

Updates on GLDc

Aug 13, 2007

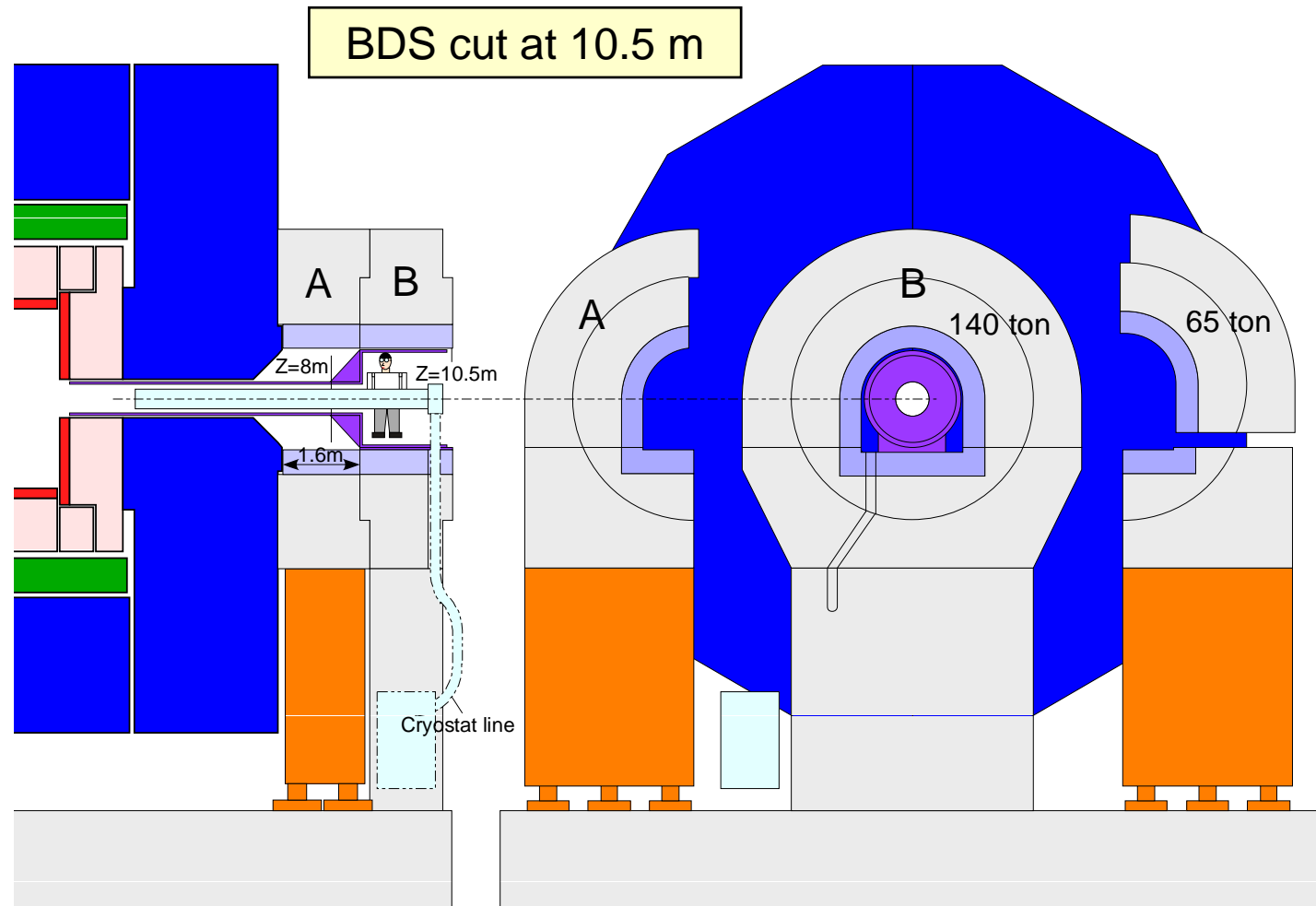
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KEK

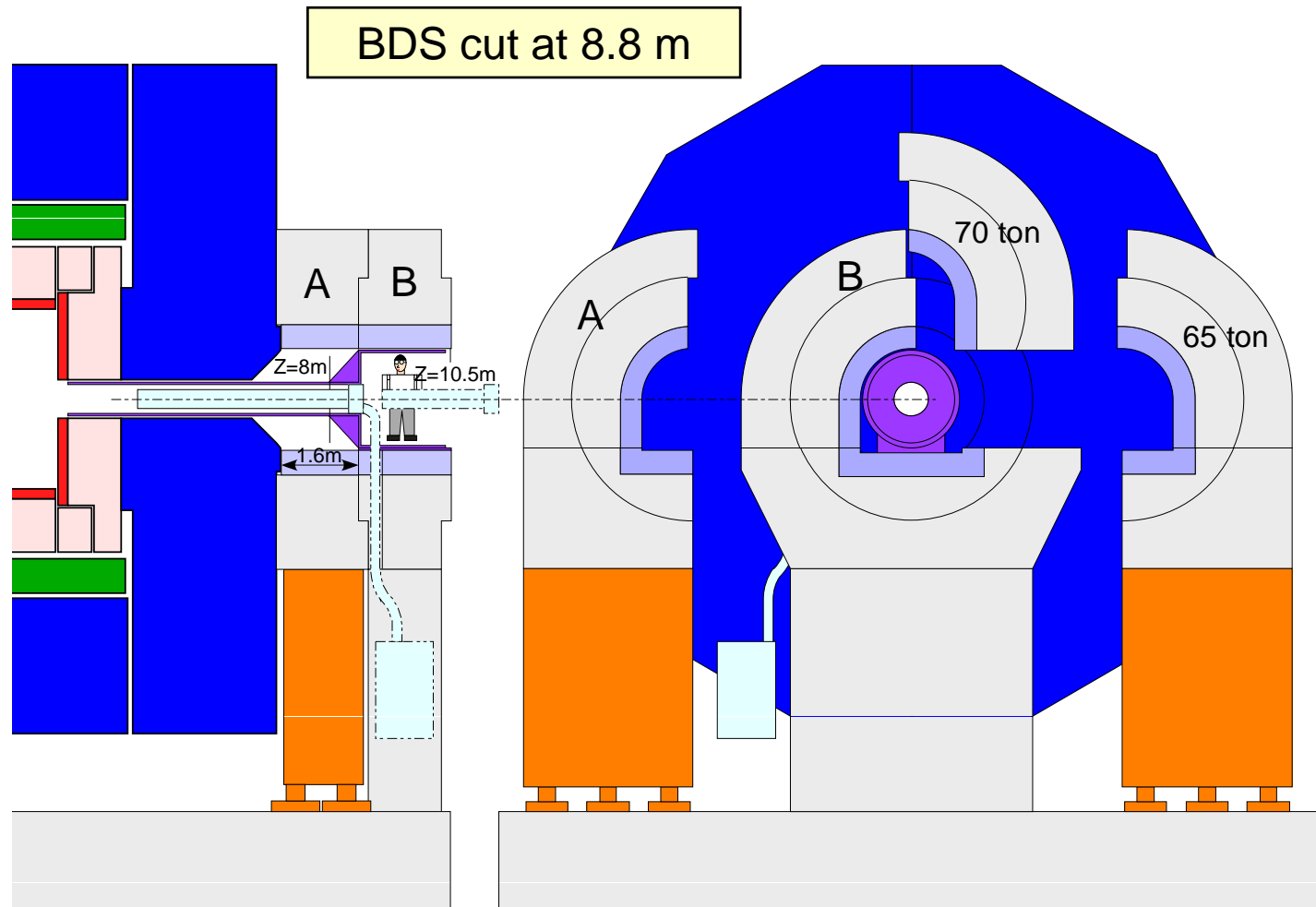
Items to be studied

- FD support / shielding scheme with the BDS disconnection between QD0 and QF1
- Stray field analysis with packman iron
- Endcap deformation with more realistic magnetic force
- Power and services necessary for the detector

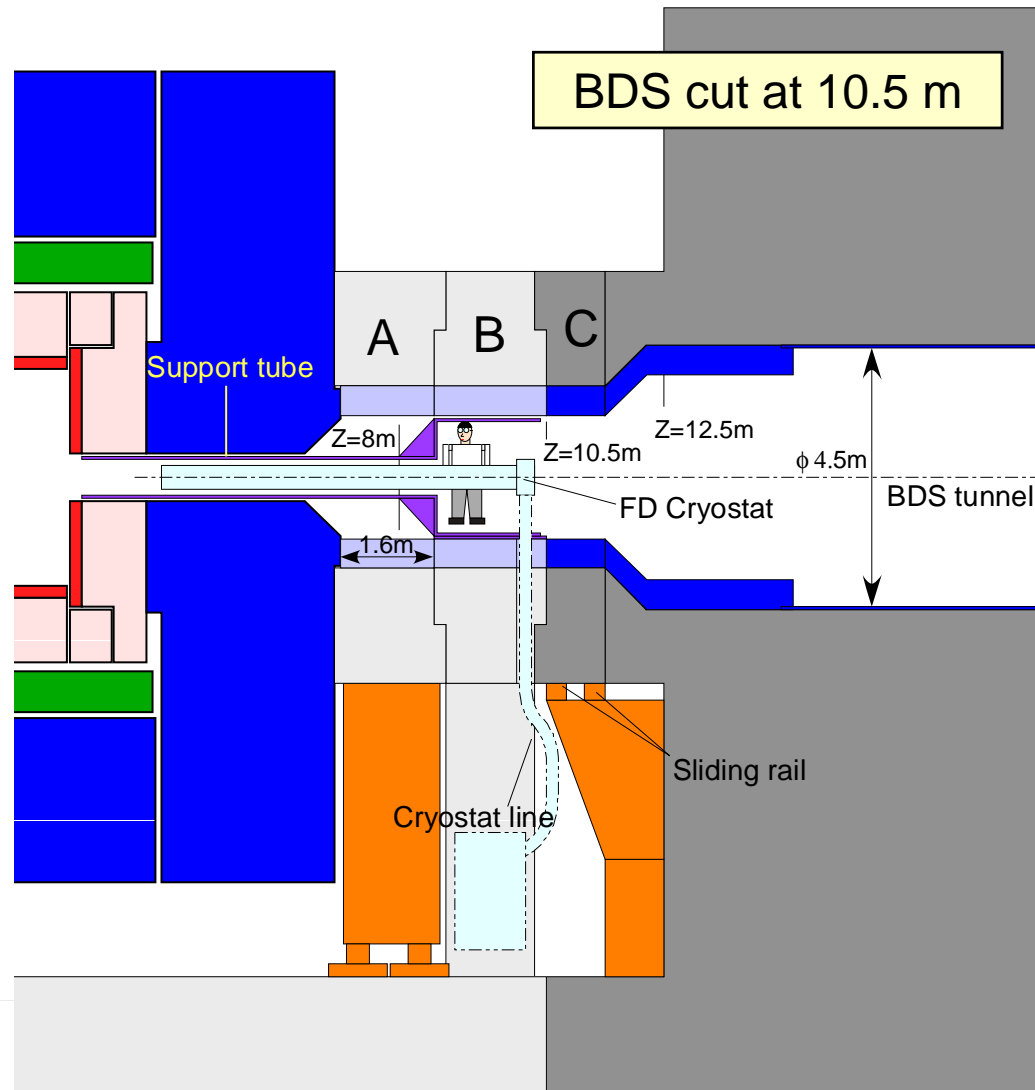
FD Support / Shield block



FD Support / Shield block

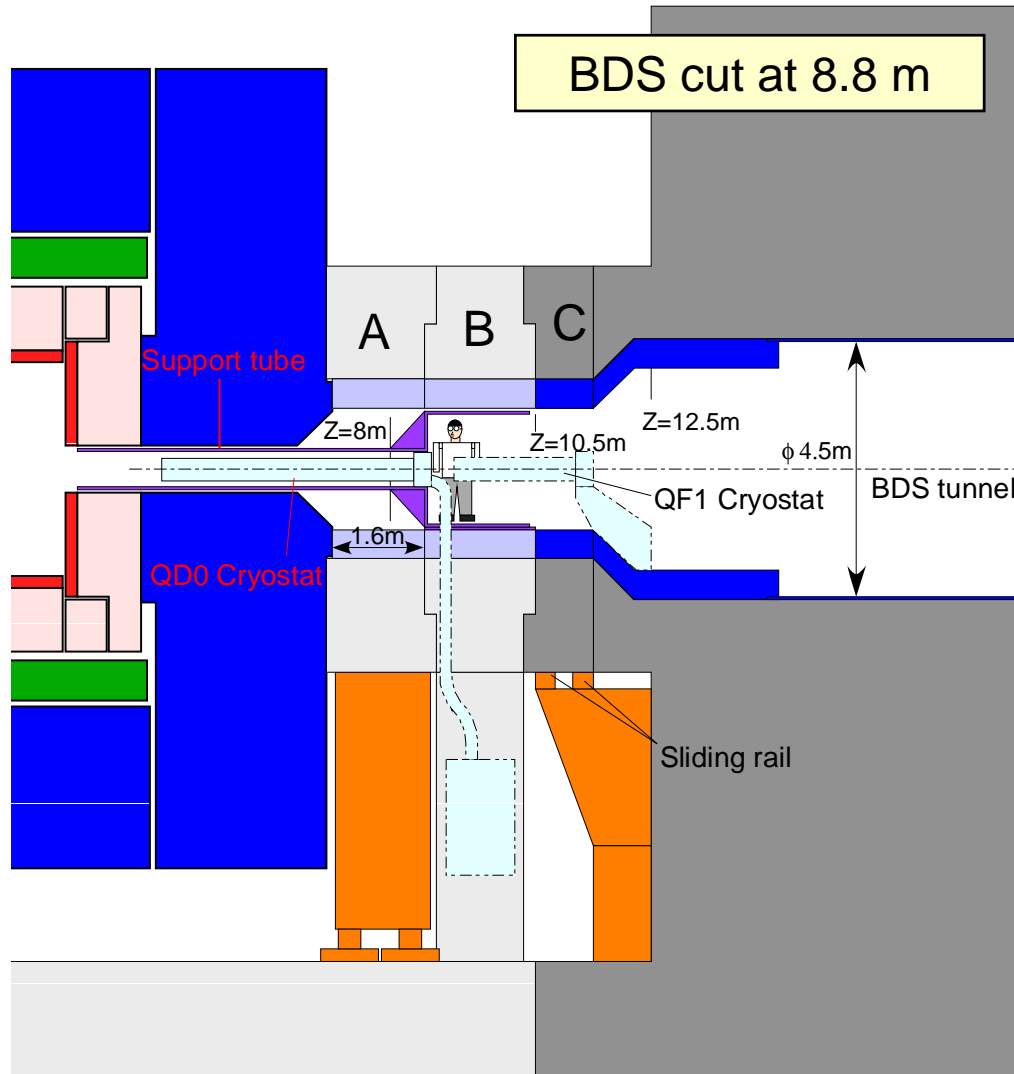


Shield



- Endcap opening
 - Remove A horizontally by air pad
 - Open the endcap
- Push-pull
 - Disconnect beam pipe at Z~10.5m
 - Slide C horizontally
 - Slide the platform

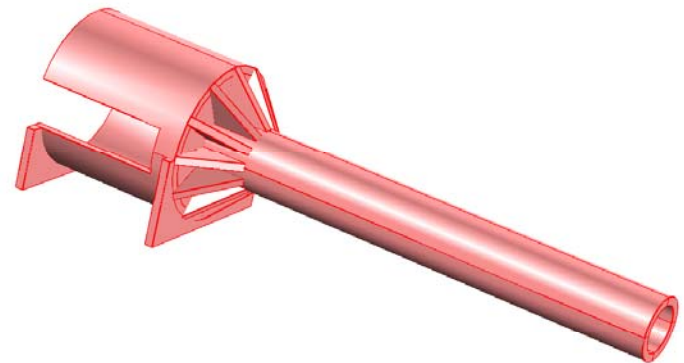
Shield



- Endcap opening
 - Remove A horizontally by air pad
 - Open the endcap
- Push-pull
 - Disconnect beam pipe at Z~8.8m
 - Slide C horizontally
 - Remove half of upper part of B by crane to keep the path for QF1 cryostat
 - Slide the platform

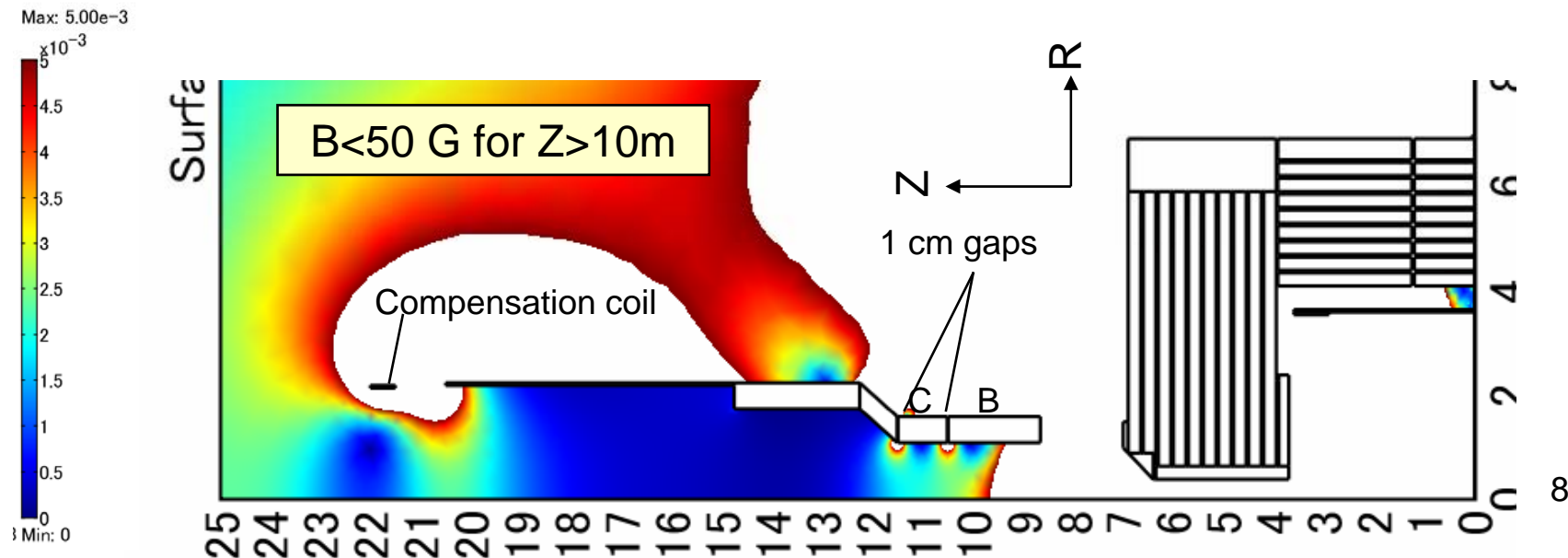
BDS cut at Z=8.8m

- It seems possible, in principle
- But what is the merit?
 - Additional cold box and pipes
 - Additional step in push-pull: Removal of upper part of shield → Larger crane necessary
 - Cut in the support structure



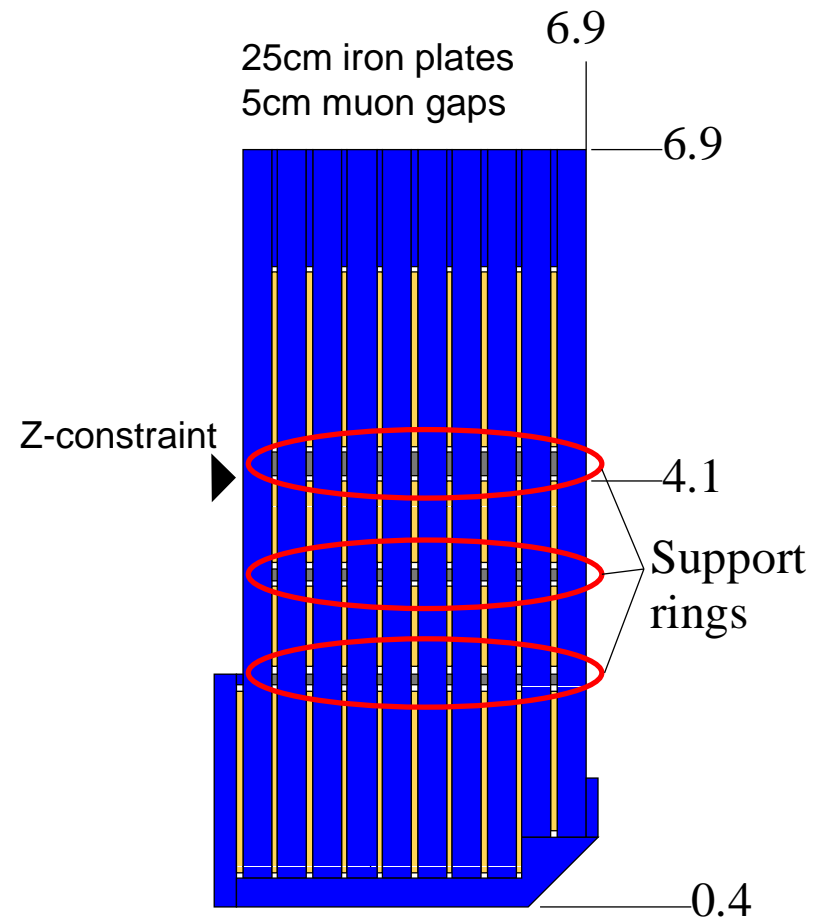
B-field with packman Fe

- A-part: non-magnetic
- 5 cm thick Fe wall inside the tunnel up to $Z=20.5$ m
- Compensation coil at $Z=21.5$ m
- Magnetic force
 - +65 kN for B and +11 kN for C (“+” means opposite direction to the detector)
 - If A is also magnetic, -200 kN ~ +200 kN depending on the gap: unstable and too much → A should be non-magnetic
- If $B < 50$ G is required only for $|Z| > 11$ m, B should also be non-magnetic

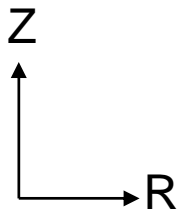
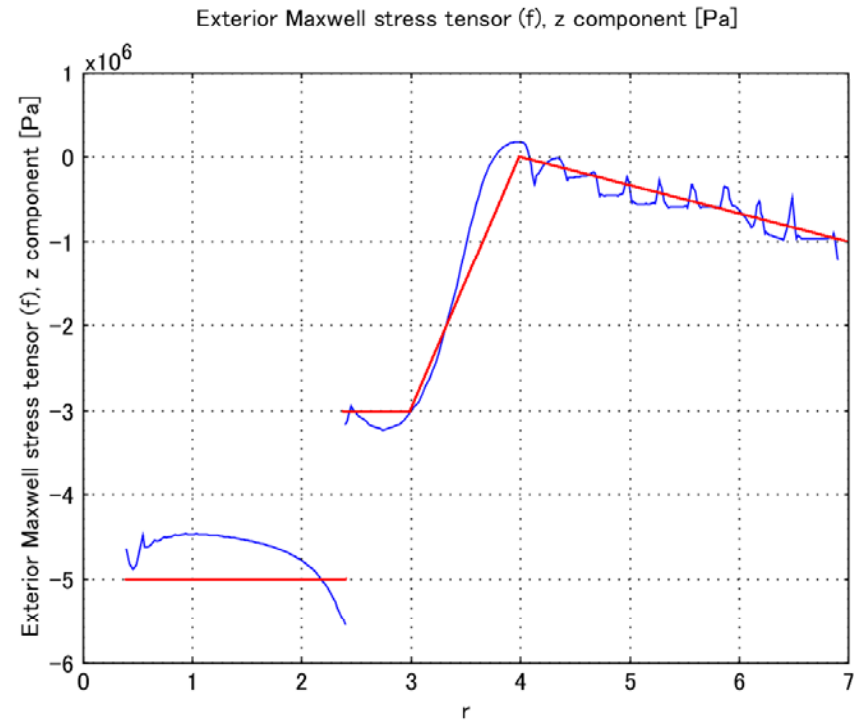
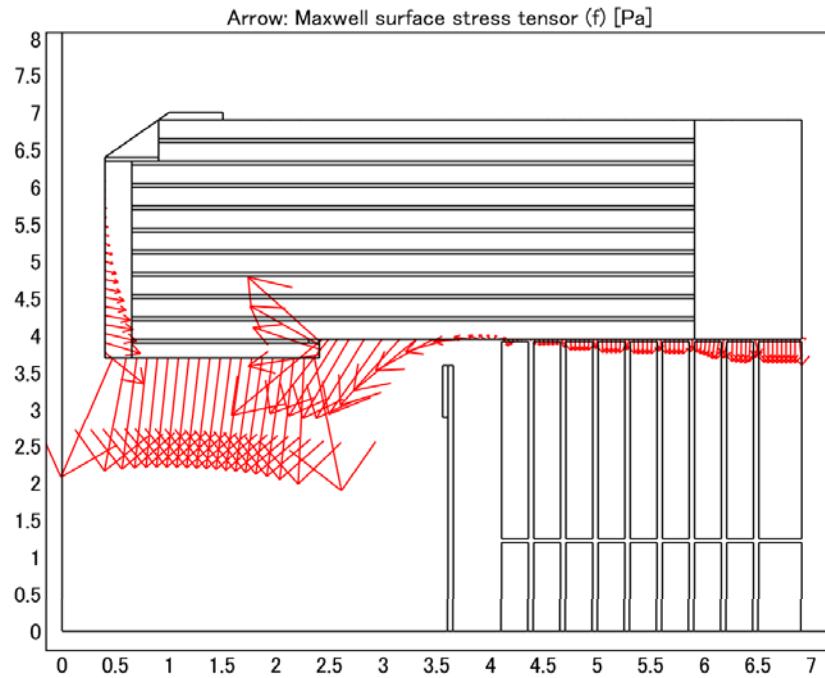


Endcap Deformation

- Comments at last meeting
 - Uniform volume force of 1 MN/m^3 is not realistic
 - Z-constraint at $R=6.9 \text{ m}$ should be removed
- New calculation
 - Endcap is treated as a whole and surface force is calculated
 - The surface force at the front surface of the endcap is obtained as a function of R , and parameterized by a simple function
 - This simple function is used for the calculation of the deformation
 - Z-constraint only at $R=4.1 \text{ m}$
 - 3D model calculation



Magnetic Force



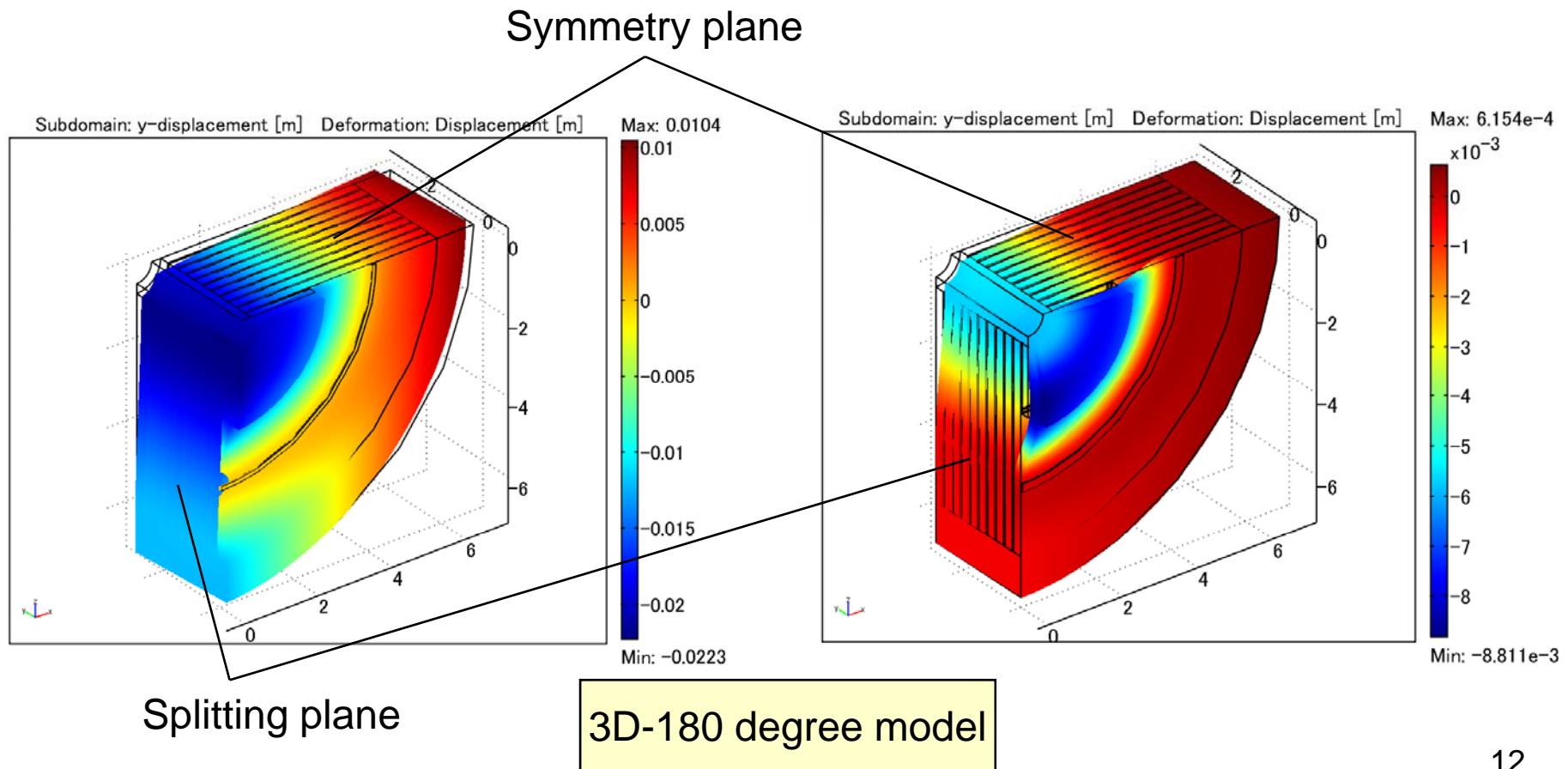
Endcap Deformation

- New results

	Angle	Support ring	ΔZ			ΔZ (r=0.4m) Aug. 6.
			r=0.4 m	r=6.9 m		
3D	180	No	-21 mm	+11 mm	$\phi=0$	-16 mm
			-23 mm	-13 mm	$\phi=90$	
3D	360	No	-12 mm	-3.9 mm		-11 mm
3D	180	1 (r=4.1m)	-5.7 mm	-0.6 mm	$\phi=0$	-4.1 mm
			-5.9 mm	-0.5 mm	$\phi=90$	
3D	360	1	-4.6 mm	-0.2 mm		-3.2 mm
3D	180	2 (r=2.3, 4.1m)	-2.6 mm	+0.5 mm	$\phi=0$	
			-2.7 mm	-0.7 mm	$\phi=90$	
3D	360	2	-1.8 mm	-0.4 mm		
3D	180	3 (r=2.3, 3.2, 4.1m)	-1.7 mm	+0.3 mm	$\phi=0$	
			-1.8 mm	-0.7 mm	$\phi=90$	
3D	360	3	-1.1 mm	-0.4 mm		

Endcap Deformation

- No support ring
- One support ring/gap



Summary

- BDS cut between QD0 and QF1 seems possible
 - but what is the merit compared with the case of cutting after QF1?
- Together with the iron wall inside the BDS tunnel, packman iron of B+C part or C part only can make the stray field of the GLDc detector less than 50 Gauss at $|Z| > 10$ m or $|Z| > 11$ m, respectively
 - but what is the real requirement from accelerator side?
- Endcap deformation calculation is updated with single constraint point at $R=4.1$ m
 - Split endcap with support rings gives better result than non-split endcap without support rings
 - Split endcap with 3 support rings gives deformation of less than 2 mm