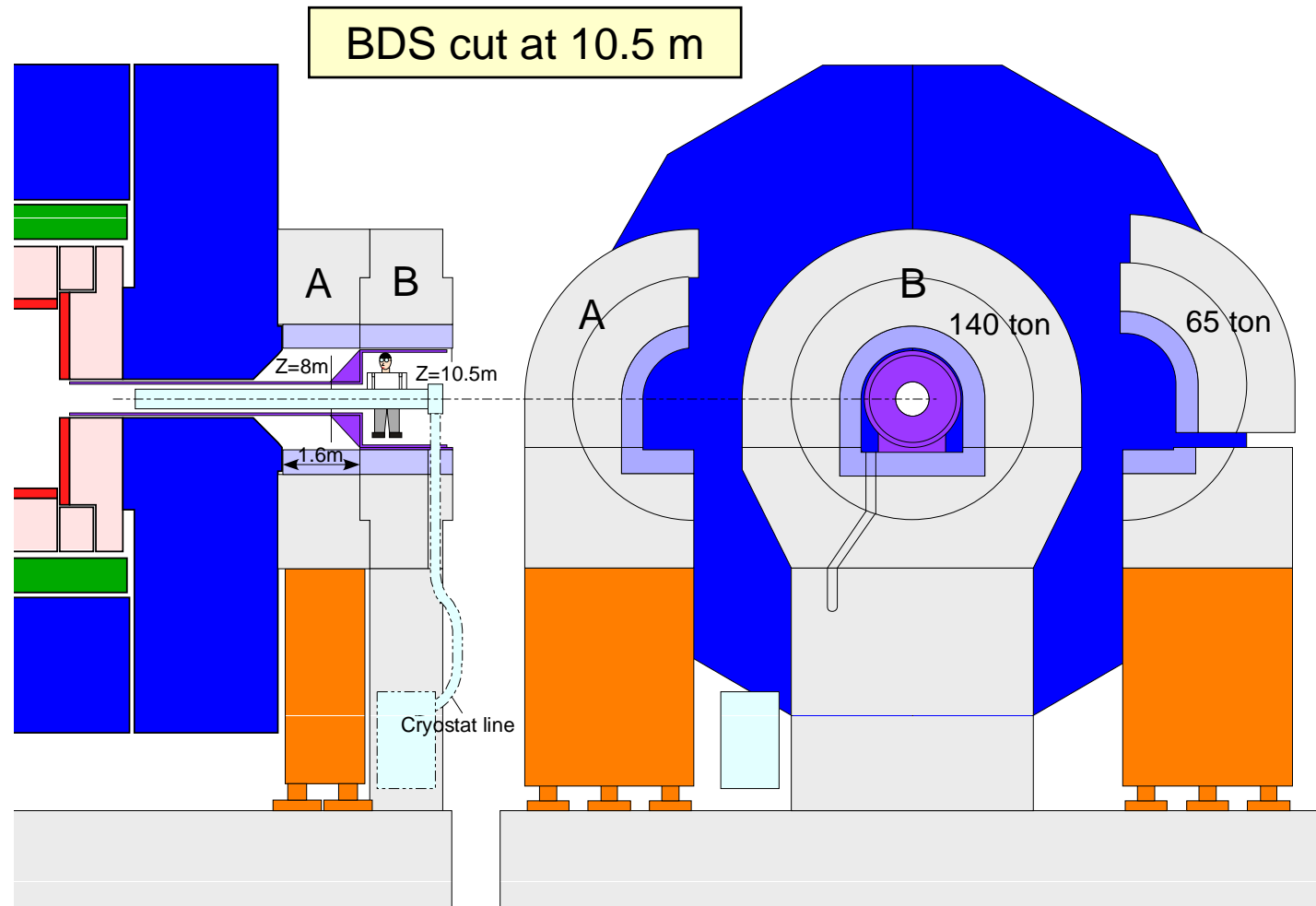


Homework of WG-A

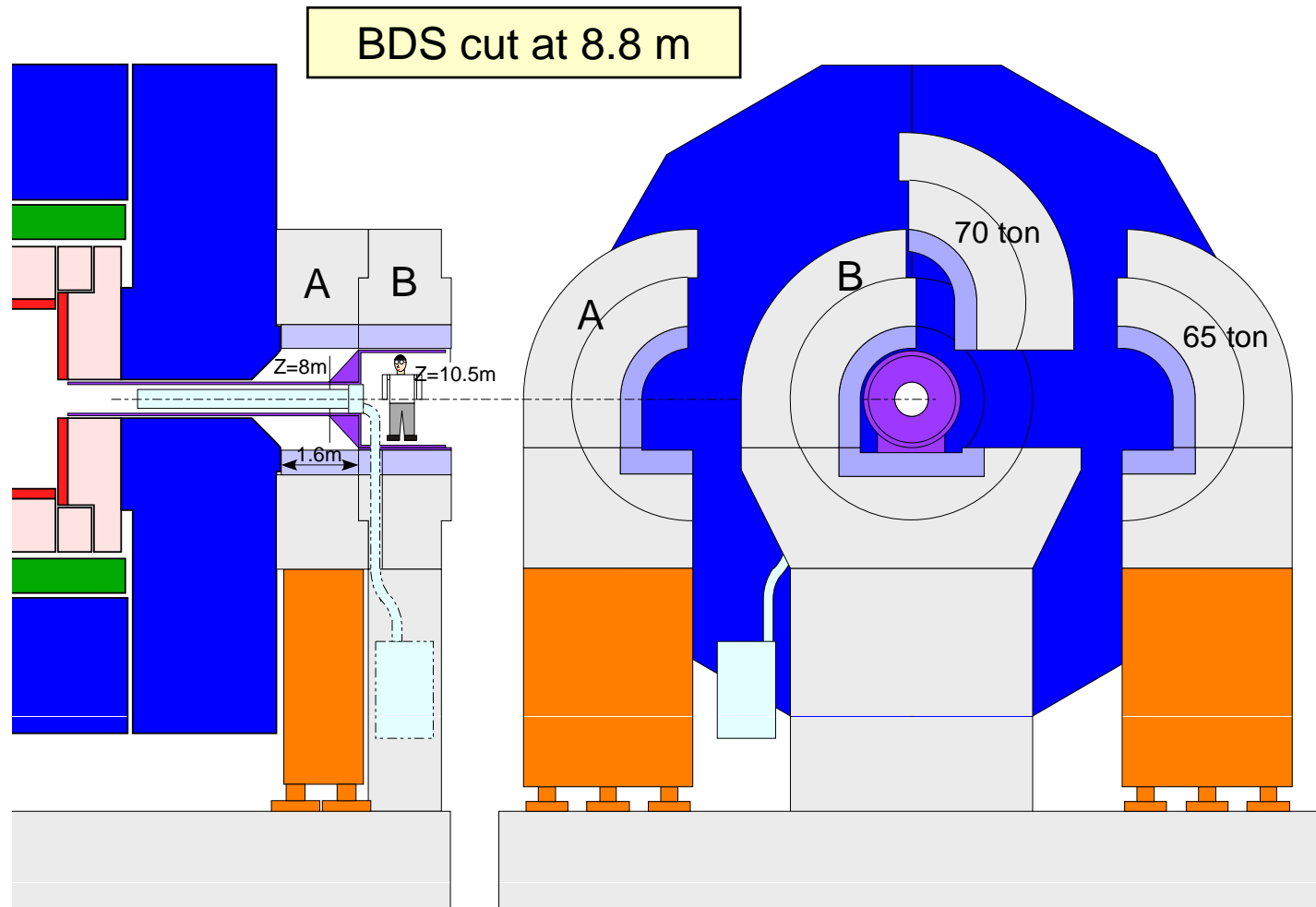
Items to be studied

- 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

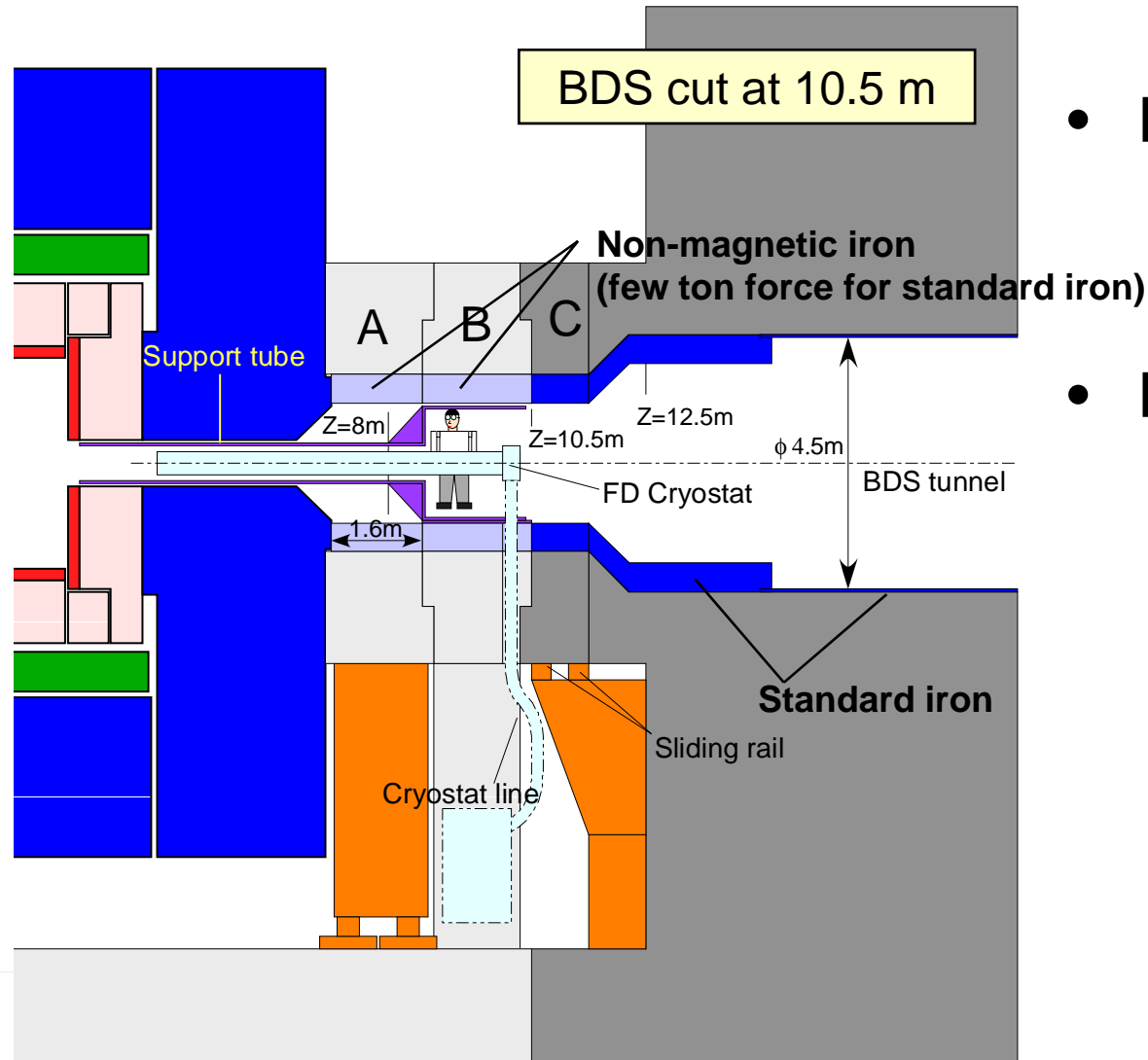
FD Support / Shield block



FD Support / Shield block

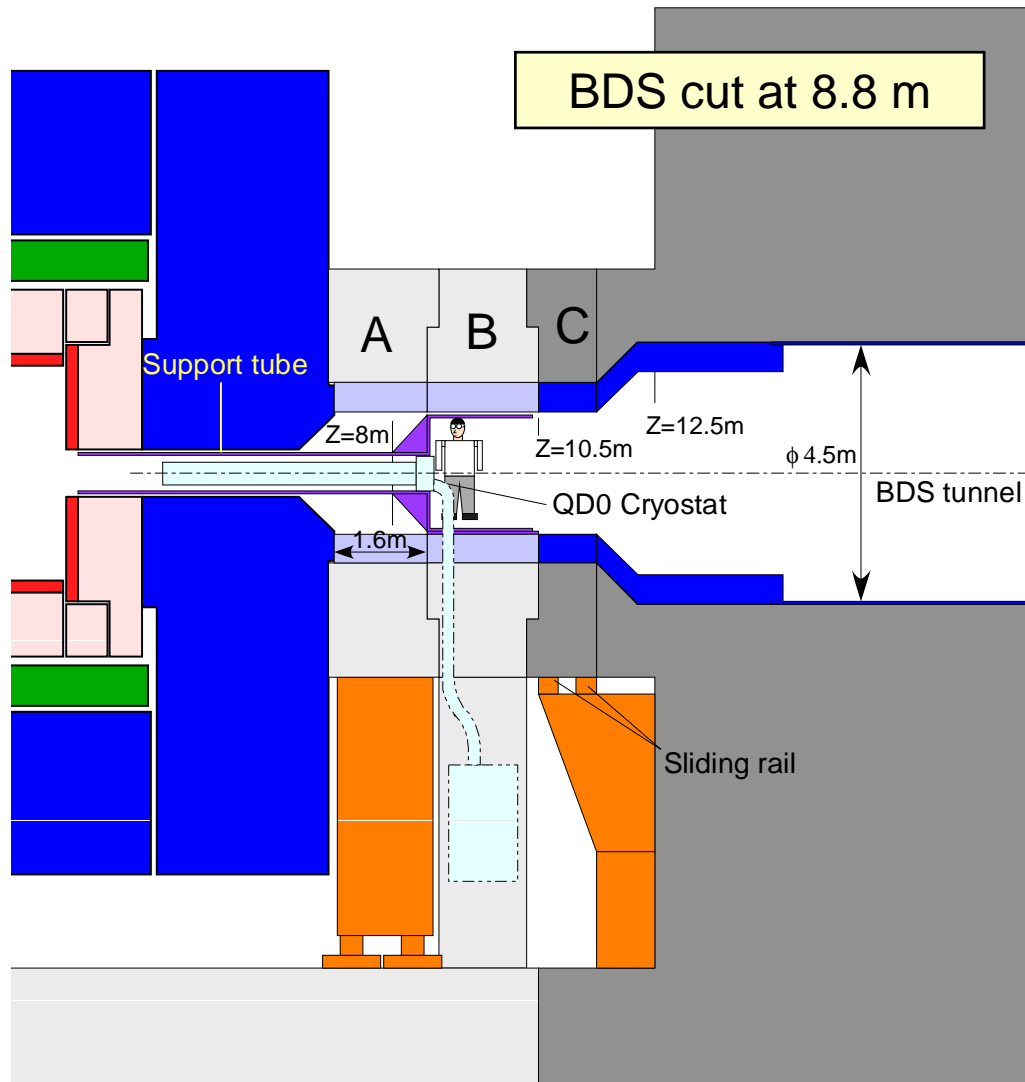


Shield



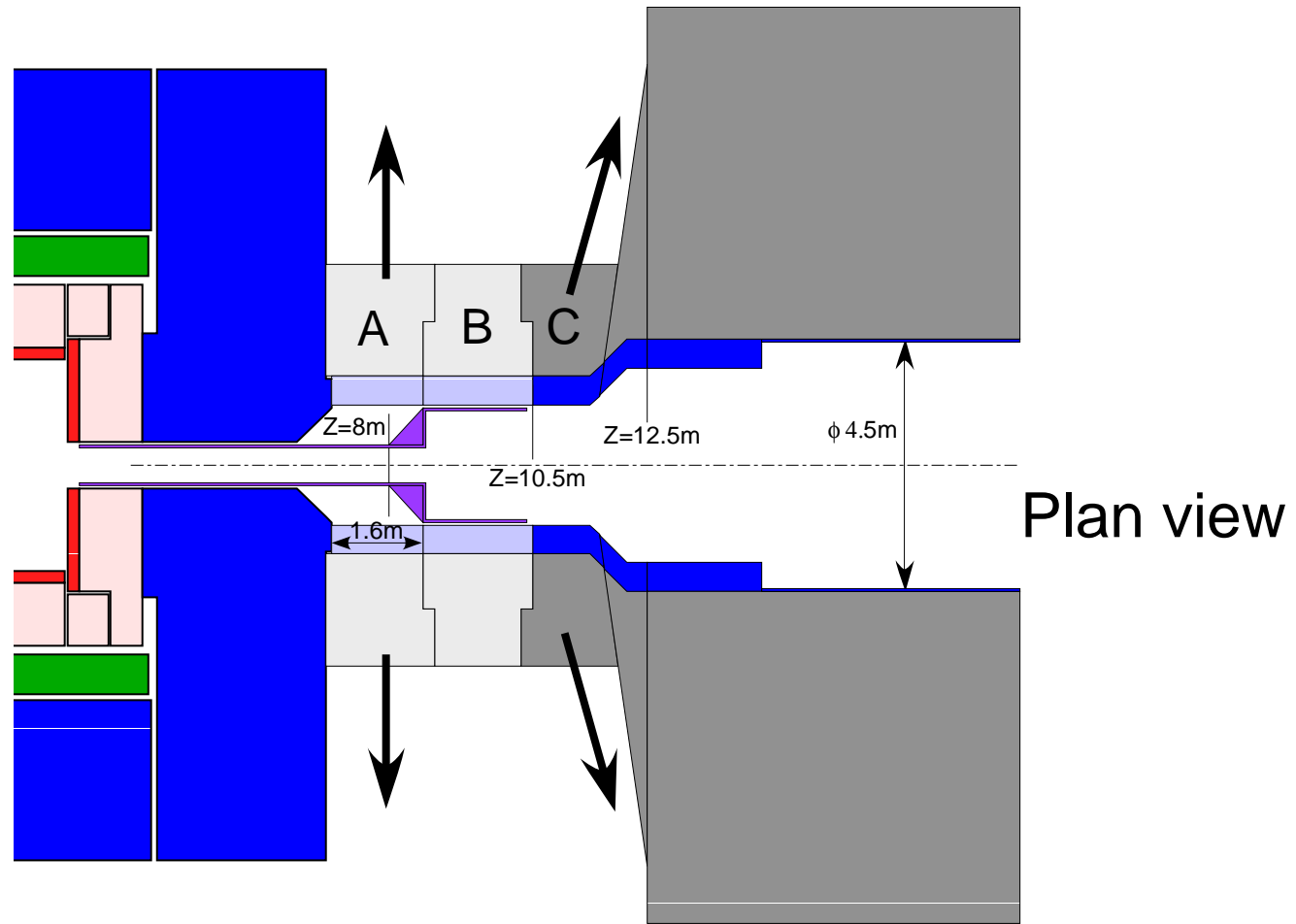
- Endcap opening
 - Remove A horizontally by air pad
 - Open the endcap
- Push-pull
 - Disconnect beam pipe at Z~10.5m
 - Slide C horizontally
 - Slide the platform

Shield

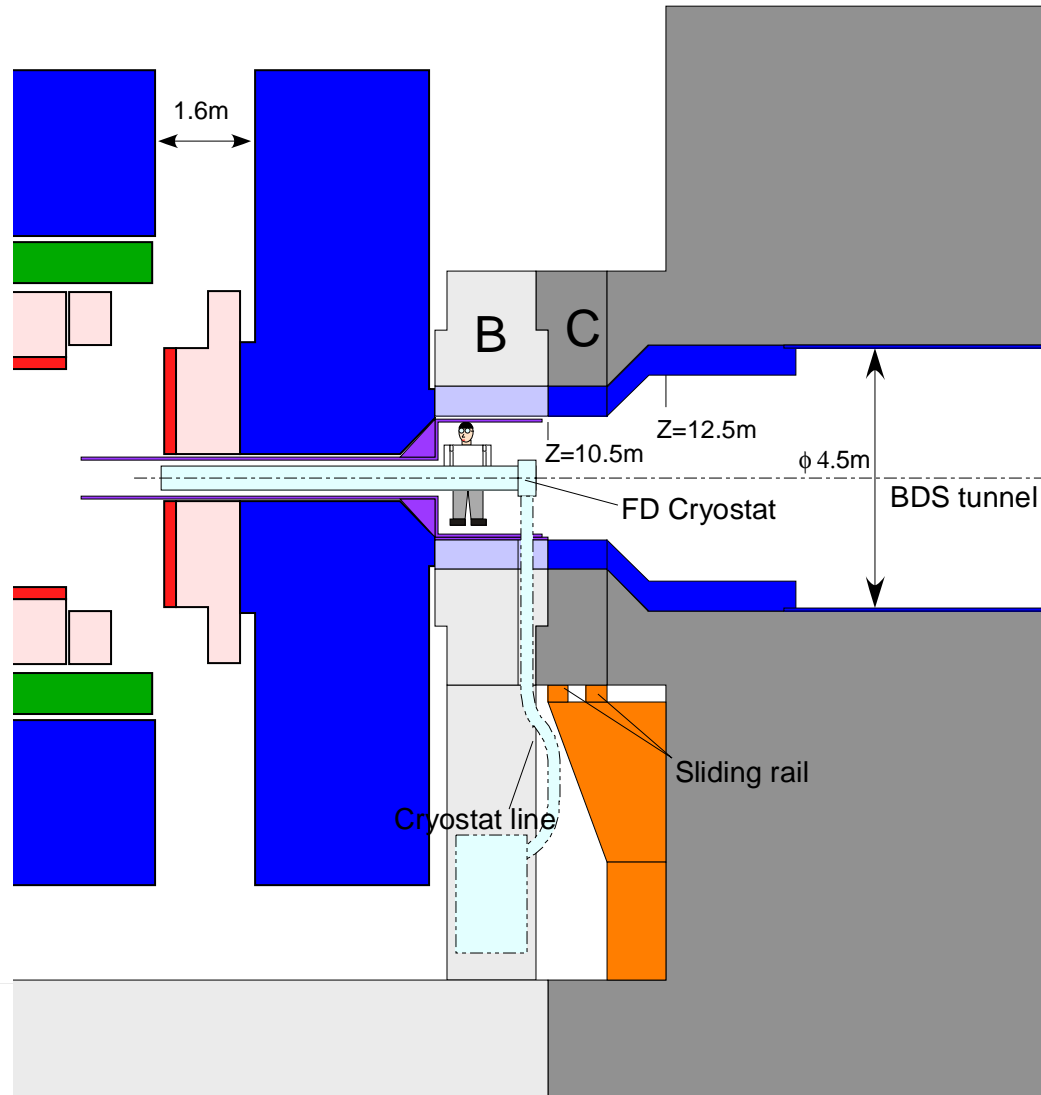


- Endcap opening
 - Remove A horizontally by air pad
 - Open the endcap
- Push-pull
 - Disconnect beam pipe at $Z\sim 8.8\text{m}$
 - Slide C horizontally
 - Remove half of upper part of B by crane to keep the path for QF1 cryostat
 - Slide the platform

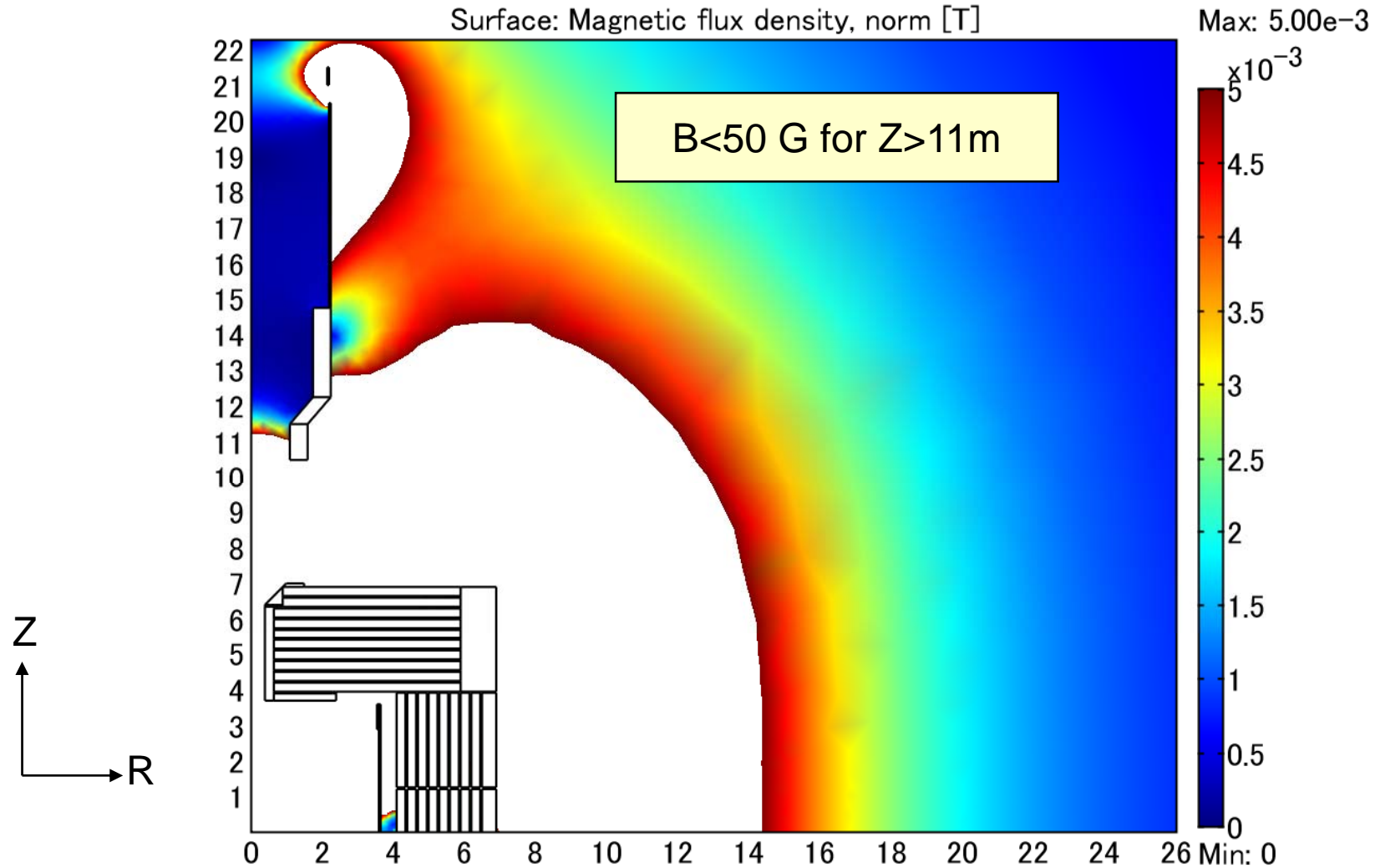
Shield



Endcap Open

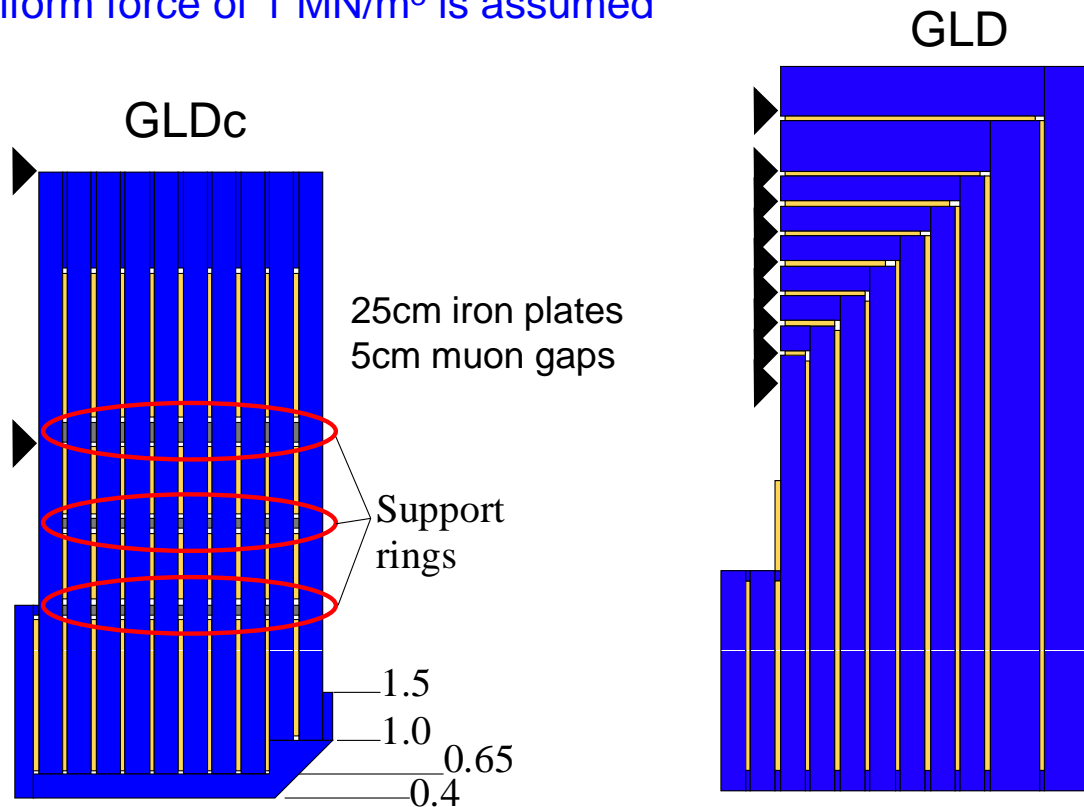


B-field



Endcap Deformation

- FEA model
 - 2D axial symmetry
 - 3D for simple structure
 - Constraint in z direction at R=4.1m and 6.9m for GLDc (Rin and Rout of barrel yoke)
 - Uniform force of 1 MN/m³ is assumed



Endcap Deformation

- Results

		Angle	Support ring	ΔZ_{max}	
GLD	3D	90	No	51 mm	57 mm by Yamaoka-san
GLDc	3D	90	No	27 mm	
GLDc	3D	180	No	16 mm	
GLDc	3D	360	No	11 mm	
GLDc	2D	360	No	12 mm	
GLDc	2D	360	1 (r=4.1m)	3.7 mm	
GLDc	3D	360	1	3.2 mm	
GLDc	3D	180	1	4.1 mm	
GLDc	2D	360	2 (r=2.3, 4.1m)	1.7 mm	
GLDc	2D	360	3 (r=2.3, 3.2, 4.1m)	1.1 mm	
GLDc-SiD like	2D	360	No	90 mm	23x(10cm Fe+5cm gap)

ΔZ_{max} is expected < 2 mm for
180 degree 3 ring case

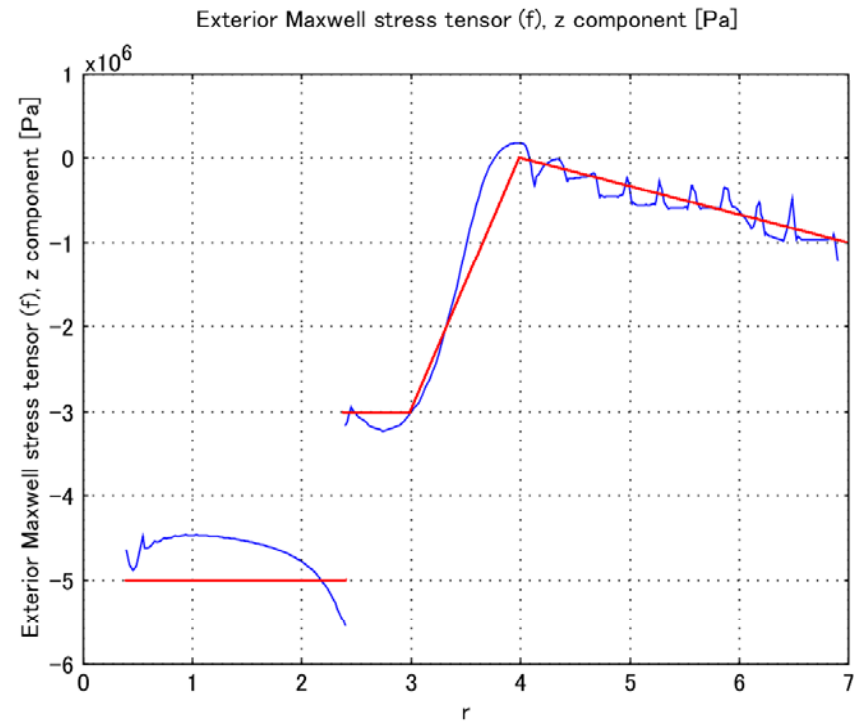
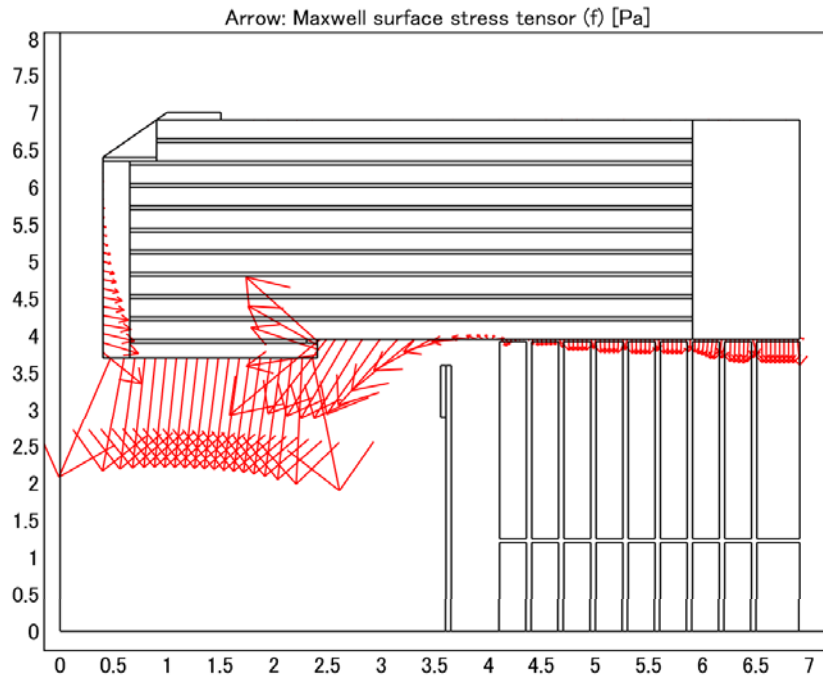
Endcap Deformation

- Summary
 - Difference of deformation between splitting and non-splitting is not so large
 - In splitting design, installation and maintenance of muon detectors can be done from the splitting plane
 - As a consequence, support rings can be put between iron slabs without disturbing the installation and maintenance of muon detectors
 - Splitting design with support rings gives much smaller deformation than non-splitting design without support ring

Endcap Deformation

- Comments at the meeting
 - Uniform volume force of 1 MN/m^3 is not adequate
 - 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
 - The simple function is used for the calculation of the deformation
 - Z-constraint only at $R=4.1 \text{ m}$

Magnetic Force



Endcap Deformation

- New results

	Angle	Support ring	ΔZ		
			r=0.4 m	r=6.9 m	
3D	180	No	-21 mm	+10 mm	$\phi=0$
			-22 mm	-12 mm	$\phi=90$
3D	360	No	-12 mm	-3.8 mm	
2D	360	No	-14 mm	-4.5 mm	
2D	360	1 (r=4.1m)	-5.8 mm	-0.35 mm	
3D	360	1	-4.6 mm	-0.2 mm	
3D	180	1	-5.7 mm	-0.6 mm	$\phi=0$
			-5.9 mm	-0.5 mm	$\phi=90$
2D	360	2 (r=2.3, 4.1m)	-2.3 mm	-0.5 mm	
2D	360	3 (r=2.3, 3.2, 4.1m)	-1.5 mm	-0.6 mm	

Endcap Deformation

- No support ring
- One support ring/gap

