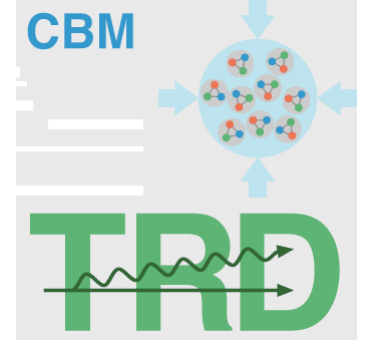




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MÜNSTER



HV, LV & Gas System

CBM-TRD TDR review
2017, March. 15th

Cyrano Bergmann
WWU Muenster, Germany
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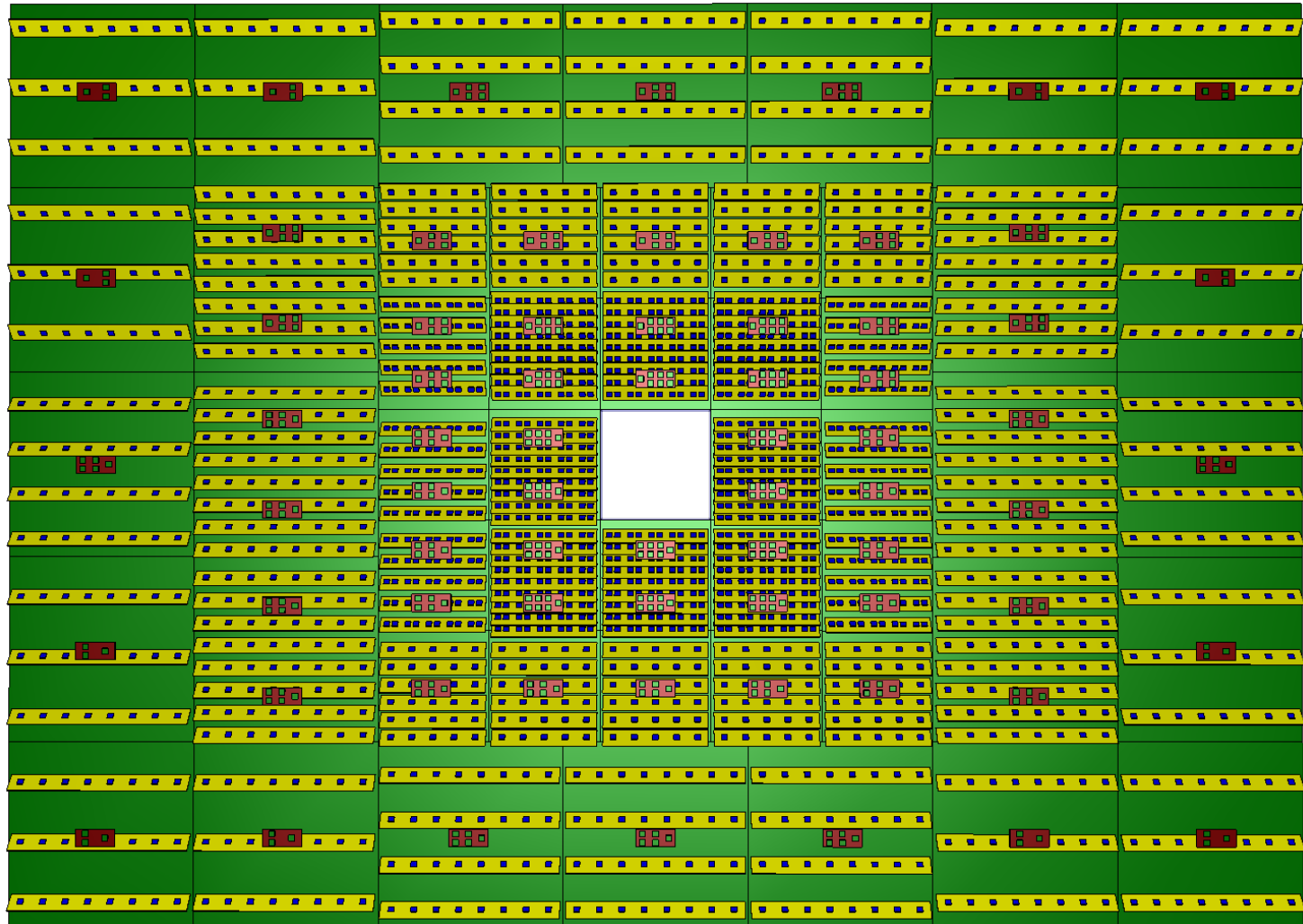
Bundesministerium
für Bildung
und Forschung



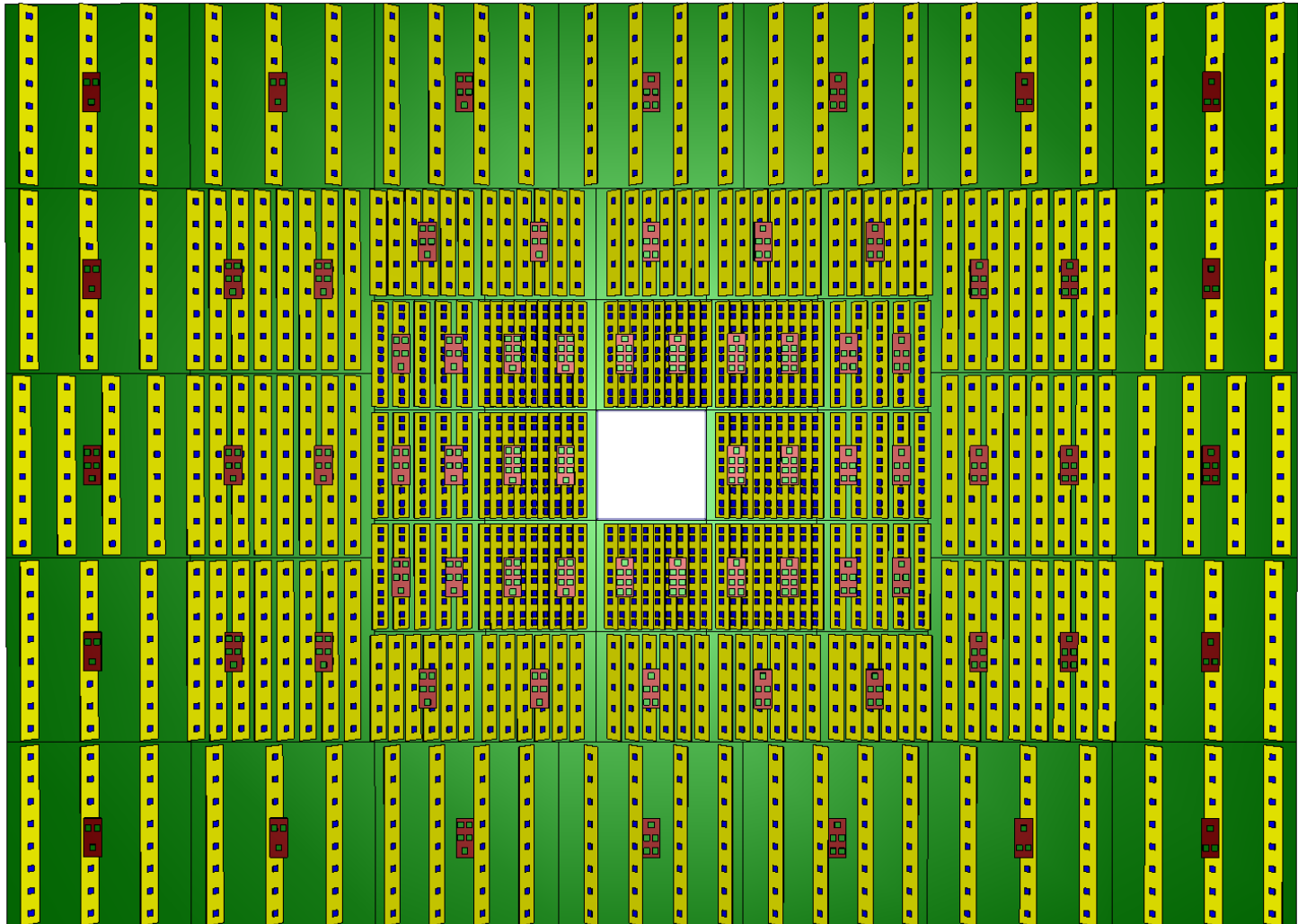
Chamber Types within one Layer

8	8	7		7		7		8	8
8	6	3	3	3	3	3	6	8	
		2	1	1	1	2			
7	6	2	1		1	2	6	7	
8	6	2	1	1	1	2	6	8	
		3	3	3	3	3			
8	8	7		7		7		8	8

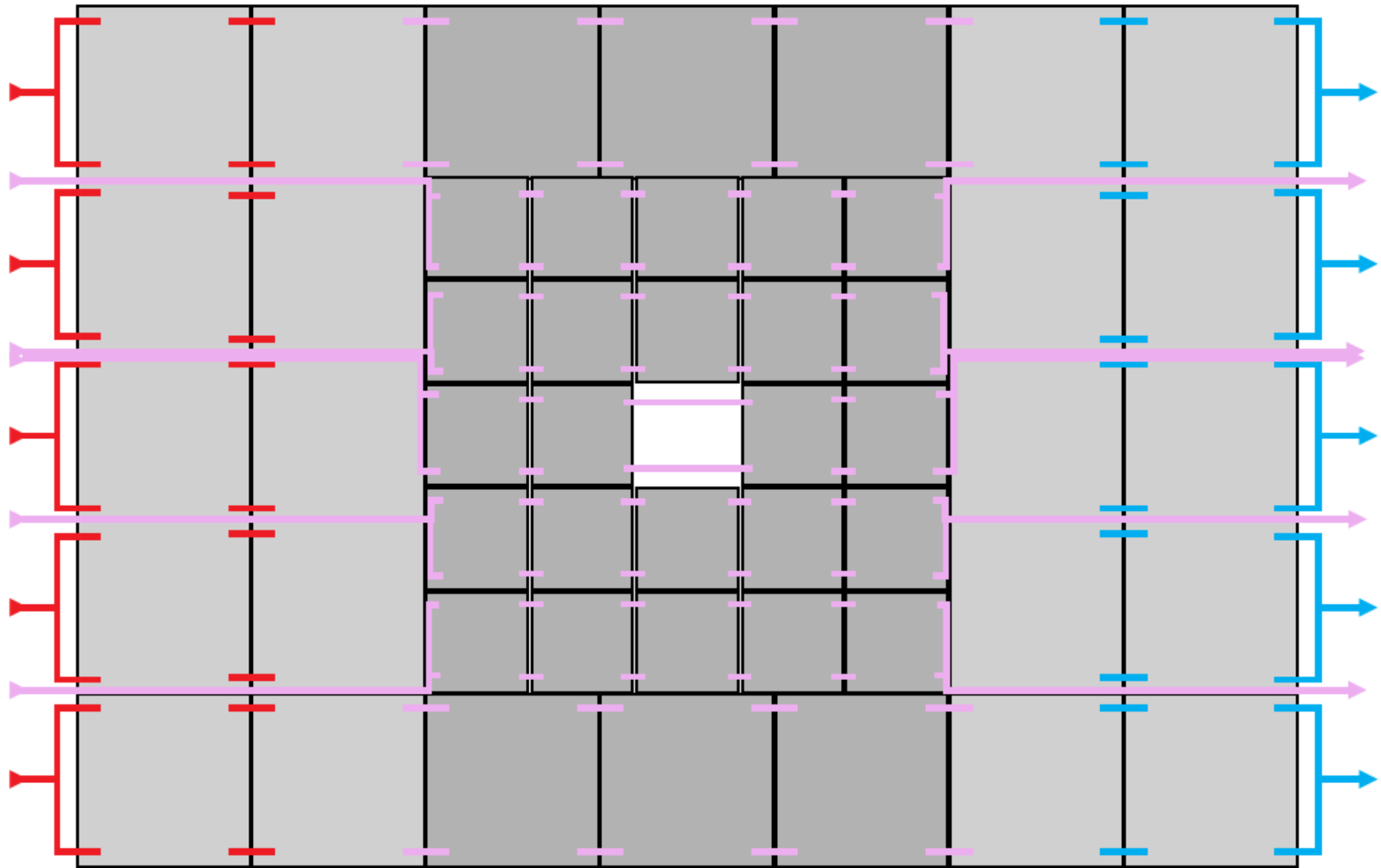
Layer 1 Backside



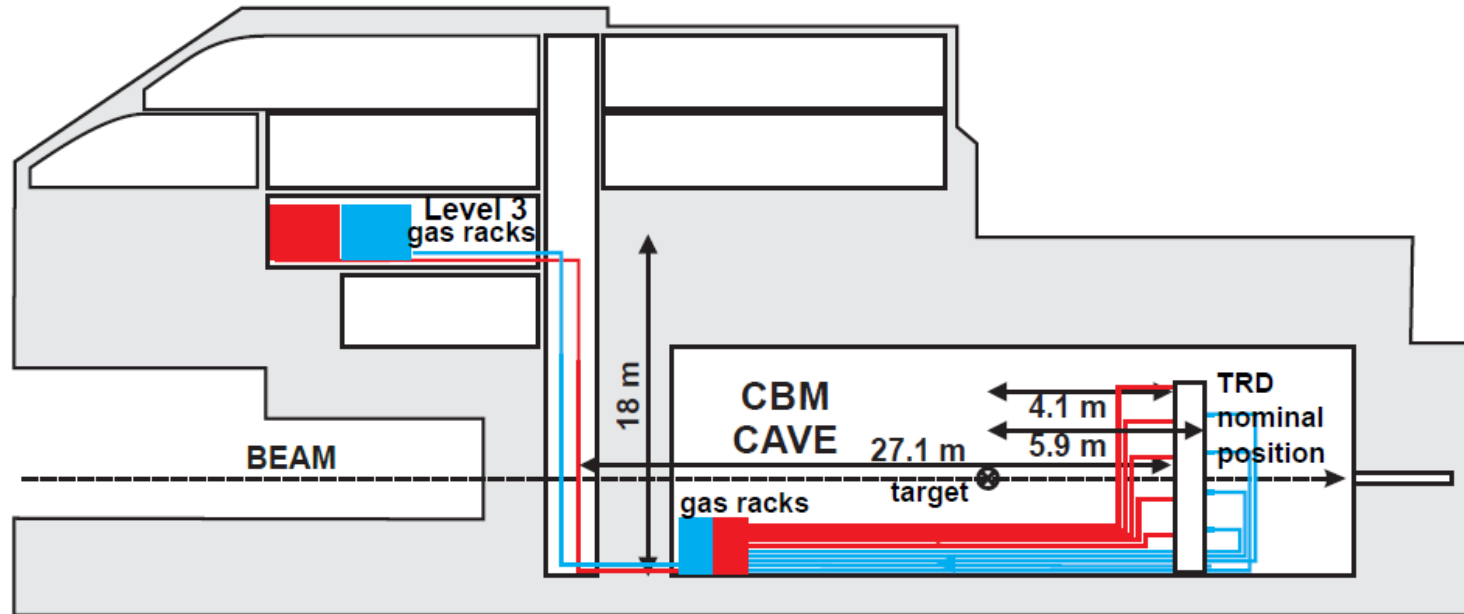
Layer 2 Backside



Gas system

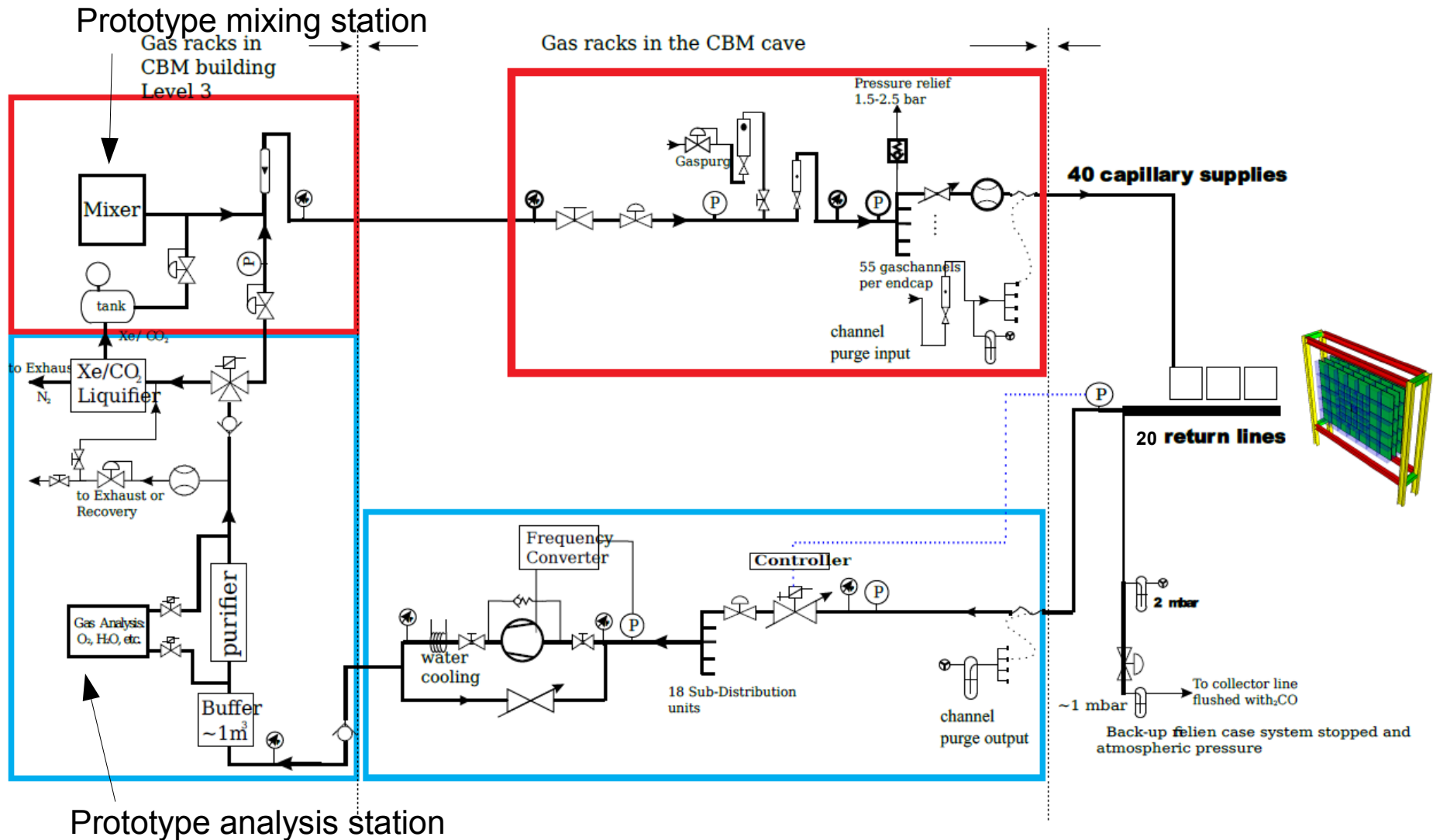


Red: 10x fresh gas input **Blue:** 10x used gas outlet



2 x 12mm Ø between Level 3 and cave (high pressure)
40 x 8mm Ø capillaries within the cave for input,
20 x 15mm Ø return lines

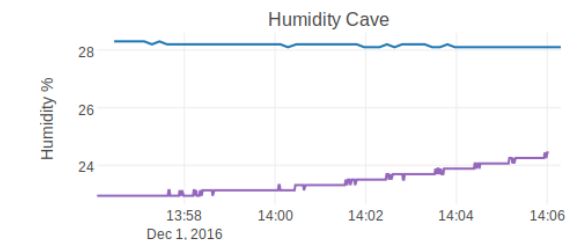
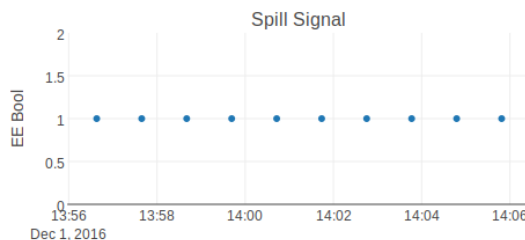
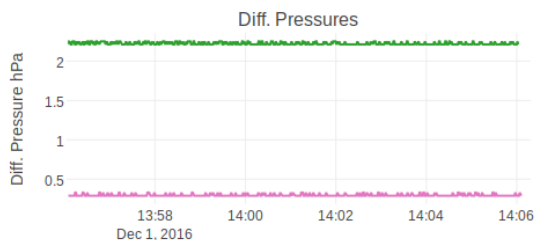
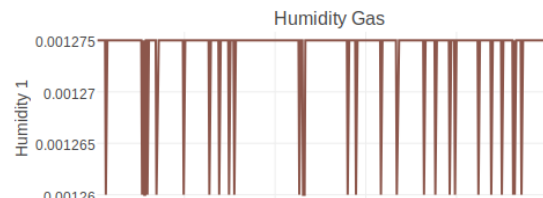
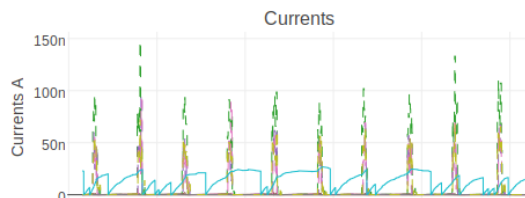
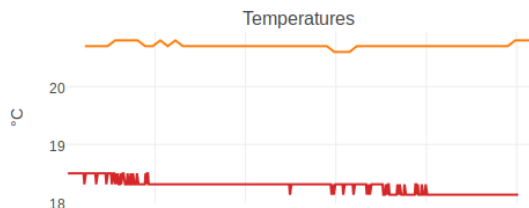
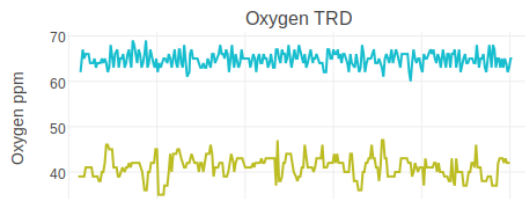
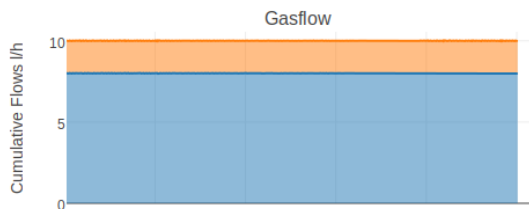
Gas system





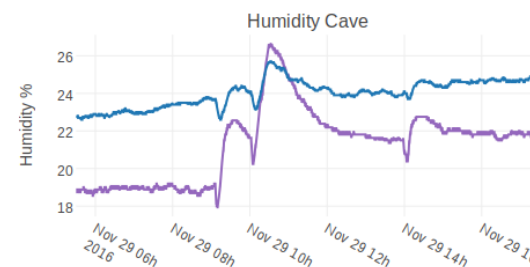
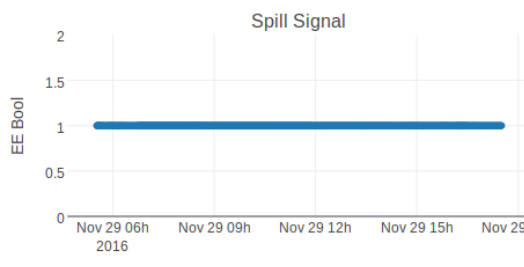
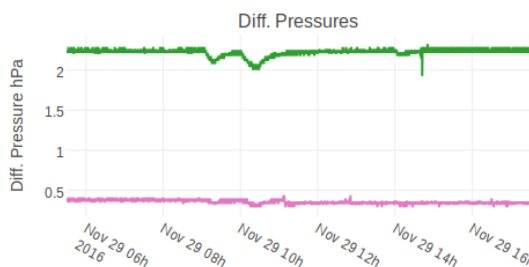
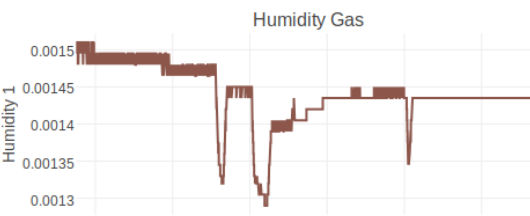
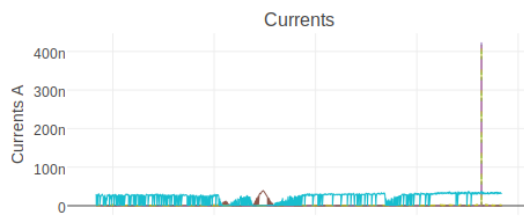
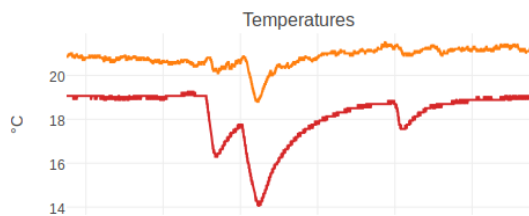
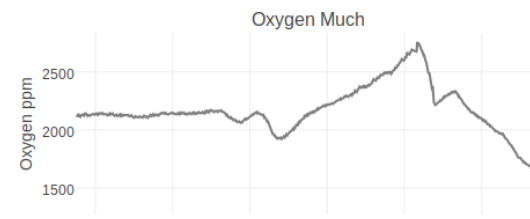
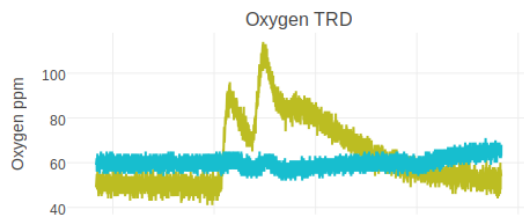
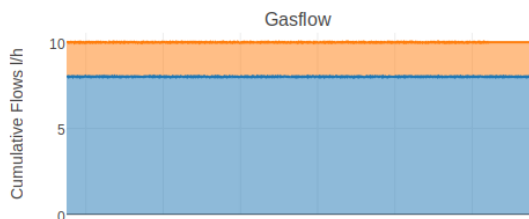
Detector Control Demonstrator @ CERN SPS 2016

TRD Slow Control Dashboard 10 Minuten



- Spill
- Chamber4Cathode
- Chamber4Anode
- Chamber3Cathode
- Chamber3Anode
- Chamber2Cathode
- Chamber2Anode
- Chamber1Cathode
- Chamber1Anode
- T Ana
- Hum% Ana
- Oxygen Bucharest
- Oxygen Muenster
- Oxygen Much
- Diff. p Ana
- Hum Gas
- Hum% Mix
- T Mix
- Diff. p Mix
- CO2
- Ar

TRD Slow Control Dashboard 12 Stunden



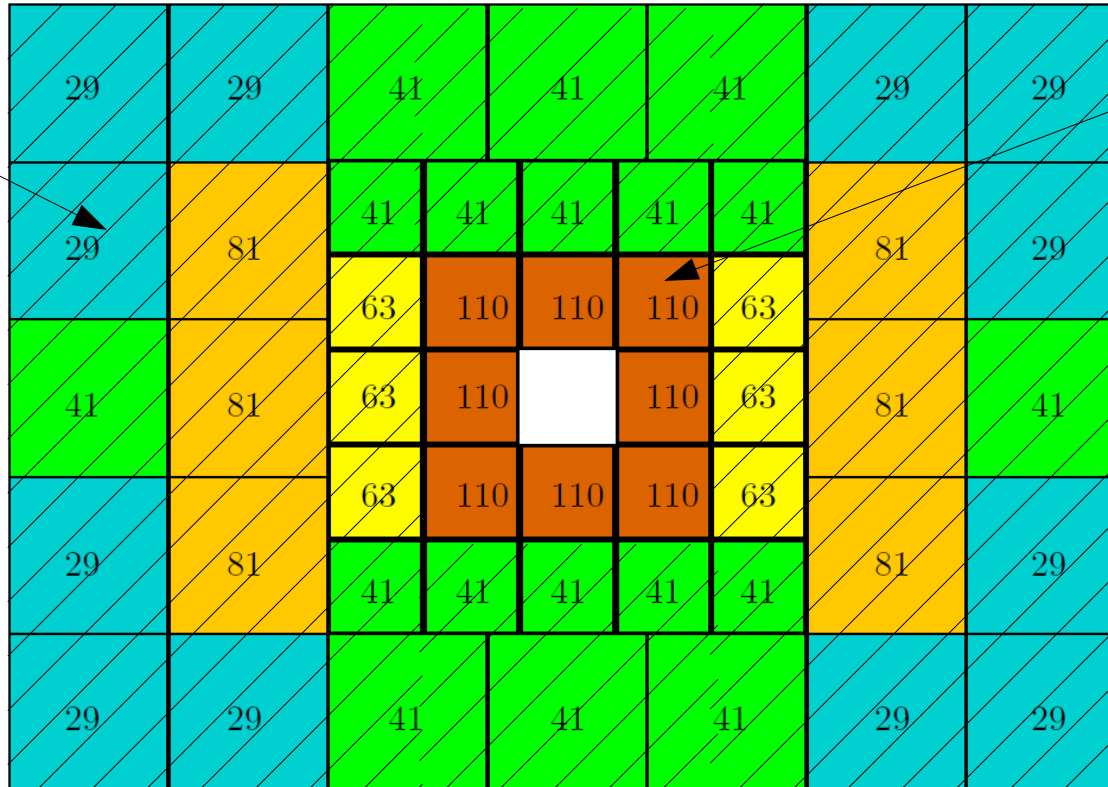
- Spill
- Chamber4Cathode
- Chamber4Anode
- Chamber3Cathode
- Chamber3Anode
- Chamber2Cathode
- Chamber2Anode
- Chamber1Cathode
- Chamber1Anode
- T Ana
- Hum% Ana
- Oxygen Bucharest
- Oxygen Muenster
- Oxygen Much
- Diff. p Ana
- Hum Gas
- Hum% Mix
- T Mix
- Diff. p Mix
- CO2
- Ar

LV system: Power Consumption (W)

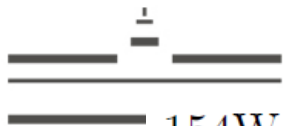
29	29	41		41		41		29	29
29	81	41	41	41	41	41	81	29	
		63	110	110	110	63			
41	81	63	110		110	63	81	41	
		63	110	110	110	63			
29	81	41	41	41	41	41	81	29	
29	29	41		41		41		29	29

Air cooling

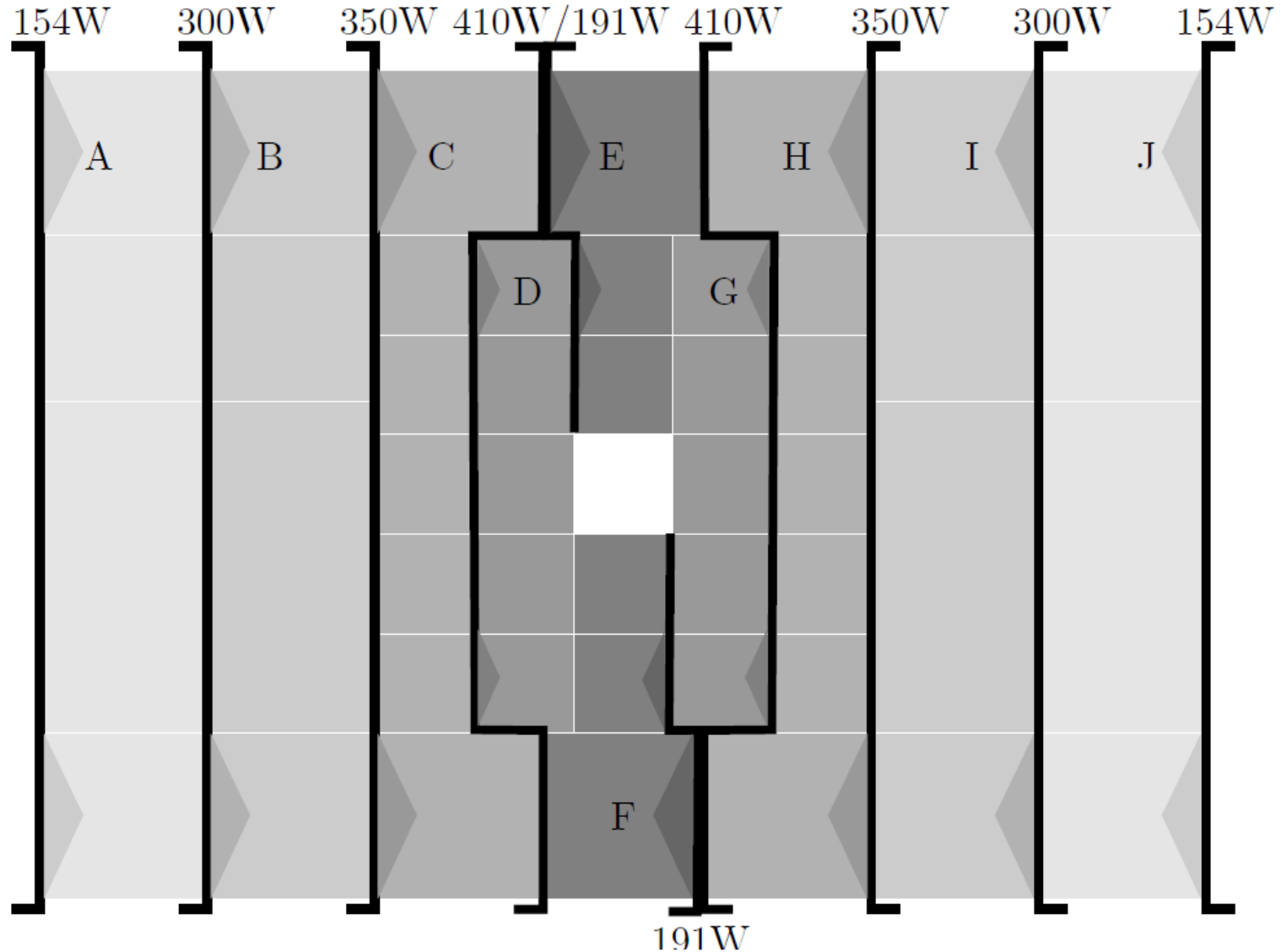
water cooling
if necessary



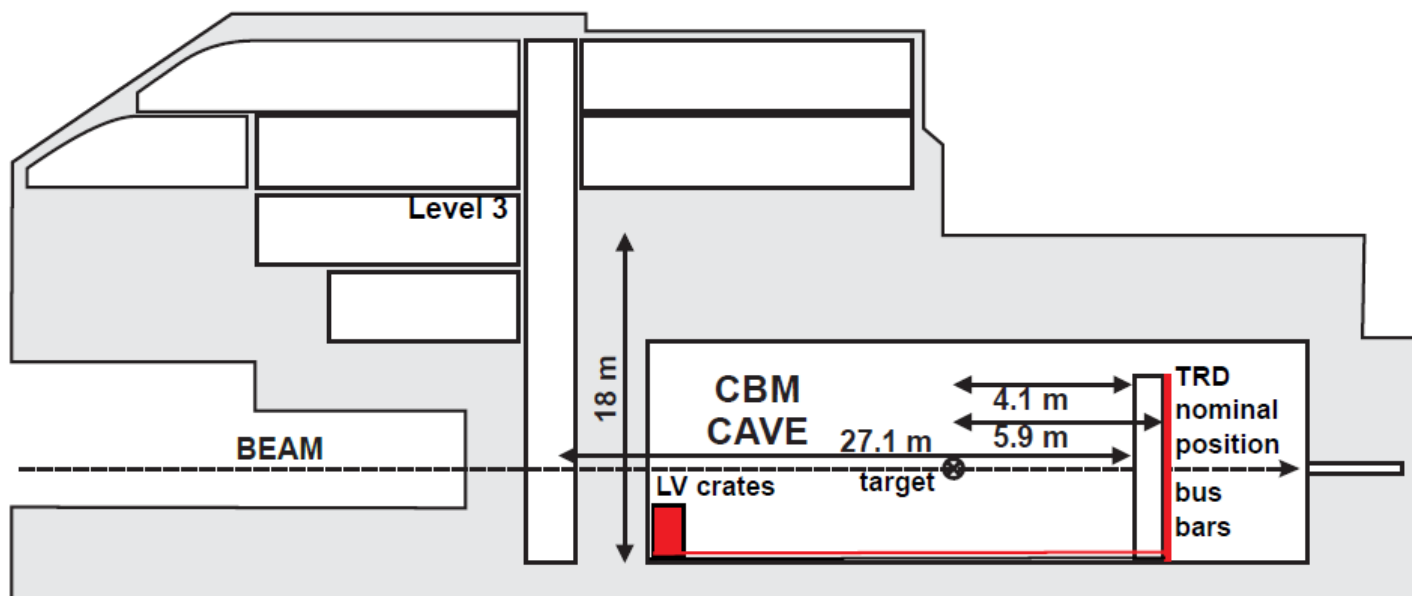
LV Power Bus-Bars



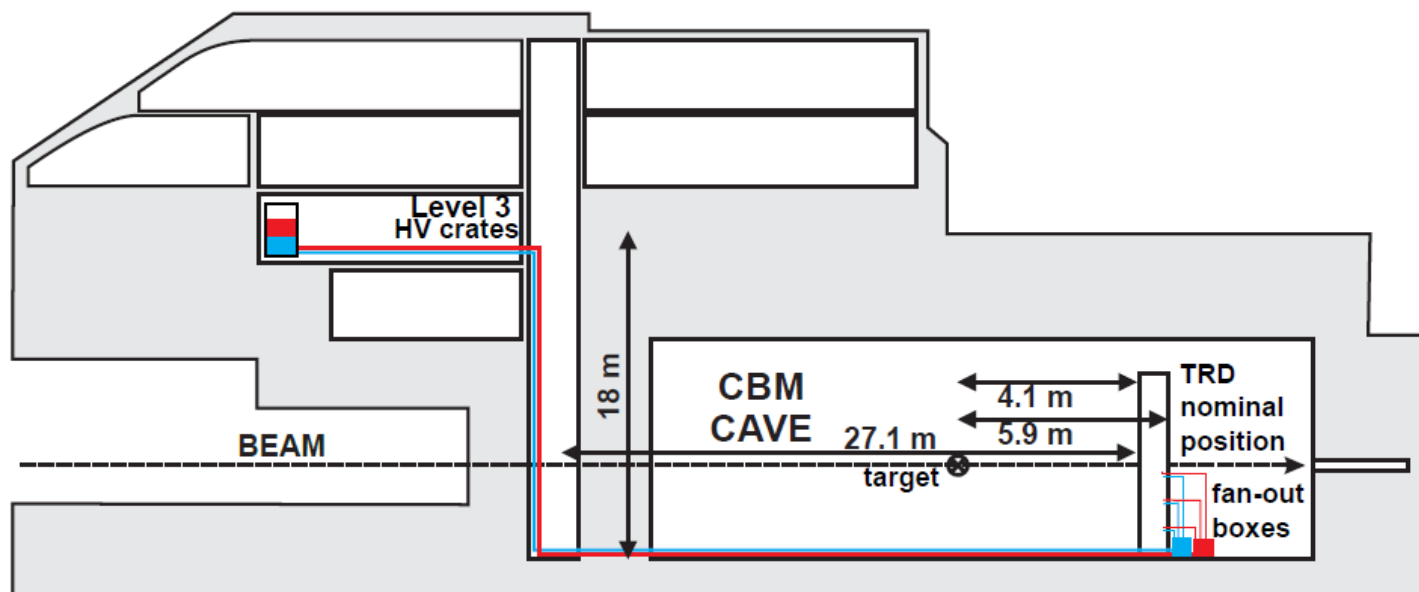
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10 power bus-bars → 20 cables



Number	Device	Length (m)	Comment
	LV power supplies		
80	LV supply cables	30	Between racks and detector
80	LV copper bus bars	2.28 – 5.51	on backside of each layer
1016	LV-FEB cables	0.6 – 1.0	



Number	Device	Length (m)	Comment
2	MPOD or ECH 44A		10 slots
7	ISEG HV EDS F025n 504		32 channels/module
7	ISEG HV EDS F025p 504		32 channels/module
16	37×0.14MM2 cable	45 – 50	32 channels
16	HV fan-out boxes		32 channels
400	Coaxial HV cables	15	single channel
200	HV filter boards		6 anode & 1 drift segment

First estimate:

1664 simplex fibers for TRD:

256 downlinks (64 per layer) → 7MPO fibers/layer
1408 uplinks (352 per layer) → 30MPO fibers/layer

CBM-TRD services:

- Gas system:

- Will be similar to ALICE TRD → knowledge transfer
- First demonstrator has been built and tested

- LV system:

- Power supplies to be defined
- Power distribution scheme ready for first demonstrator
- Cooling concept to be validated

HV system:

- Power distribution scheme tested in lab and beam