



**High
Luminosity
LHC**

Machine lay-out September 2015

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A. Rossi, S. Redaelli and the whole WP5
A. Ballarino, A. Jacquemod and the whole WP6
I. Efthymiopoulos, F. Sanchez Galan and the whole WP8
F. Cerutti, L. S. Esposito and the whole WP10
V. Baglin, C. Garion, J. Perez Espinos and the whole WP12
R. Jones, T. Lefevre and the whole WP13
All participants to WP15 weekly meeting.
Model construction B. Vazquez de Prada, C. Magnier, S. Maridor

Presented by P. Fessia



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Summary

- Model and drawing status
- Main changes of magnetic lengths and magnetic centres respect to the approved drawing
- Position of BPMs in present lay-out
- Scrolling through the lay-out
- 5 Right versus 5 Left

Status of model and drawings

- The 3D model of the 5R and 5L are completed (previously only 5R)
- New process to create the 2D drawings from the CATIA model developed by EN-MEF-DC (S. Chemli):
 - One unique parent model (3D)
 - Intimately linked to the database
 - Under debugging
 - More complex than autocad drawing
 - Frist time so it takes more time
- To be improved: generation of the excel file to check optics with ABP colleague and to position elements. Too manual leads to false inconsistencies

Main magnetic length and position changes

Assembly	Sub assembly	Magnetic length [mm]		Magnetic centre [mm]		
		Previous	New	Previous	New	Difference
Q1 (LQXFA)	MQXFA	4000	4200	25000	25100	100
	MQXFA	4000	4200	29500	29946	446
Q2A (LQXFC)	MCBXFB	1200	1200	34100	34585	485
	MQXFB	6800	7150	38600	39249	649
Q2B (LQXFD)	MQXFB	6800	7150	47400	48507	1107
	MCBXFB	1200	1200	51900	53170	1270
Q3 (LQXFB)	MQXFA	4000	4200	56500	57810	1310
	MQXFA	4000	4200	61000	62656	1656
CP (LCXF)	MCBXFA	2200	2200	66444	68603	2159
	MQSXF	807	807	68243	70402	2159
	MCTXF	430	430	69003	71162	2159
	MCTSXF	89	89	69401	71559	2159
	MCDXF	95	95	69627	71786	2159
	MCDSXF	95	95	69856	72105	2159
	MCOXF	87	87	70080	72238	2159
	MCOSXF	87	87	70297	72456	2159
	MCSXF	111	111	70527	72685	2159
	MCSSXF	111	111	70768	72927	2159

Main magnetic length and position changes

Assembly	Sub assembly	Magnetic length [mm]		Magnetic centre [mm]		
		Previous	New	Previous	New	Difference
D1 (LBXF)	MBXF	6270	6270	75455	77804	2349
TAXN		3500	3332	128736	128800	65
D2 (LBRD)	MBRD	7780	7780	142396	142513	118
	MCBRD	1500	1800	147516	147699	173
	MCBRD	1500	1800	149496	149873	378
ACFGA001	ACFCA.AR5.B1			153574	154818	1244
	ACFCA.BR5.B1			154624	155868	1244
ACFGA002	ACFCA.AR5.B2			156974	158638	1664
	ACFCA.BR5.B2			158024	159687	1663
ACFGA001	ACFCA.CR5.B1			160174	162258	2084
	ACFCA.DR5.B1			161224	163308	2084
ACFGA002	ACFCA.CR5.B2			163574	166078	2504
	ACFCA.DR5.B2			164624	167128	2504
Q4 (LQYY)	MCBYY	1500	1800	172605	172228	-377
	MCBYY	1500	1800	174585	174413	-172
	MQYY	3830	3830	177600	177600	0

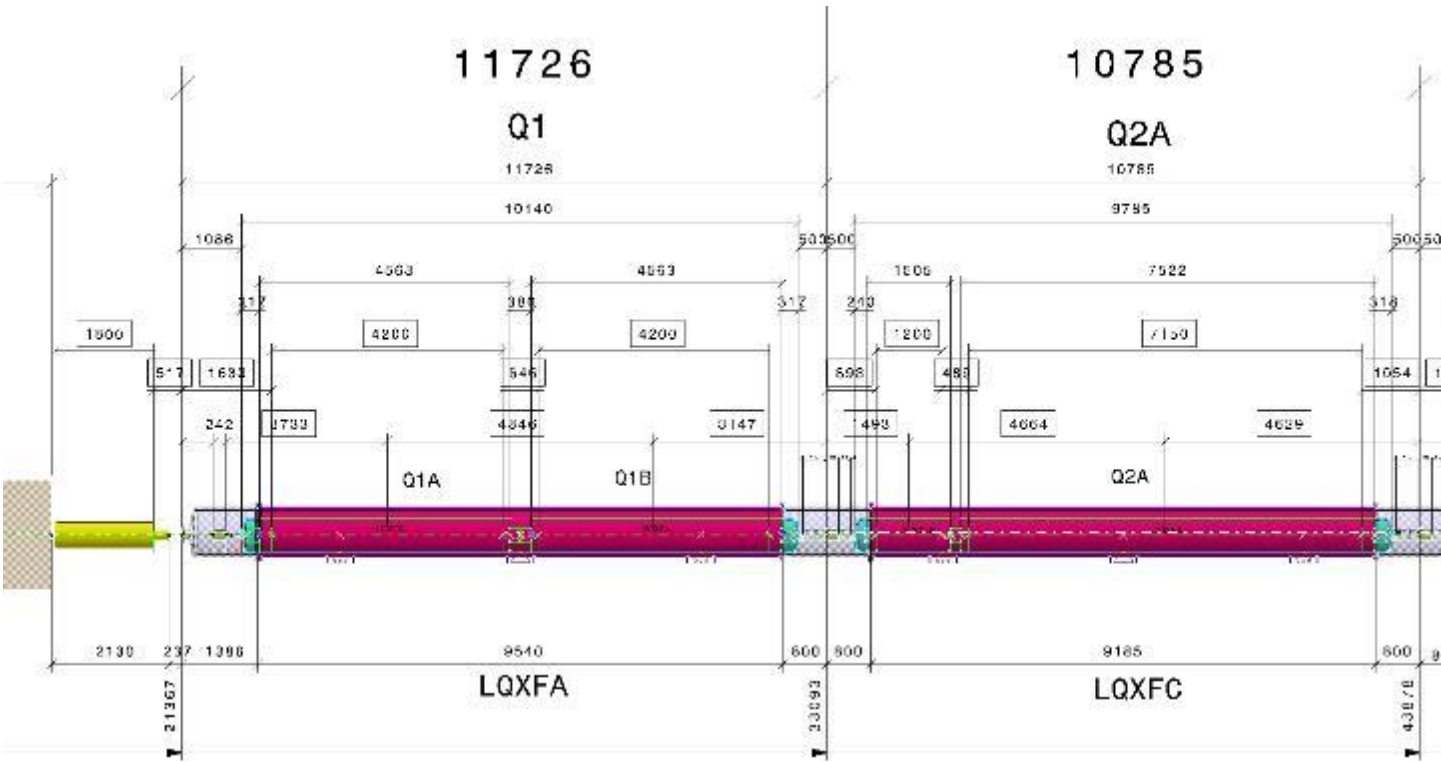
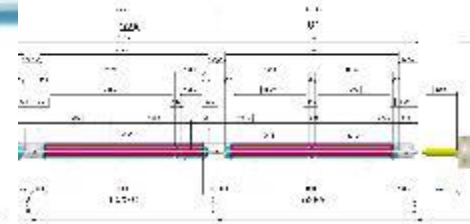
Main magnetic length and position changes

Assembly	Sub assembly	Magnetic length [mm]		Magnetic centre [mm]		
		Previous	New	Previous	New	Difference
Q5 (LQYCJ)	MQY	3400	3400	207490	207490	0
	MCBY	900	900	202376	210012	7636
	MCBY	900	900	203672	211308	7636
	MCBY	900	900	204968	212604	7636
Q6 (LQNDF)	MCBC	900	900	2252348	225348	0
	MQML	4800	4800	228390	228390	0

BPM positon present lay-out
 extra BPM on the IP side under study by WP8

	Q1	Q2A	Q2B	Q3A	Q3B	D1
NAME	BPMSQ	BPMSQ	BPMSQT	BPMSQT	BPMSQT	BPMSQ
L*23m	BLIND	BLIND	OK	OK	OK	OK
DISTANCE TO THE BLIND AREA EDGE	-92	-12	181	616	696	360

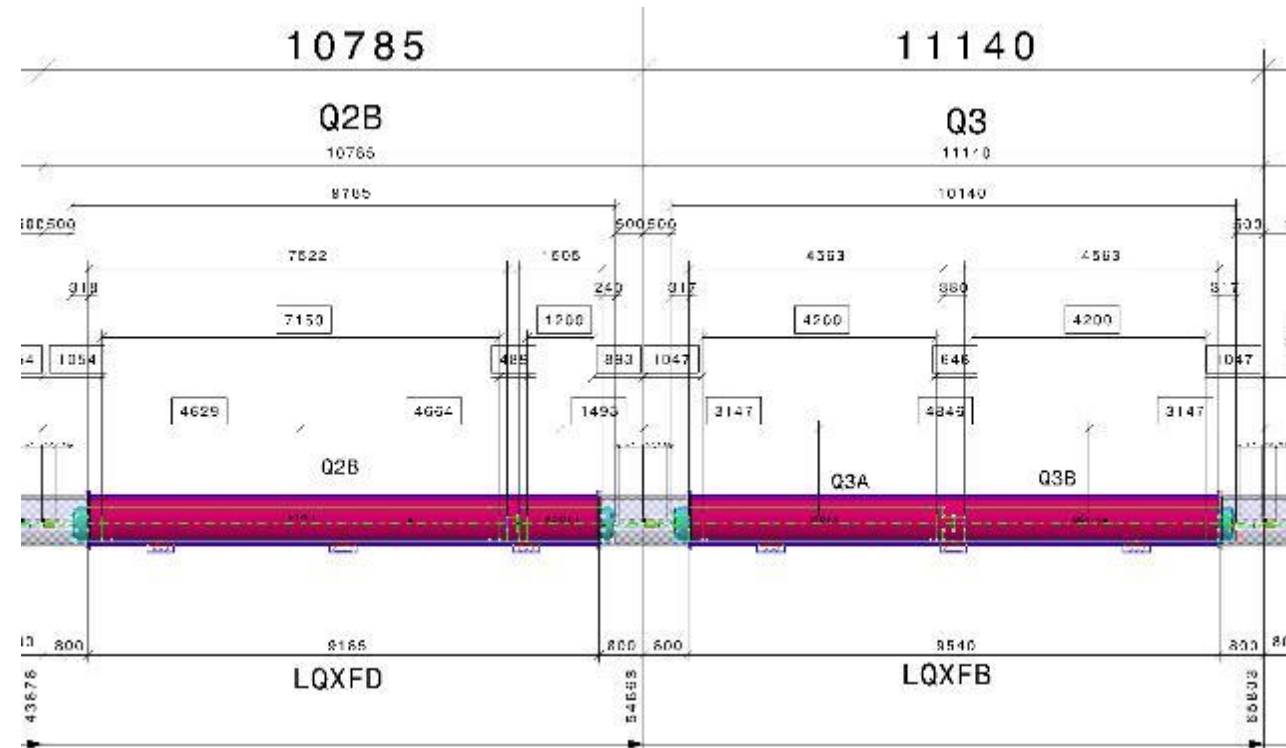
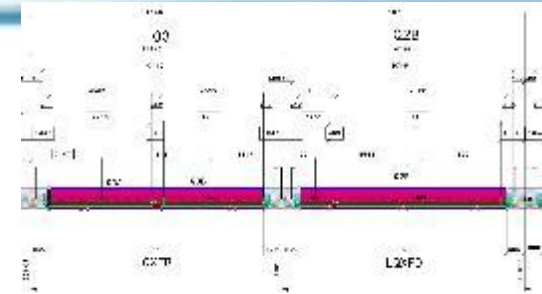
From Q1 to Q2a



CHANGES

TAXS→Q1	Equipment between TAXS and TAXN reduced accordingly to WP8 most credible option. BPM of Q1 cold inside the cryostat. Not in best position.
MQXFA/MQXFB	Magnetic lengths increased
MQXFA/MQXFB	Mechanical lengths increased and mechanical lengths repartition left and right changed to accommodate the magnet mechanical fixing
Interconnect	Lengths increased

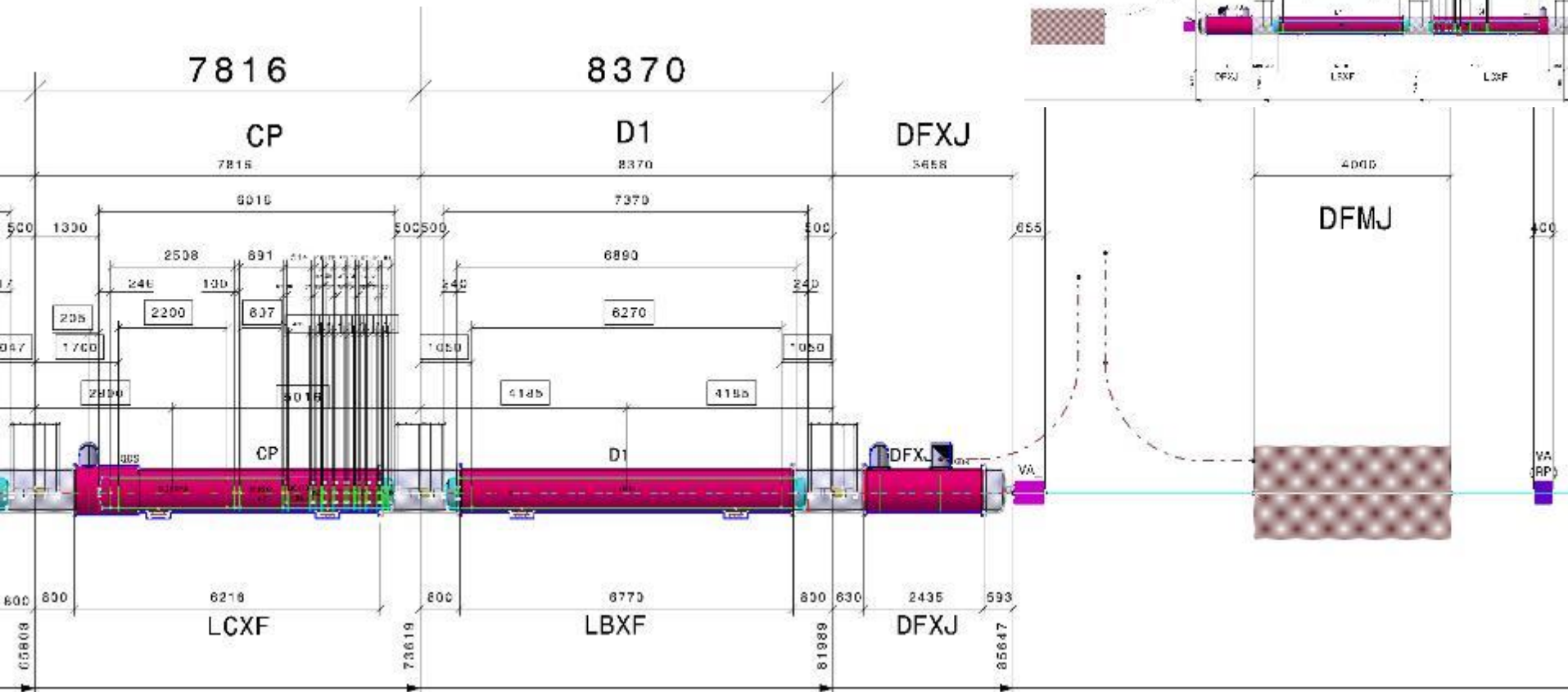
From Q2b to Q3



CHANGES

MQXFA/MQXFB	Magnetic lengths increased
MQXFA/MQXFB	Mechanical lengths increased and mechanical lengths repartition left and right changed to accommodate the magnet mechanical fixing
Interconnect	Lengths increased

From CP to DFM



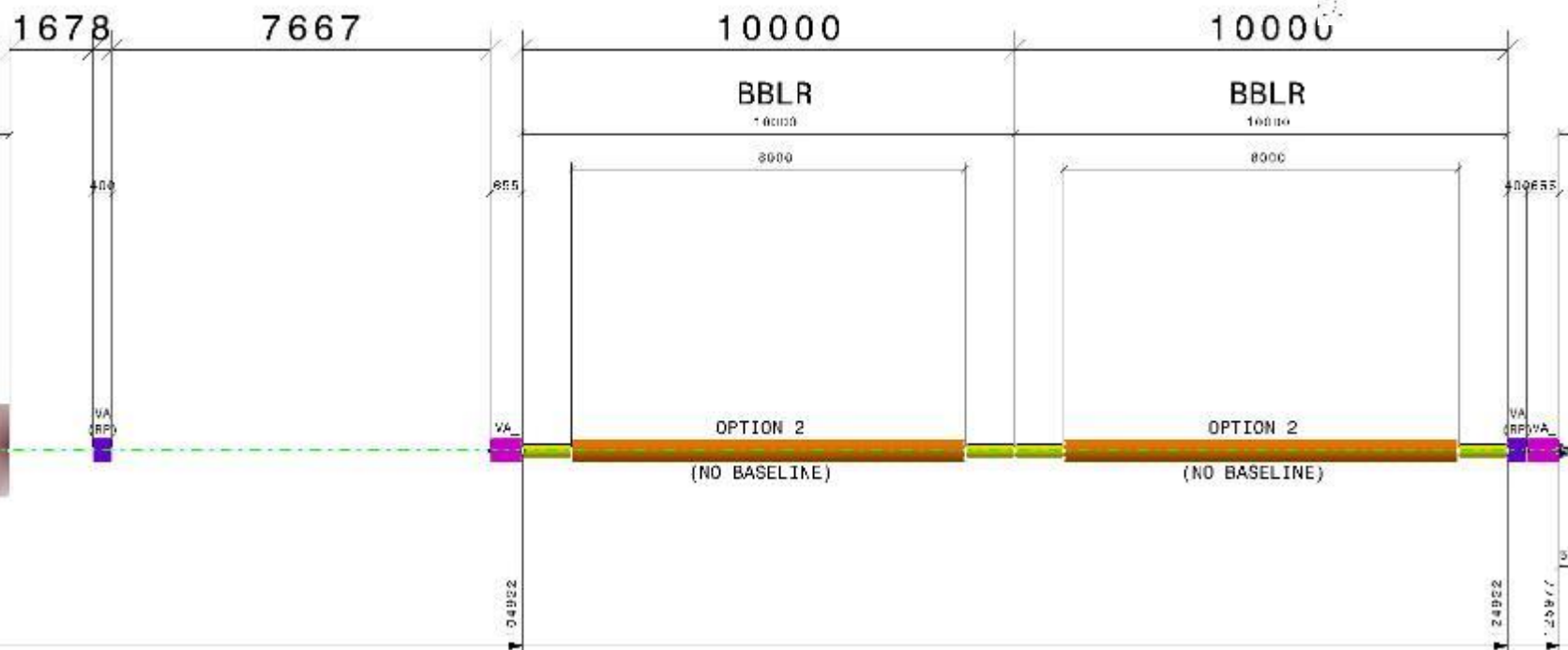
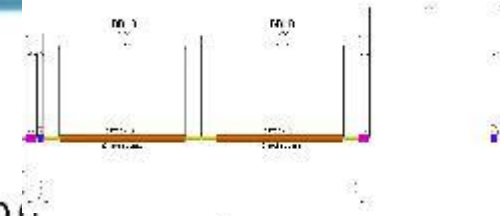
CHANGES

Interconnect	Interconnect between the D1 and CP brought to the same lengths as other
CP diameter	Same as Q3 before, was the same as D1 (change to improve field quality of the MCBXFA)
DFM	Displaced to provide the necessary curvature radius of the SC link for connection. Vault core displaced accordingly +1700 mm

Distances DFM to elements to be powered

Element	Approximate distance
LBRD (D2)	58 m
LQYY (Q4)	87 m
LQYCJ (Q5)	120 m
LQNDF (Q6)	138 m

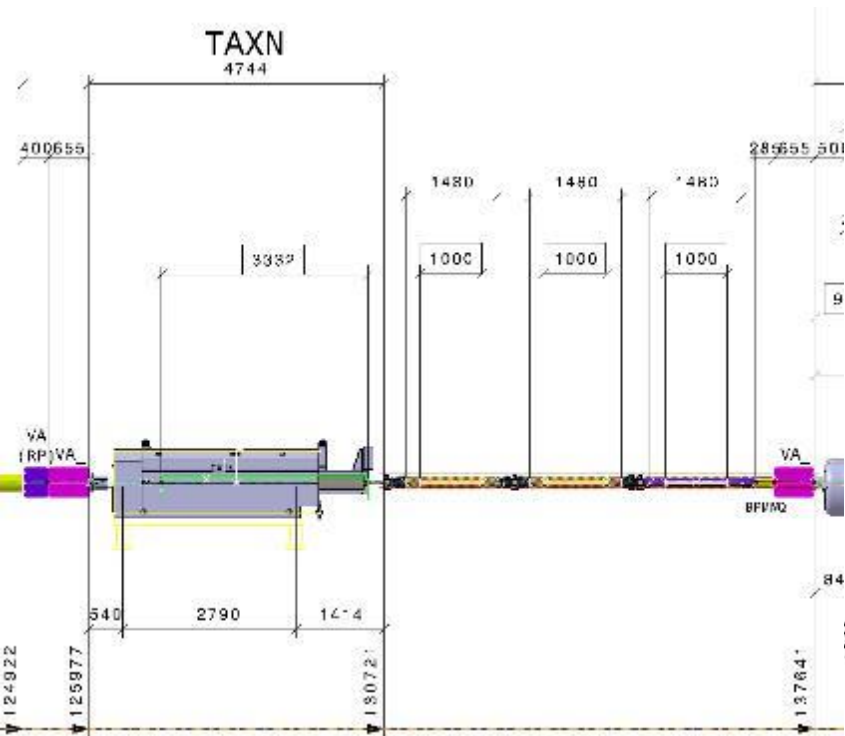
From DFM to the TAXN



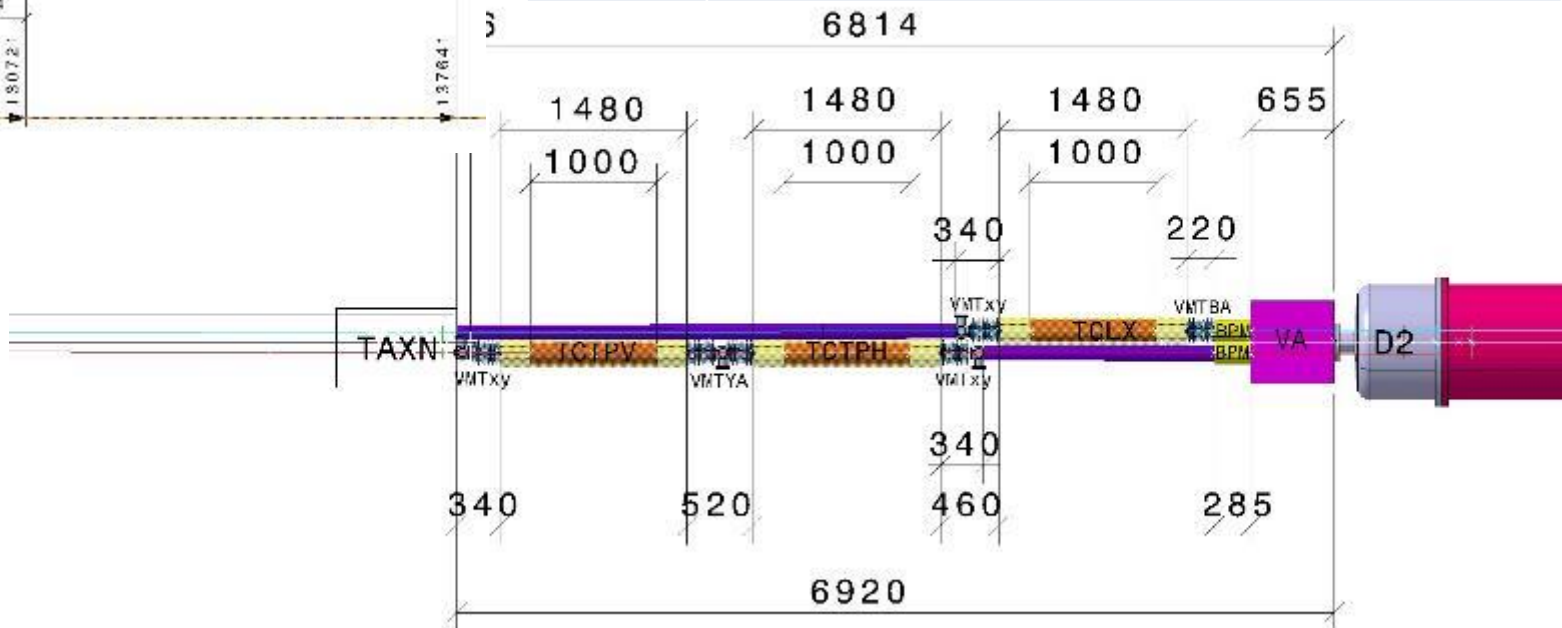
CHANGES

<i>BBLR</i>	<i>Second option for integration of the BBLR. Element not in the baseline</i>

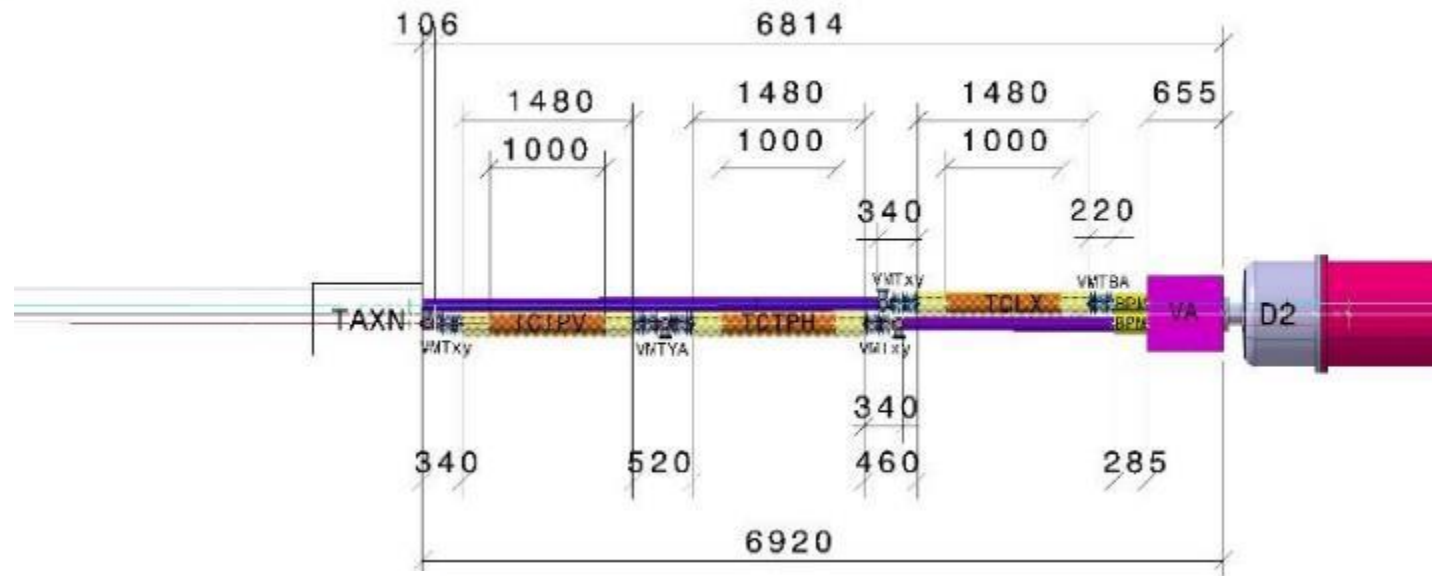
From TAXN to D2



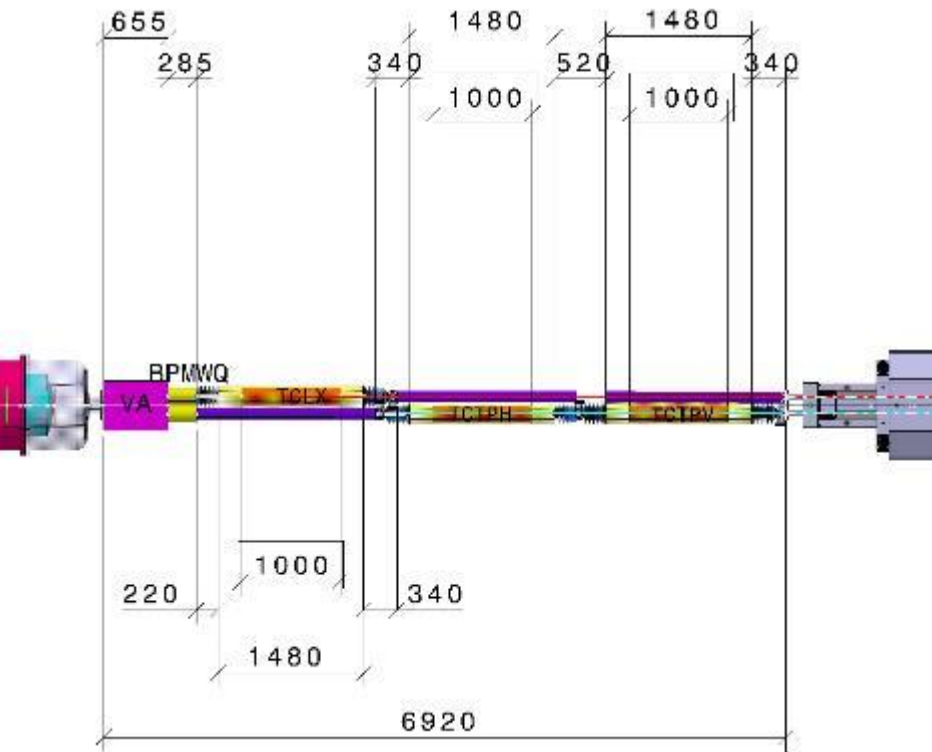
CHANGES	
TCLMA	Suppression of mask in front of D2
TCLX and TCT	Longitudinal integration seems ok thanks to suppression TCLMA
TCLX	no real transversal integration performed yet as design starting
TCT	Challenging transversal integration



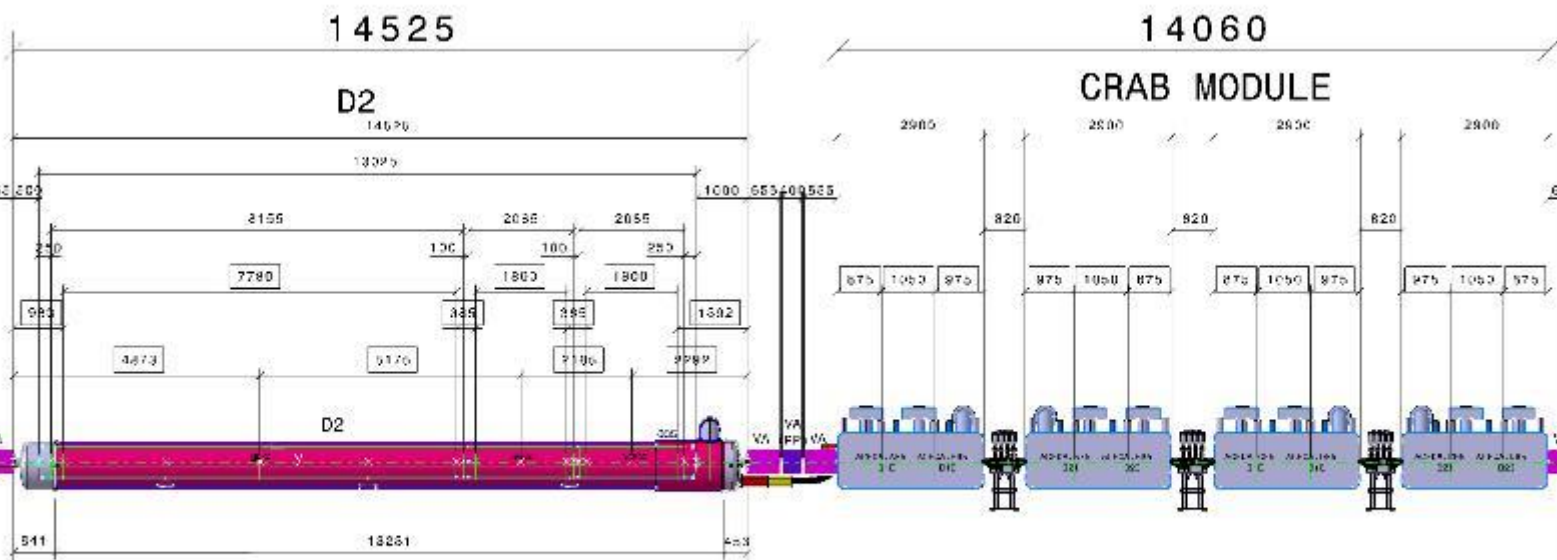
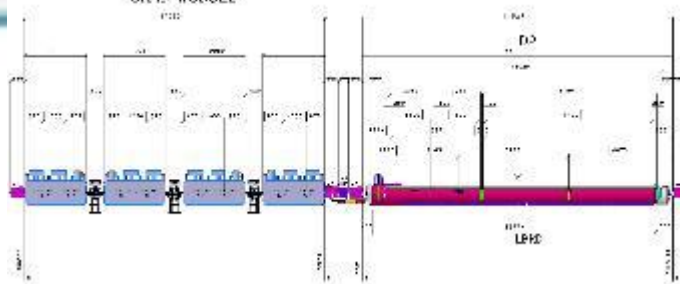
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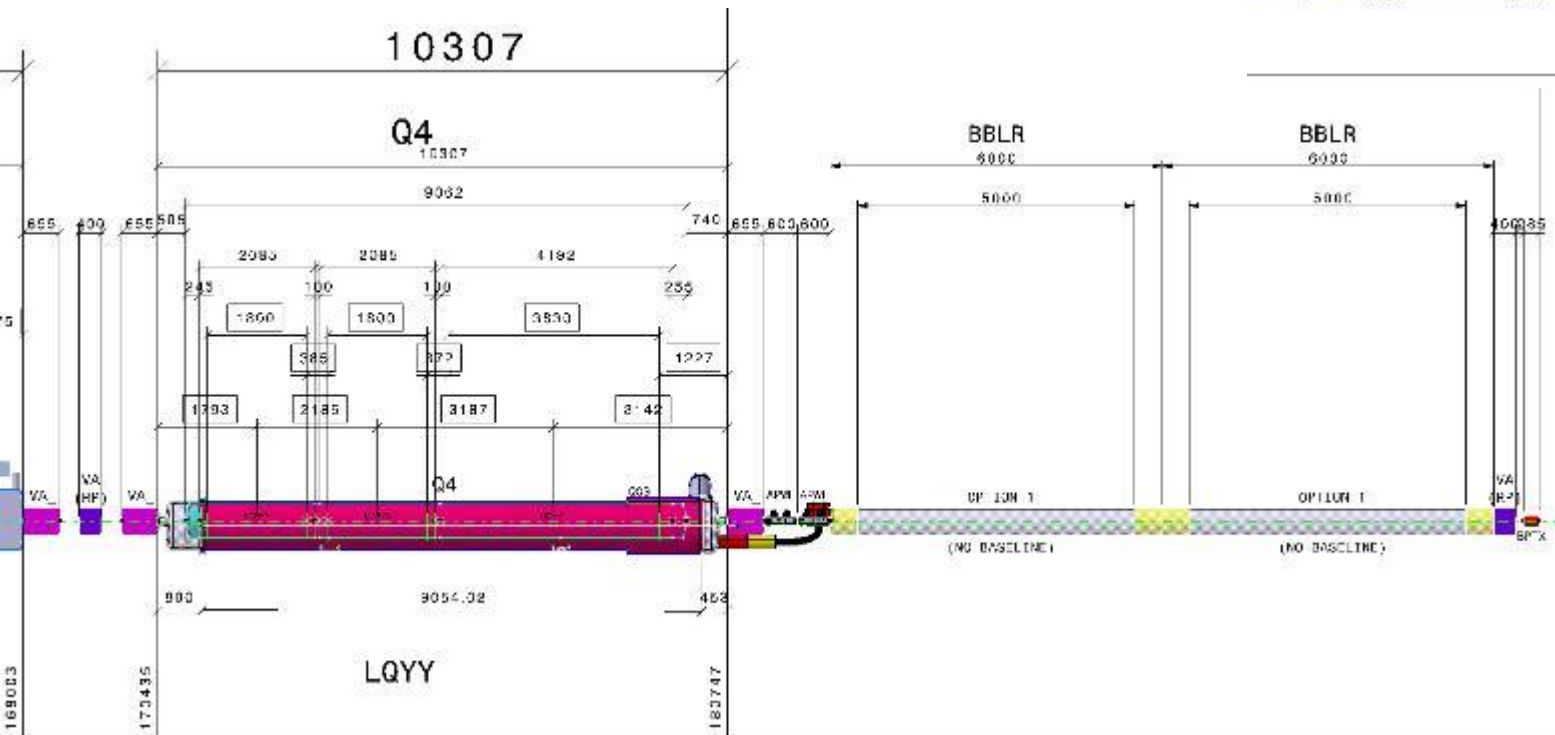
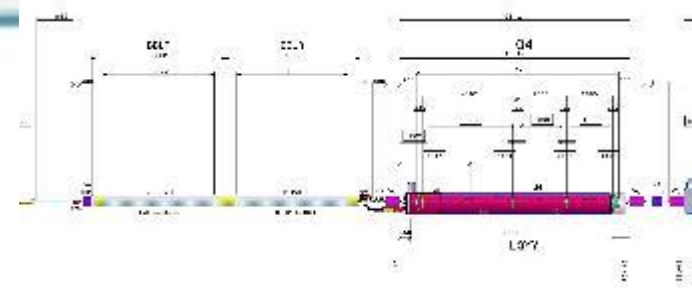
From D2 to CRAB



CHANGES

MCBRD	increase magnetic lengths
LBRD non IP side	Space reservation for the SC link connection based on present technology used in the LHC. Increased distance crab to D2
Crab module	New cryomodule model from 3000 to 2900
Crab interconnects	From 400 to 820 mm
Total crab system	From 13400 to 14060 mm

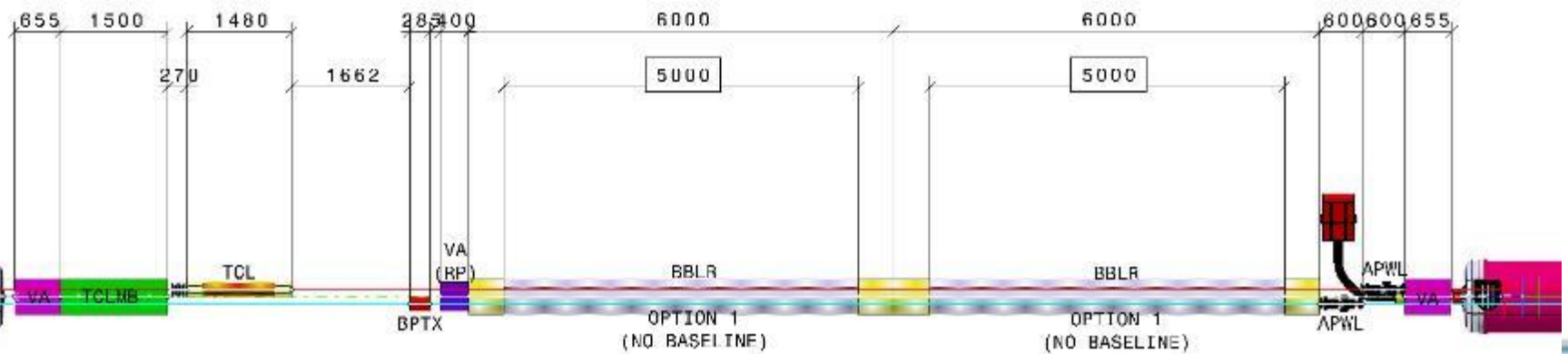
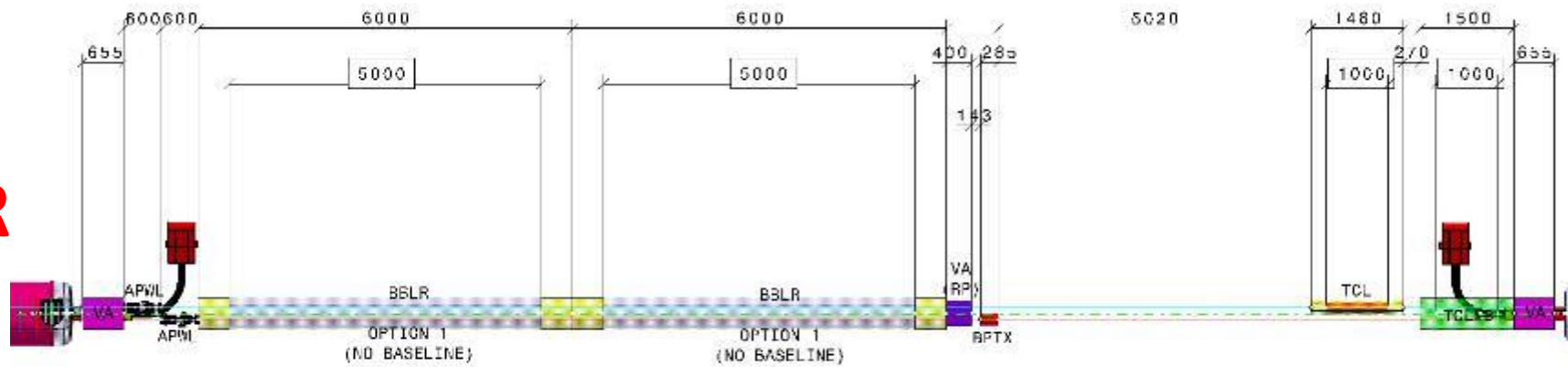
From CRAB to BBLR



CHANGES

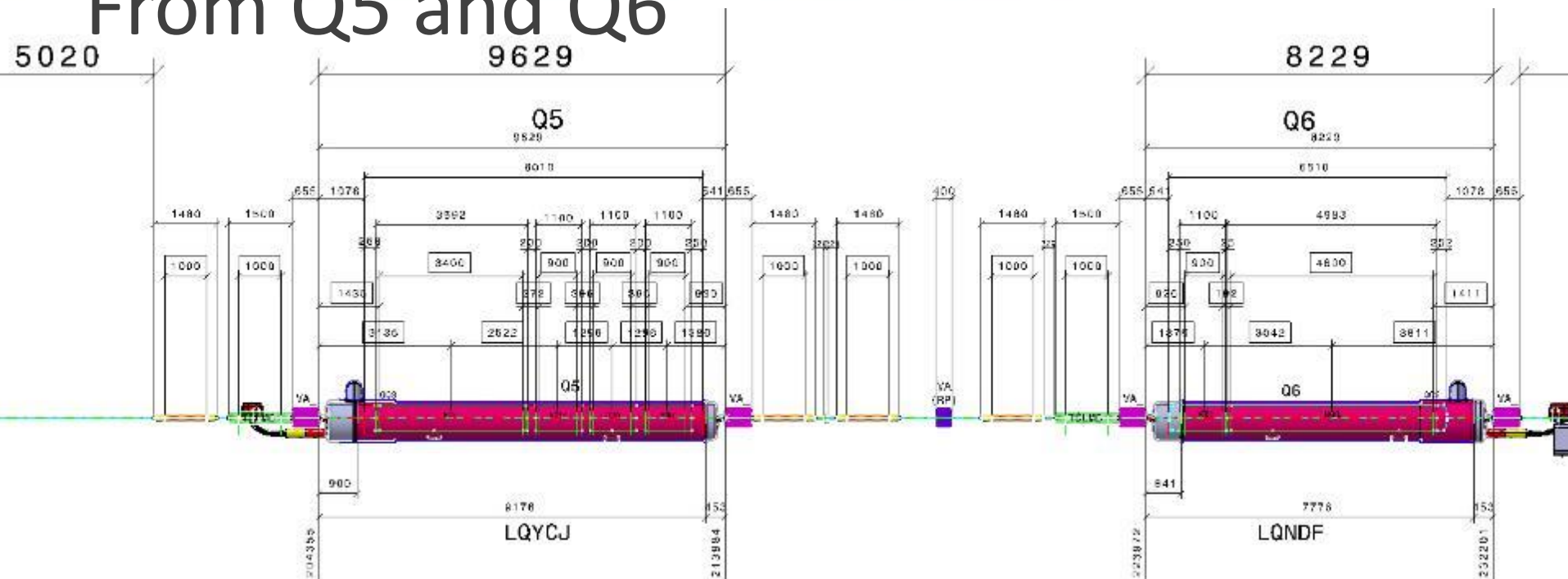
MCBYY	Increased magnetic length, pushing correctors towards crab
LQYY non IP side	Space reservation for the SC link connection based on present technology used in the LHC
BBLR	<i>First option for integration of the BBLR. Element not in the baseline</i>

R



L

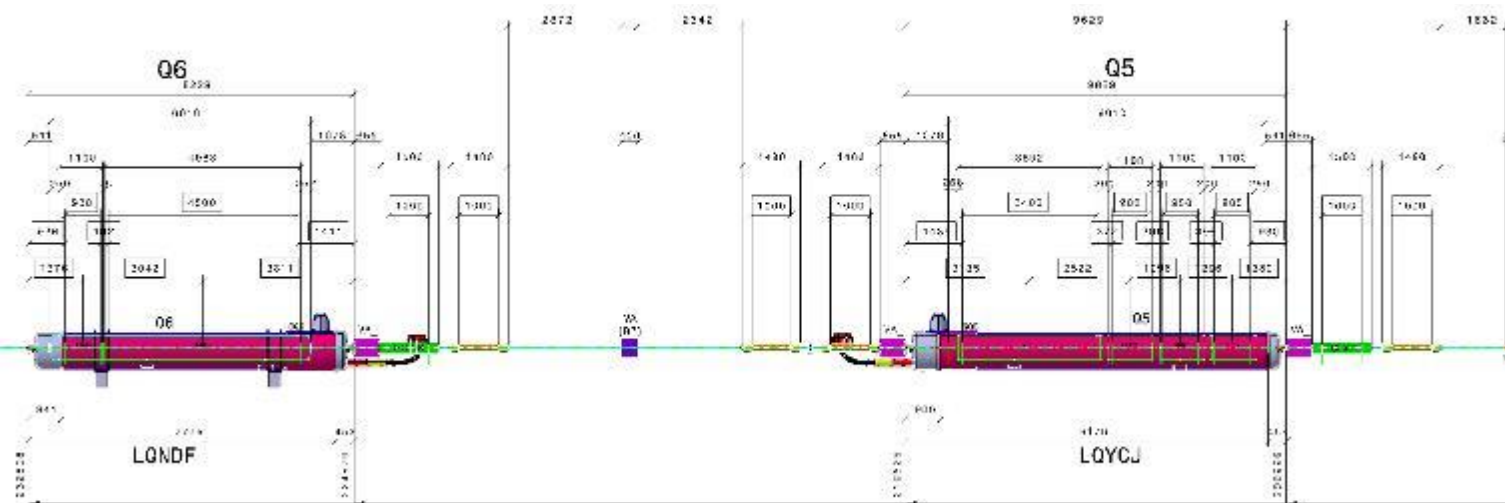
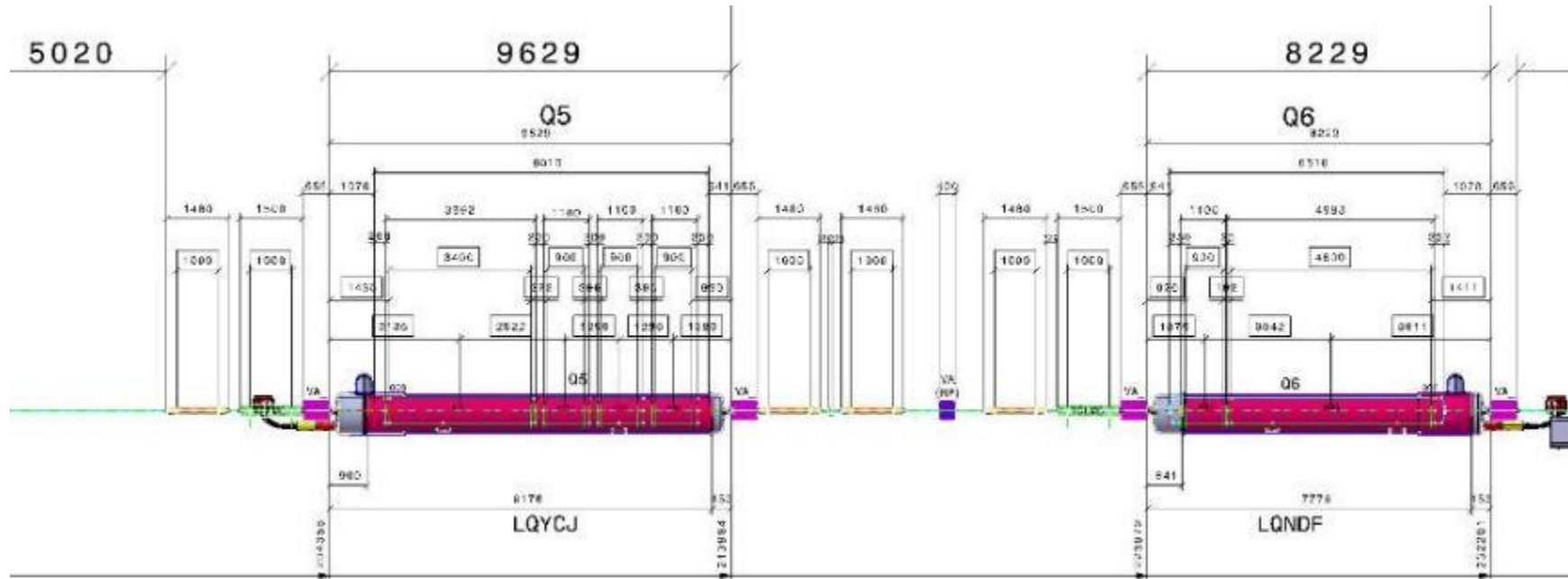
From Q5 and Q6



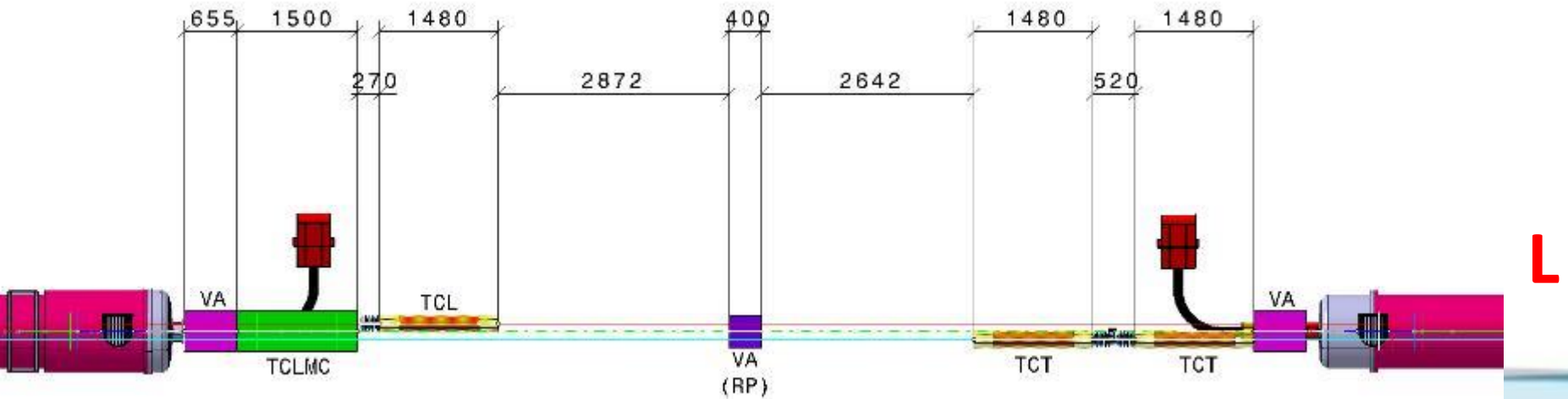
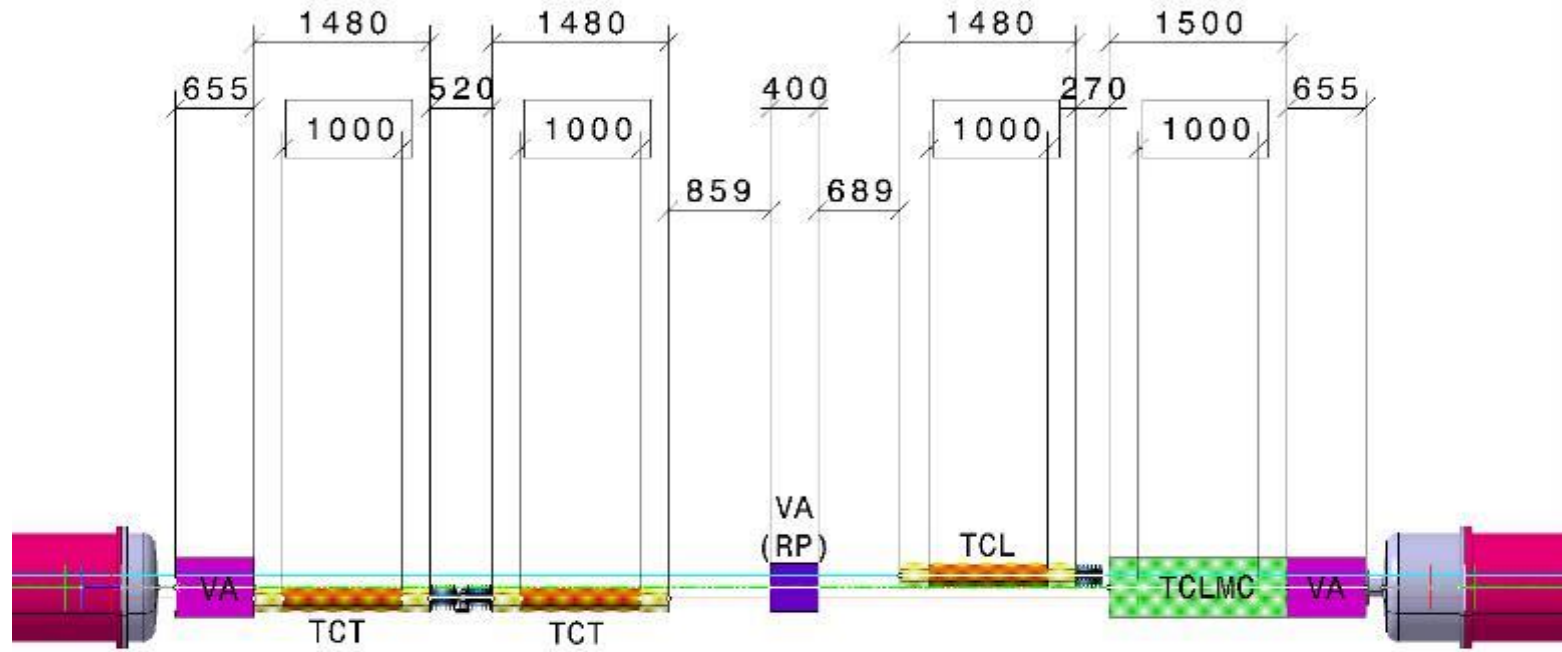
CHANGES

LQYCJ (Q5)	Jumper on left side at both side (5R IP, 5L non IP) TRANSLATION NON MIRRORING quadrupole with same magnetic centre correctors displaced respect to IP. Units go back to their slots after modification for 1.9K.
LQNDF (Q6)	Jumper on right side at both side (5R non IP, 5L IP) TRANSLATION NON MIRRORING quadrupole with same magnetic centre correctors displaced respect to IP. Units interchanged between IP1 and IP5 after modification for 1.9K. If 4.5 they go back to same slots
LQYCJ and LQNDF jumper side	Space reservation for the SC link connection based on present technology used in the LHC

From Q5 and Q6: TRANSLATION NO SYMMETRY



R



L



High Luminosity LHC



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