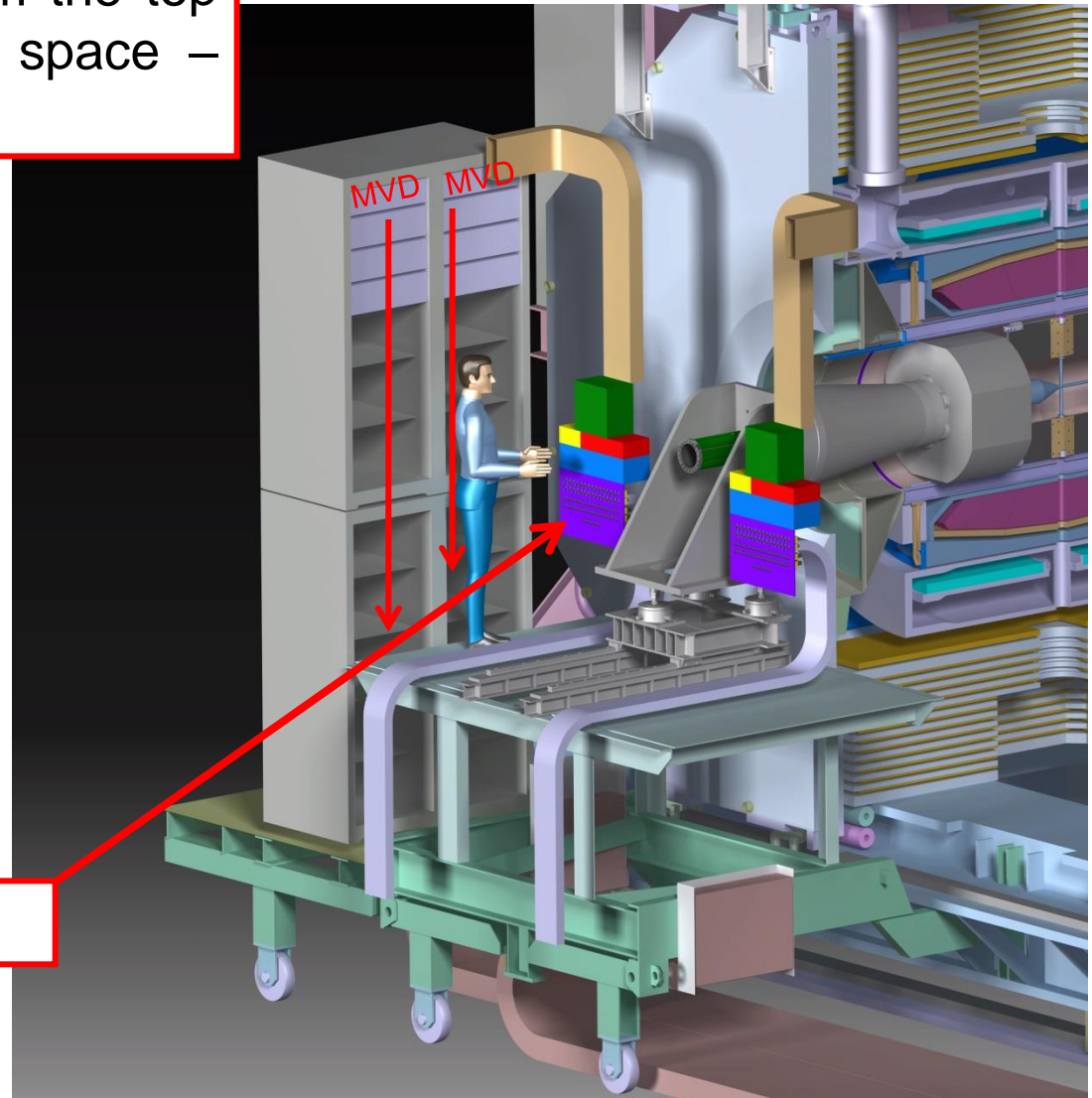
3.2 Cross sections		Section of unit	Units	Total	Type (model, series)
3.2.1	HV cable (mm ²)			1300 + 10%	
3.2.2	HV connector (same on both ends?)				Under study
3.2.3	LV cable			22790 +10%	
3.2.4	LV connector (same on both ends?)				Under study
3.2.5	Signal cable			see optical fibers	
3.2.6	Signal connector (same on both ends?)				Under study
3.2.7	Cooling channel	256	150	from PP to building wall - 38400 + 10%	
3.2.8	Cooling channel connector (same on both ends?)				Under study
3.2.9	Optical fiber cable			3900 + 10%SF from PP to E10	
3.2.10	Optical fiber connector (same on both ends?)				Under study
3.2.11	...				

Services tables

4. Racks				
4.1	Selection (<i>Which rack is preferred, e.g. <u>B-L-U</u></i>)			
	T - Top, B - Bottom			
	L - Left (west), R - Right (east)			
	U - Upstream, D - downstream (closer to the IP)			
4.2	"U" - Rack units			
4.2.1	HV	10		
4.2.2	LV	10		
4.2.3	Signal	8		
4.2.4	Cooling	3		
4.2.5	...			
4.3	Crates/Box (<i>Number</i>)			
4.3.1	HV	4		
4.3.2	LV	18		
4.3.3	Signal	1		
4.3.4	Cooling	4		
4.3.5	...			
4b	Pipes path (<i>Describe the path of the items not going to the racks</i>)			
4b.1	HV			
4b.2	LV			
4b.3	Signal			
4b.4	Cooling	bias and signal, from RACK to the pressure trasducers, at the cooling pipe PP		
4b.5	Optical fibers	from PP to E10		

Racks - request

Use the racks starting from the top (229 U (including cooling space – 50% left and 50% right)).



MVD patch panels

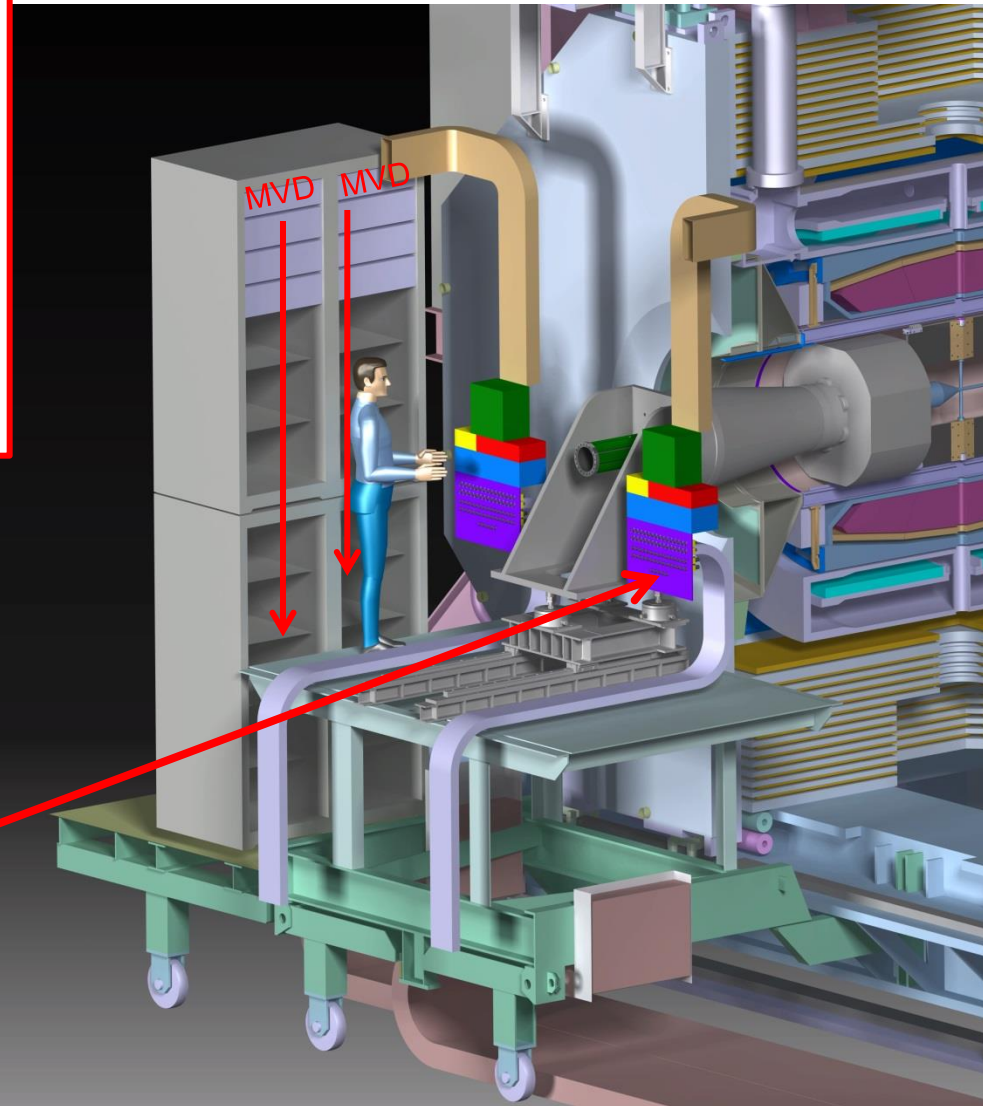
Racks - request

170 Pressure sensors to be

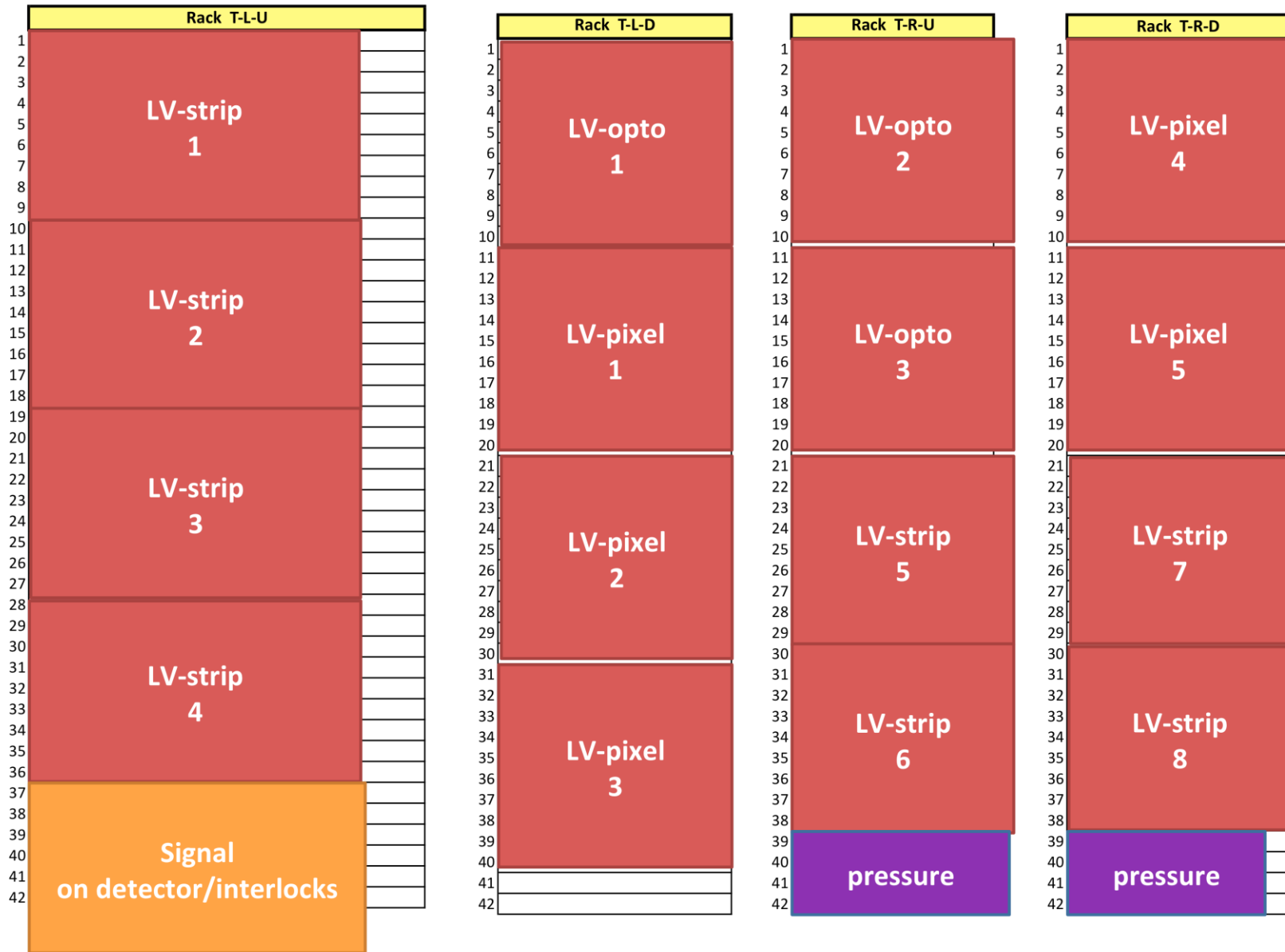
- powered
- read-out

With, alternatively:

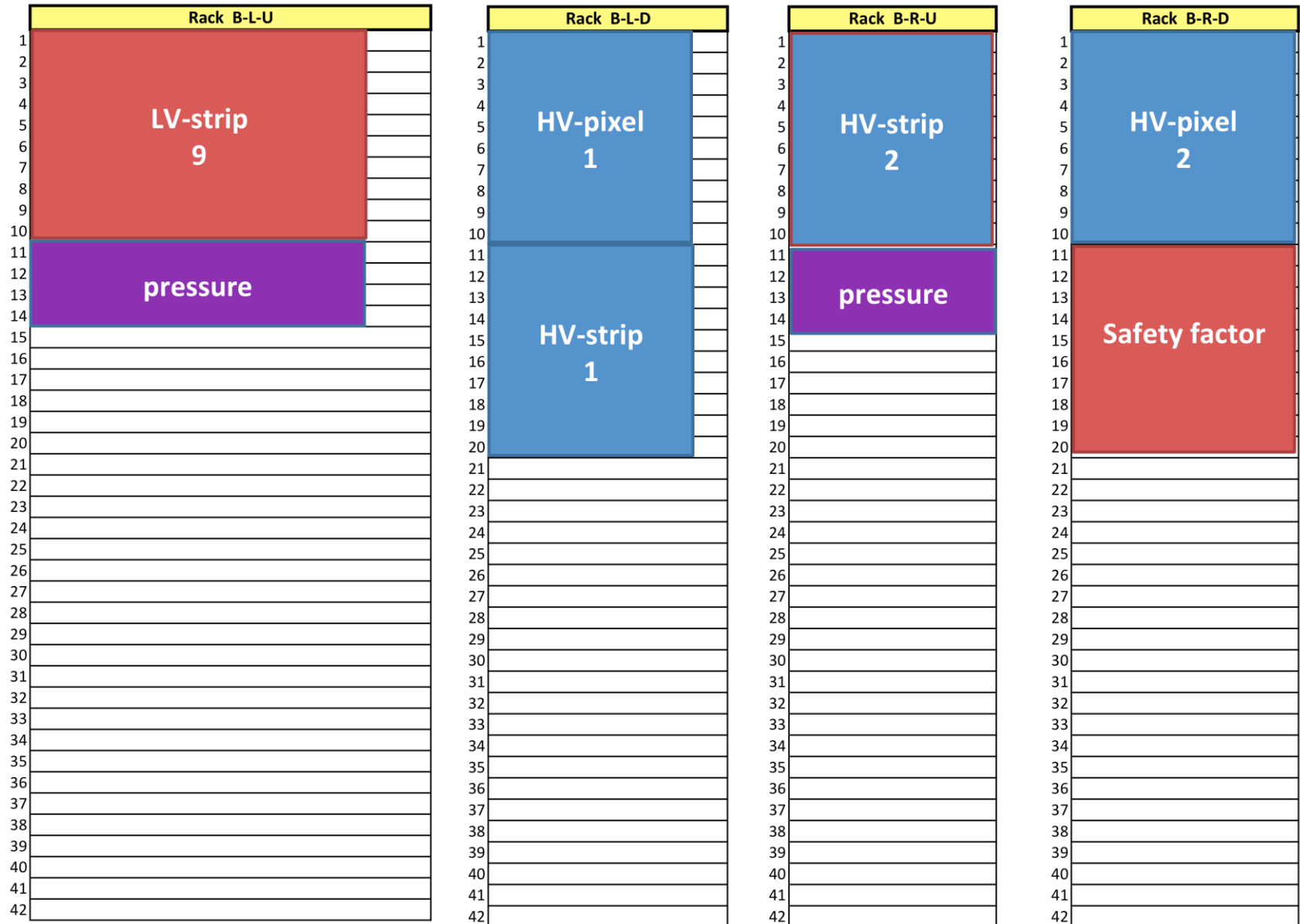
1. Boards to be arranged in the racks + local PLC to be connected with the MVD cooling plant
2. Cables along all the MVD cooling pipe duct up to the cooling plant

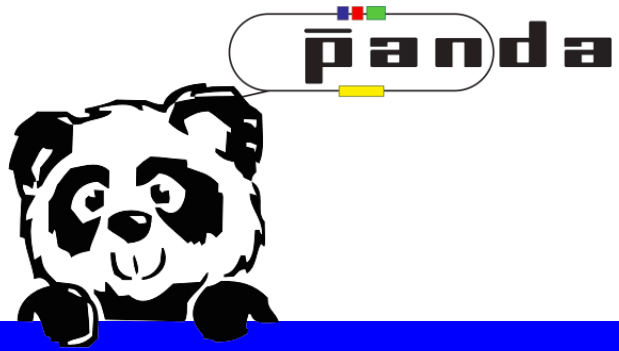


Rack occupancy – Top



Rack occupancy – Bottom





Thank you for your attention!

spares

DIMENSION of the HYDRAULIC CIRCUIT for MVD SYSTEM (PIXEL + STRIP + SERVICES):

TUBES FROM COOLING PLANT TO MAGNET:

- 21+22+32 INLET LINES= 75 INSULATED TUBES [Diam ext. 16mm each+ insulation]
- 21+22+32 RETURN LINES = 75 TUBES [Diam ext. 16mm]
- = 0,65 m* 0,15m total section for Tubes FROM COOLING PLANT TO PANDA (Stainless steel)

IN FRONT OF THE MAGNET DOOR (PP4)

- 150 Pressure sensors (one on each tube) CLOSE TO MVD (immediately in front of the magnet) + fittings
- 150 Readout cables and Power supply

TUBES INSIDE THE MAGNET (around the beam pipe)

- 8+8 Polyurethane tubes - inlet + return lines (diam. 6-8mm) for GBT Boards.
- 24+24 Polyurethane tubes – inlet + return lines (diam. 6-8mm) for DC-DC Converter Boards
- 43+43 Polyurethane tubes – inlet + return lines (diam. 6-8mm) for MVD internal patch panels
- 85+85 Polyurethane tubes- inlet + return lines (diam. 2,5-4 mm) from internal patch panels to MVD
- 8+24 U-Tubes for GBT and DC-DC Converter Boards in Stainless steel

INSIDE THE MVD

- 53 U-tubes for PIXEL + 24 U-tubes for STRIPS + 8 Strip Disks in MP35N

THE COOLING PLANT

- PLC
- Tank
- Vacuum pump
- Inlet pump + filter
- Water cleaning unit
- Manifolds and 75 inlet tubes
- Manifolds and 75 return tubes
- Heat exchanger
- 75 pressure regulator, + 75 flow meters + 75 valves on return lines + 75 water Temperature sensors
- 150 pneumatic valves
- Other sensors (tank level indicator, pump pressure sensors, water temperature sensors...)