



SiD Conceptual Engineering Status Report

Kurt Krempetz



SiD Engineering Group Participates

Engineers

- ANL
 - Victor Guarino→Hcal
- FNAL
 - Bob Wands→FEA
 - Kurt Krempetz→Integration
 - Walter Jaskierny→Solenoid Electrical
- LAPP
 - Claude Girard
 - Franck Cadoux
 - Nicolas Geffroy→Hcal
- PSL
 - Farshid Feyzi→Muon Steel
- SLAC
 - Jim Krebs→EndDoors
 - Marco Oriunno→Ecal
 - Wes Craddock→Solenoid
- RAL
 - Andy Nichols→Tracking
- U of Texas, Arlington
 -

Physicists

Bill Cooper

Yannis Karyotakis

Marty Breidenbach
Tom Markiewicz
Takaski Maruyama

Phil Burrows

Andy White



SiD Engineering Group-History

- Formed in the summer '07
- Meet via Webex on Wednesdays @10:00 (US Central Time Zone) ~ every other week
- If interested send me mail (Krempetz@fnal.gov) to get on meeting notice list.
- Meetings/Workshops
 - IR Workshop - Sept '07
 - ALCPG – Oct '07
 - SLAC SiD Workshop – Jan '08
 - RAL SiD Workshop-April '08
 - Warsaw Meeting-June'08



Pre-Engineering Meeting

- Well attended
 - ~10 growing to ~20 people
- Many Ideas and Concepts Discussed
- Conceptual Design Phases
 - LOI Design
 - Consistent with Simulation Studies
 - Baseline Design
 - Latest ideas that have been put on paper
 - Optimized Design
 - Ideas and work that still needs to be done and is a process that continues until a final design is required.



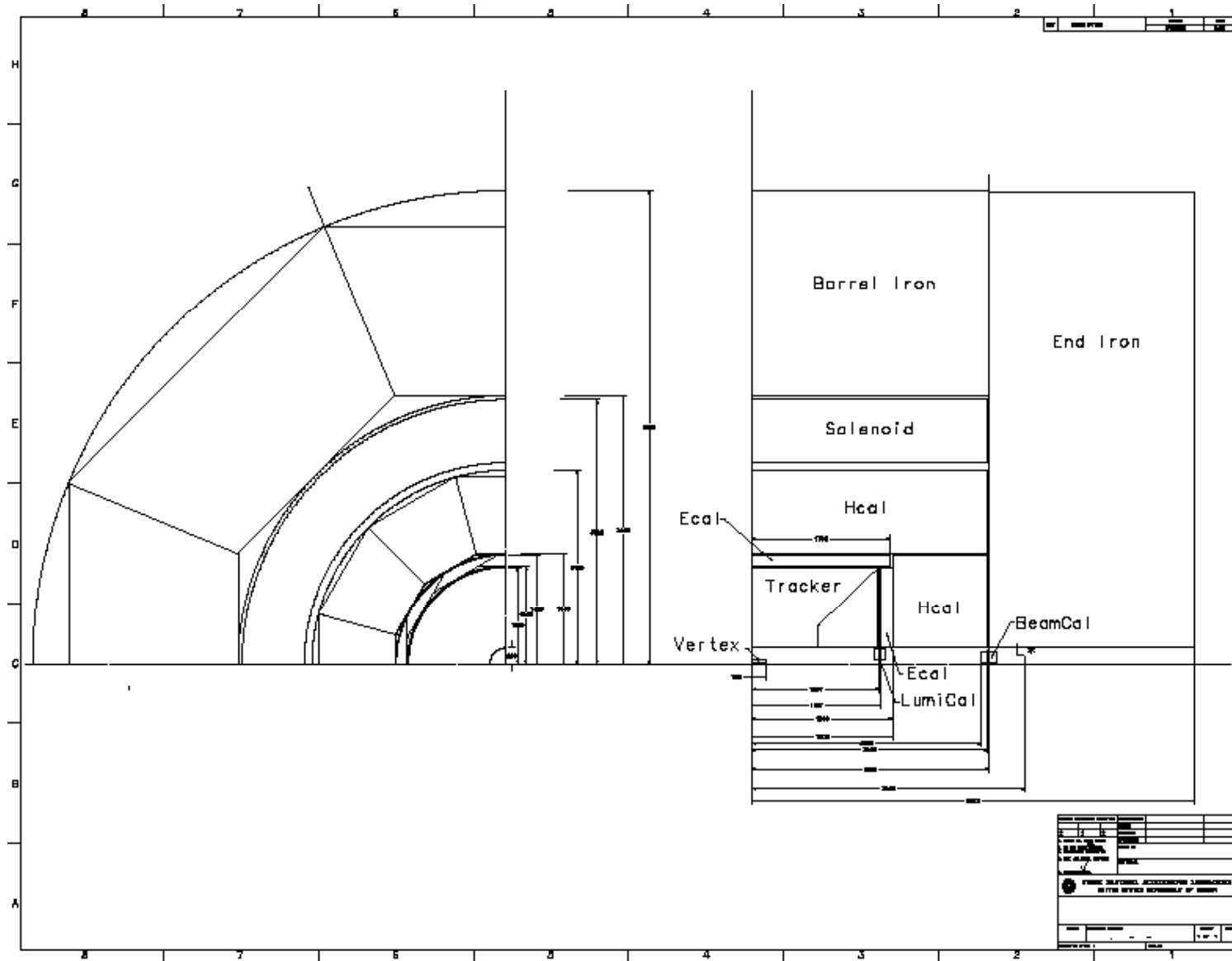
Global Parameters

New Proposed 4.5 λ Detector

Detector	Radius (m)		Axial (z) (m)	
	Min	Max	Min	Max
Vertex Detector	0.014	0.060	0.000	0.180
Central Tracking	0.206	1.250	0.000	1.607
Endcap Tracker	0.207	0.492	0.850	1.637
Barrel Ecal	1.265	1.409	0.00	1.765
Endcap Ecal	0.206	1.250	1.657	1.800
Barrel Hcal	1.419	2.493	0.000	3.018
Endcap Hcal	0.206	1.404	1.806	3.028
Coil	2.591	3.392	0.000	3.028
Barrel Iron	3.442	6.082	0.000	3.033
Endcap Iron	0.206	6.082	3.033	5.673



Global Parameters

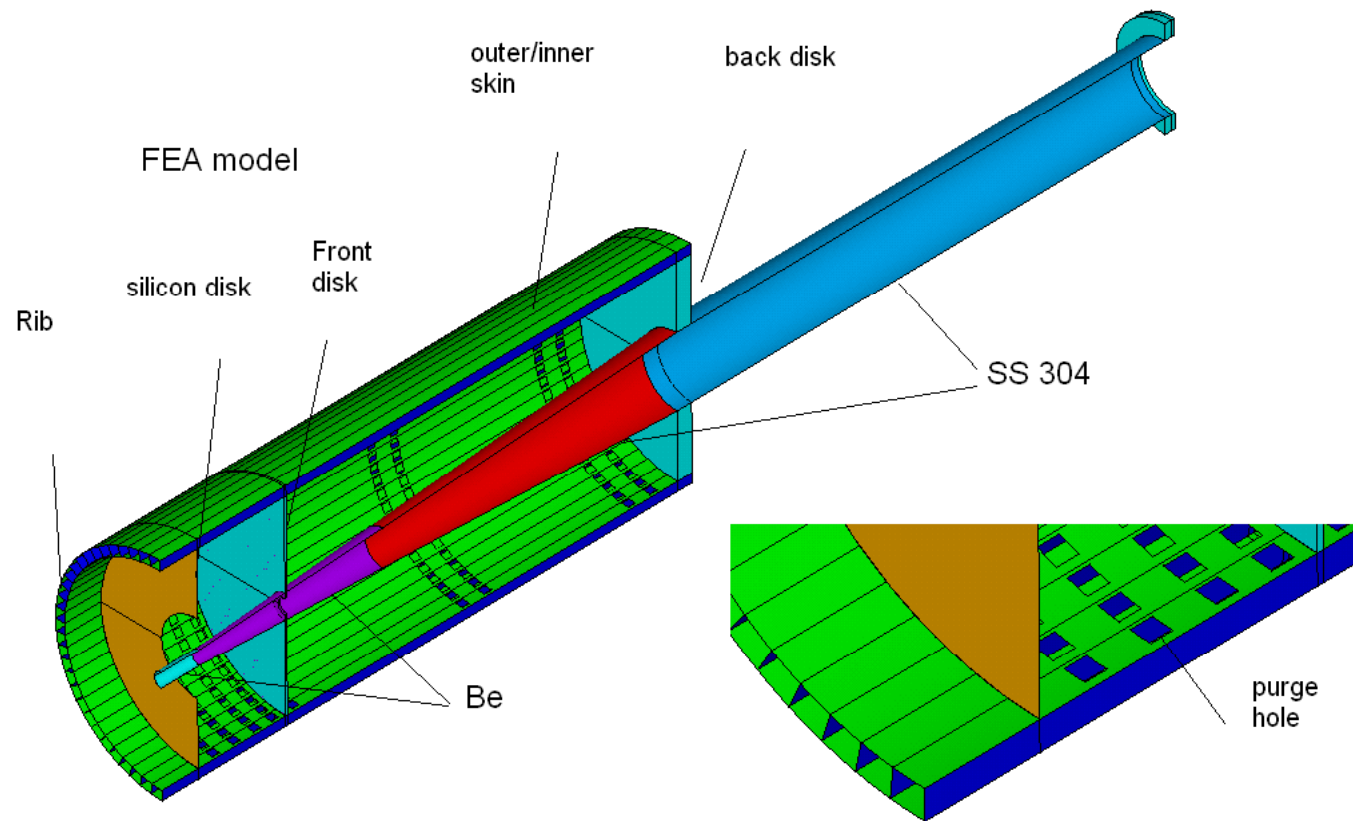




Beam Tube/Exoskeleton

ANSYS

FEA Model Description

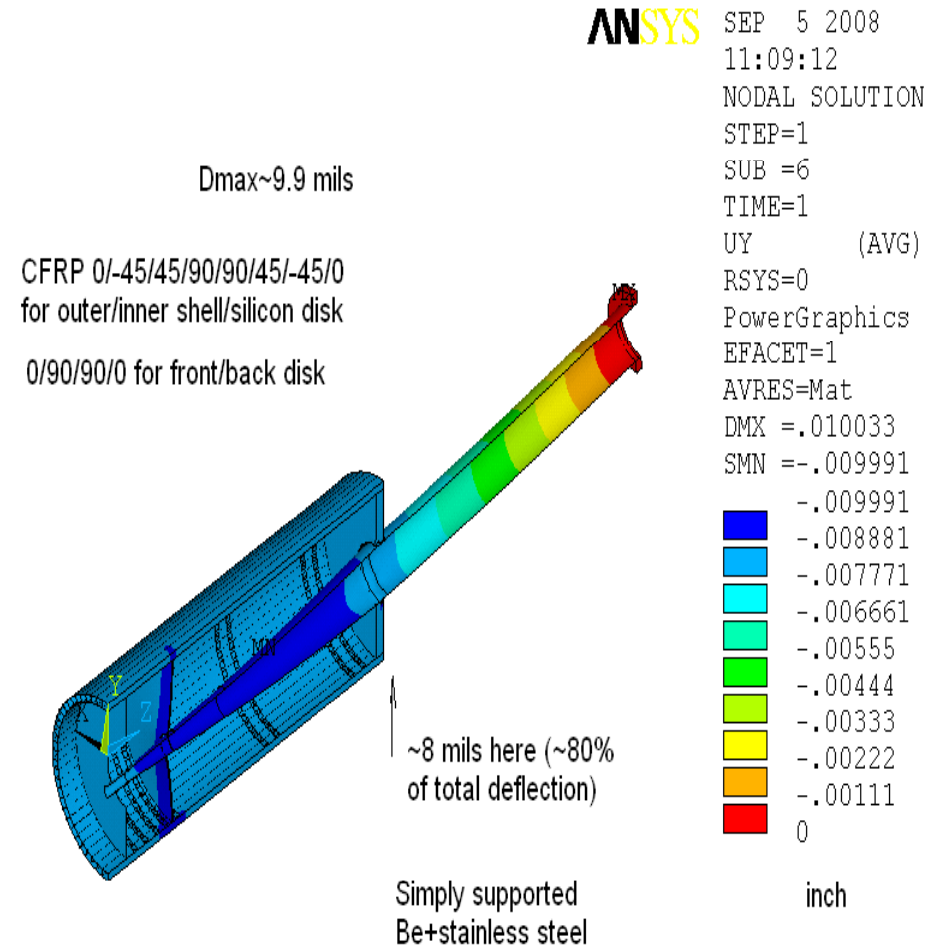




Beam Pipe + Exoskelton

Deflection due to the vacuum load + gravity (simply support)

- Simply supported (uy=0 at 0/180 degree)
- 0/45/-45/90/90/45/-45/0 for outer/inner shell/silicon disk
- 0/90/90/0 for the front/back /rib

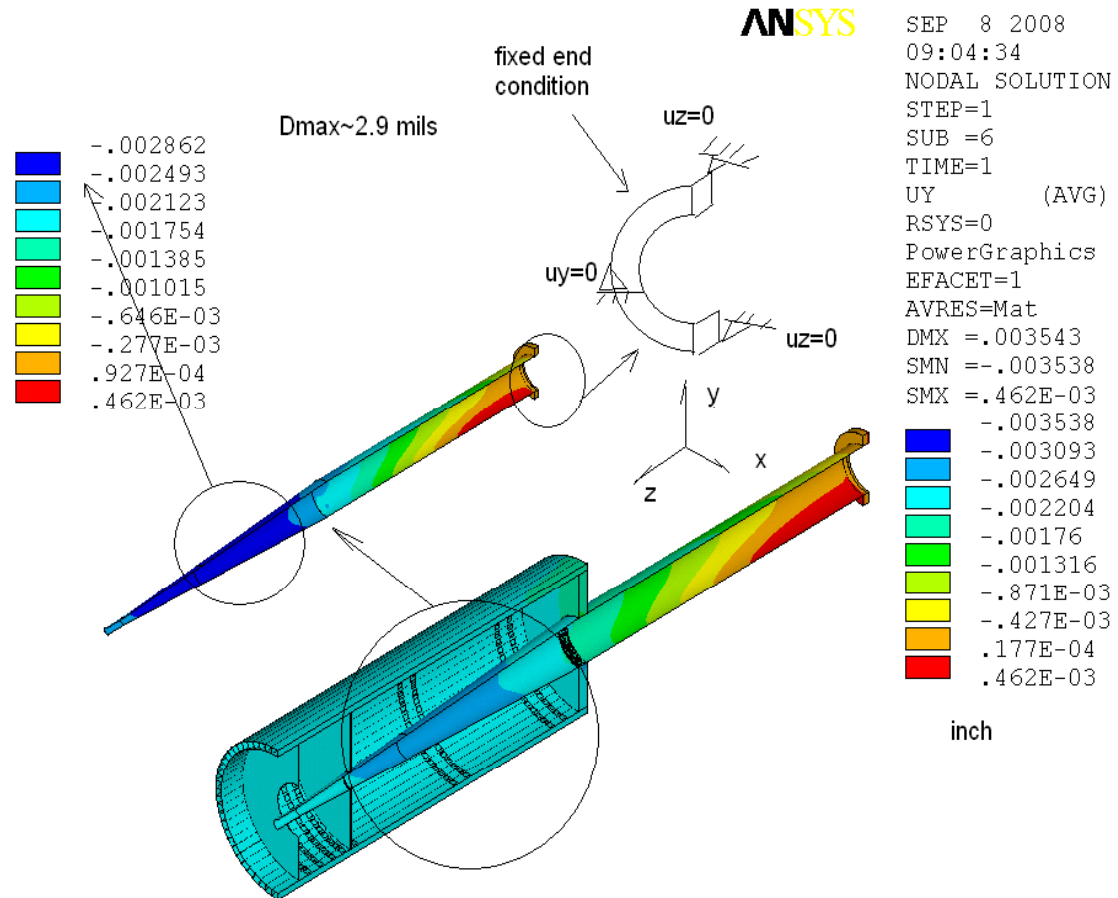




Beam Pipe + Exoskeleton

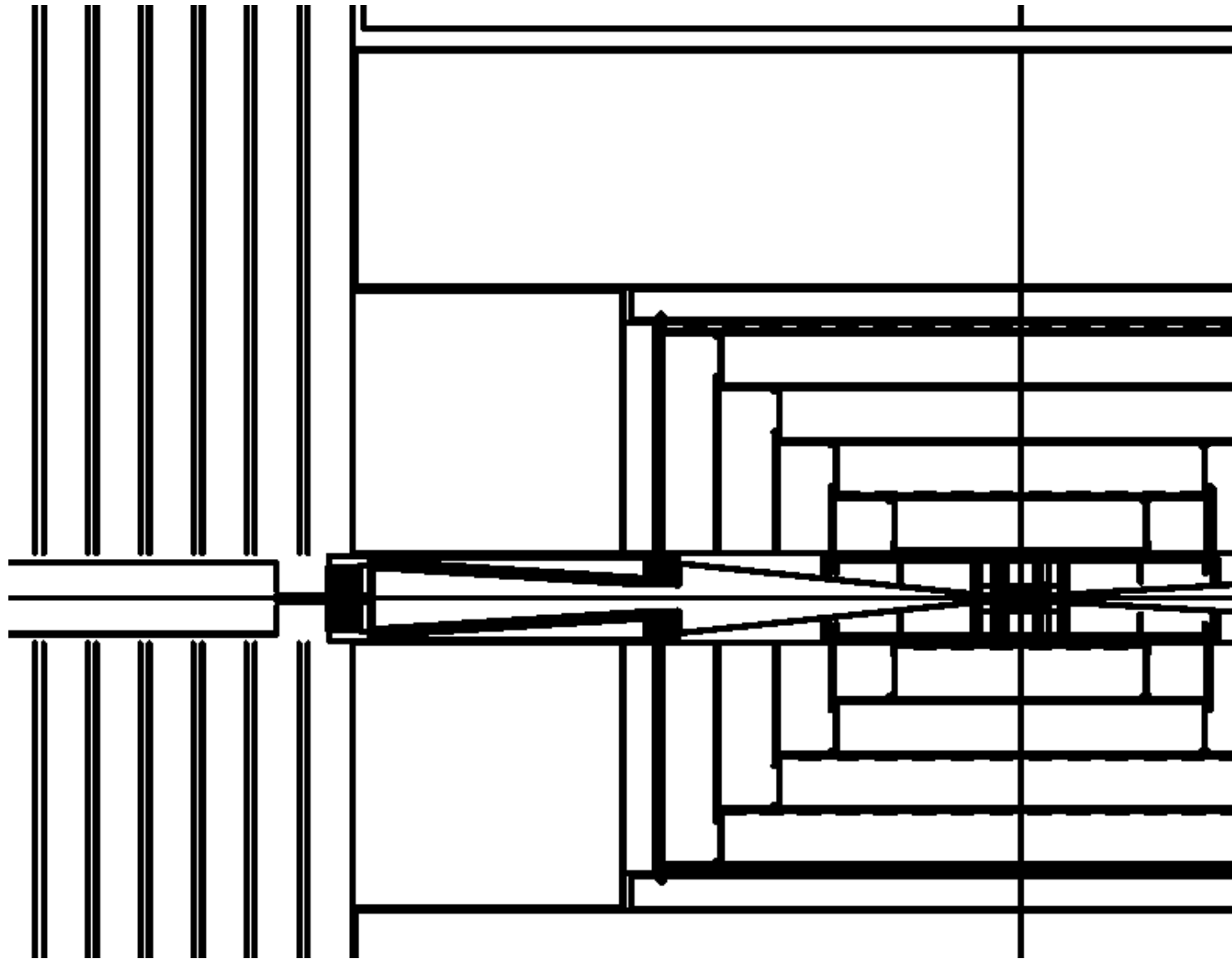
(Deflection due the vacuum load+gravity for a fixed support)

- “Fixed supported”
($u_y=0$ at 0/180 degree and $u_z=90/-90$ degree)
- 0/45/45/90/90/4 /-45/0 for outer/inner/silicon disk
- 0/90/90/0 for the front/back /rib



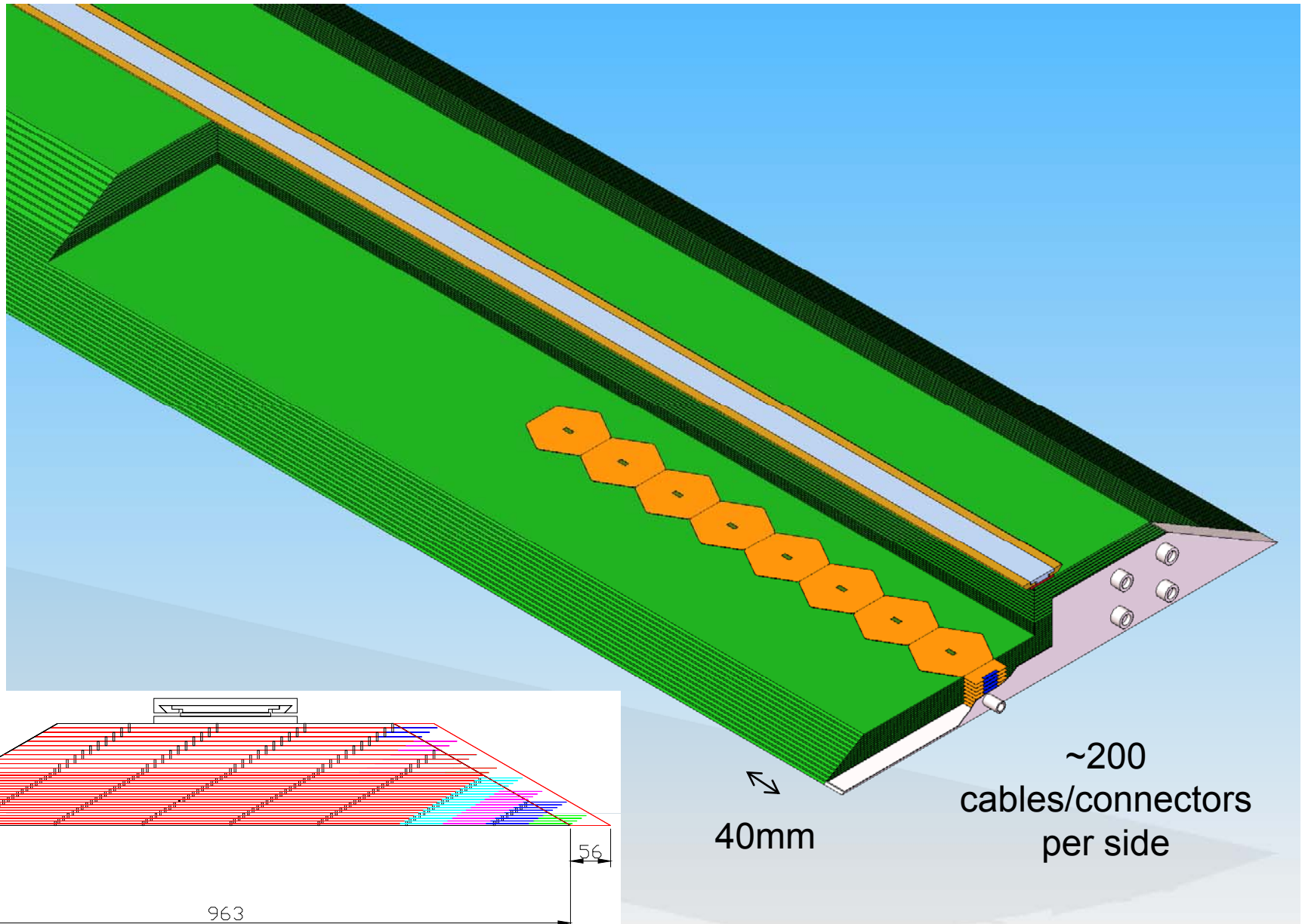


Proposed Beam Tube



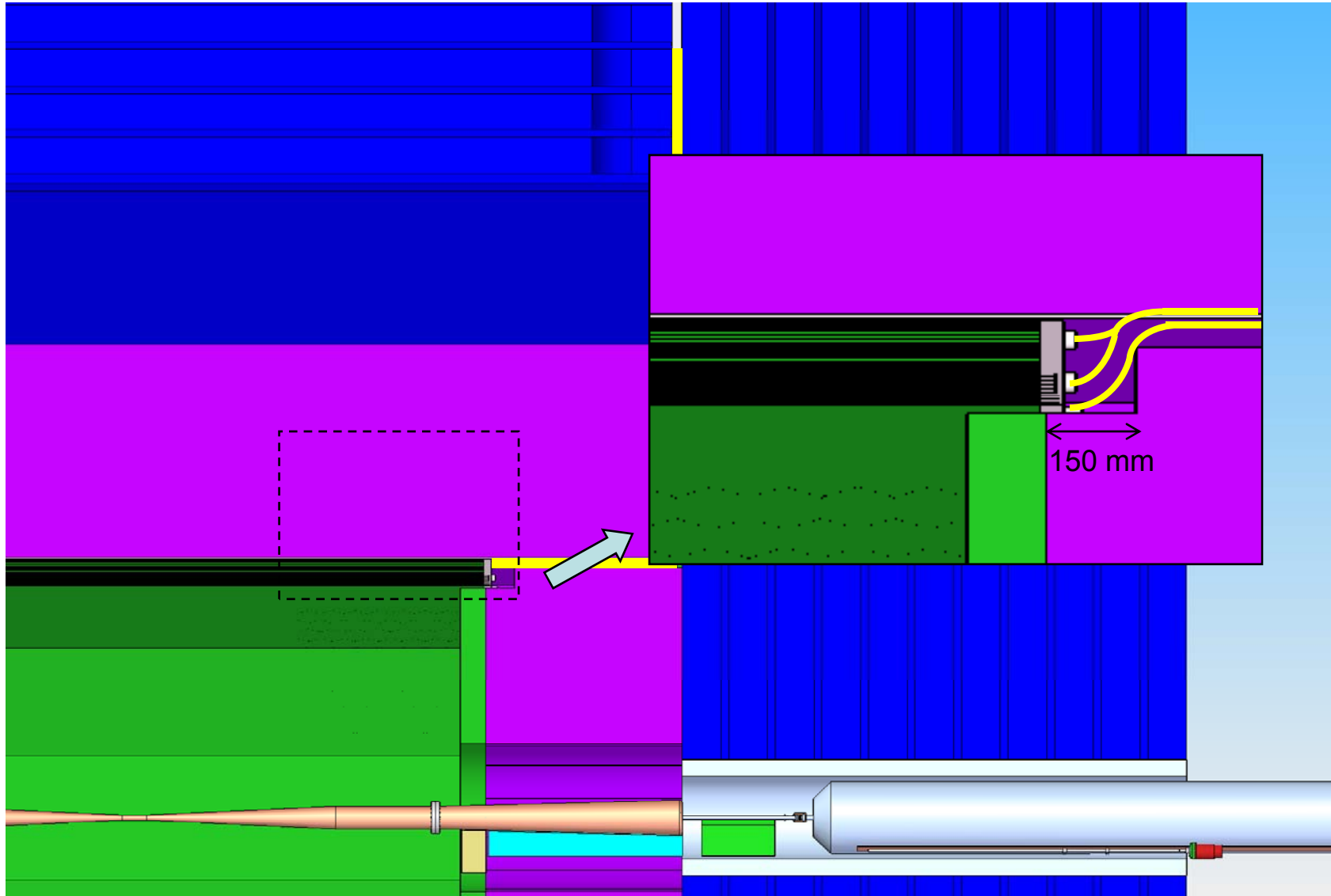


Ecal Module



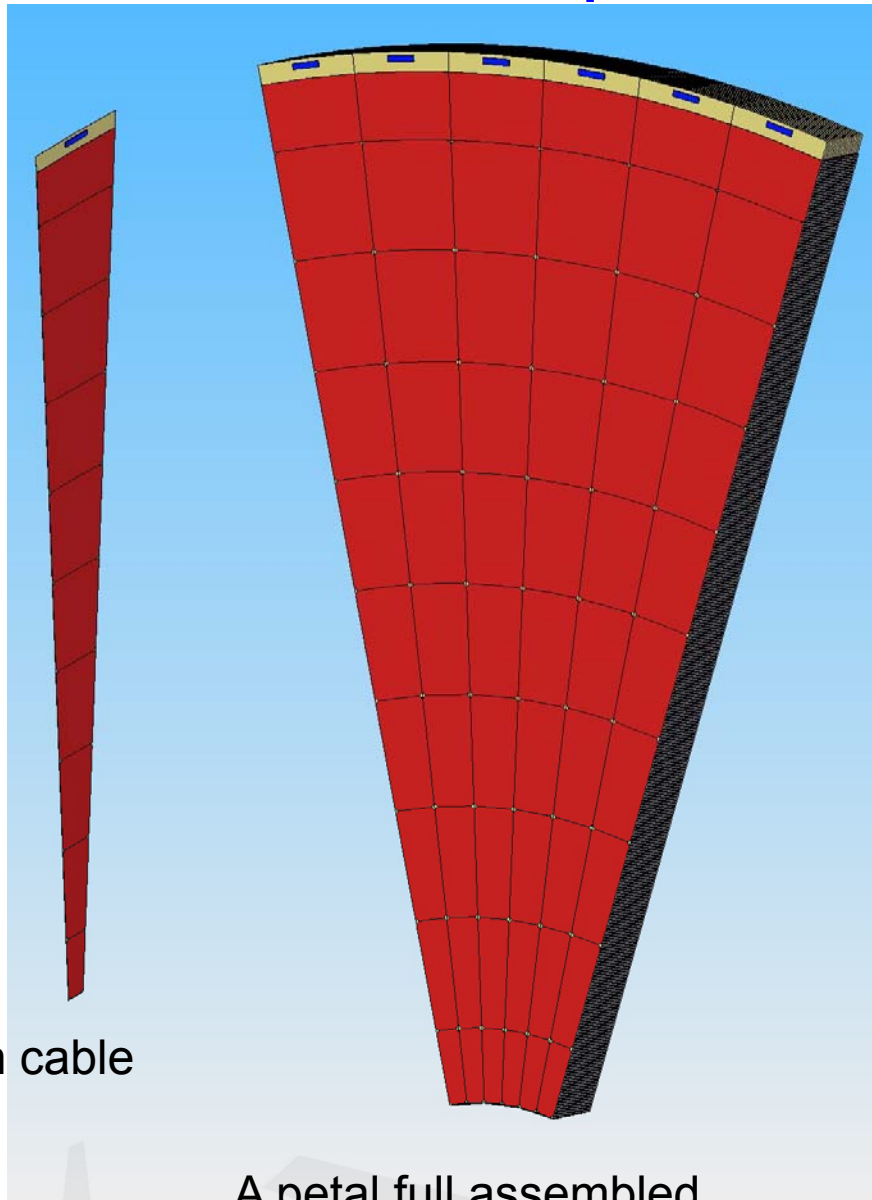


Ecal Cable Routing





Ecal End Cap Module



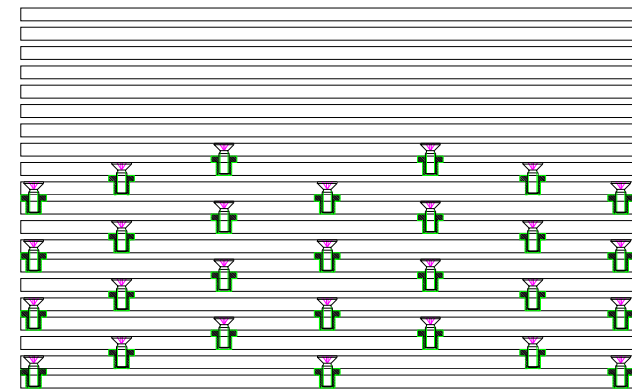
Kapton cable

A petal full assembled

as in the barrel wedges

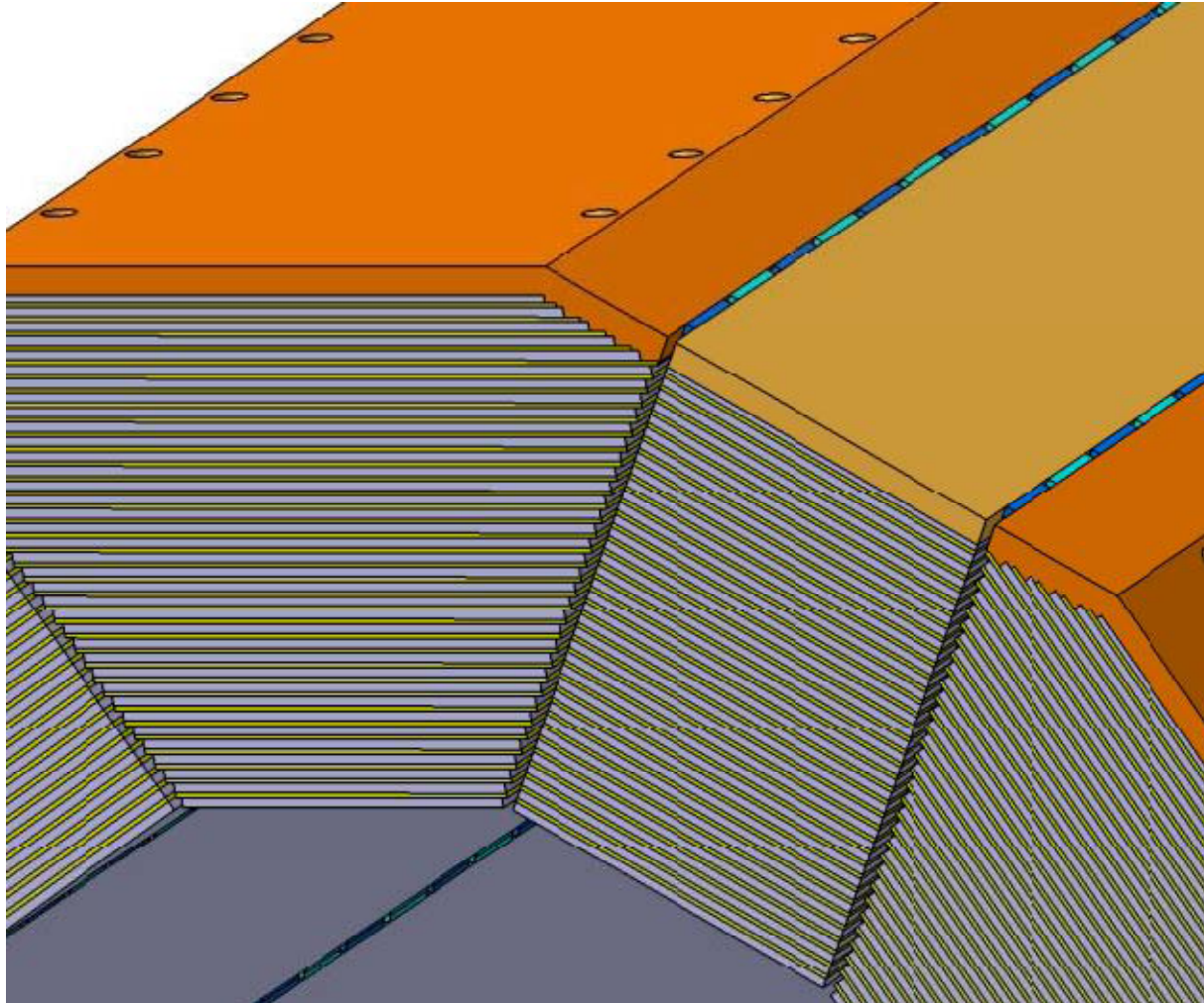
Not all the screws in the name planes
need to be used

Some projectivity on the dead space,
mitigated by the coiling due to B and the
offset of the IP

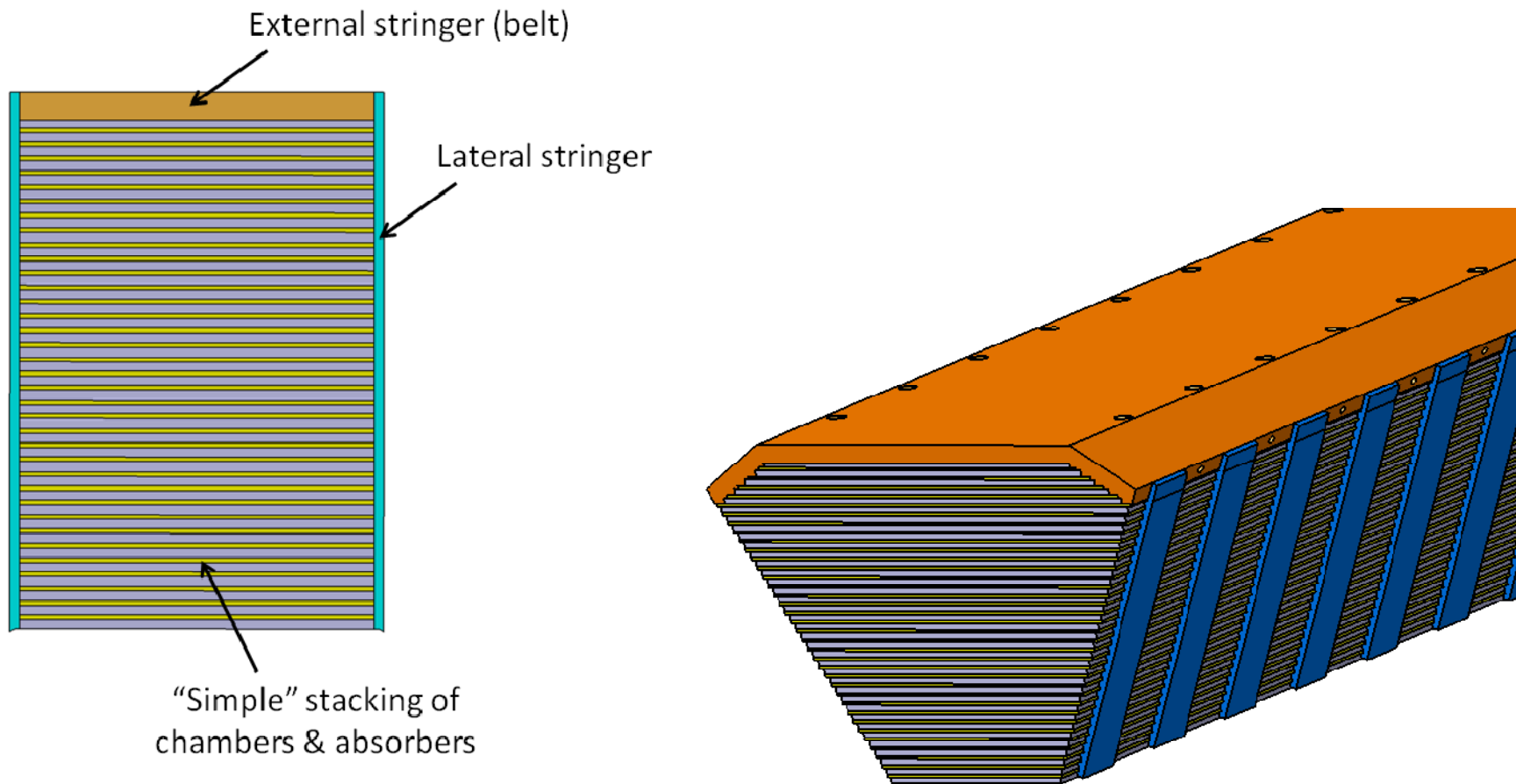




Hcal-Nonprojective Geometry

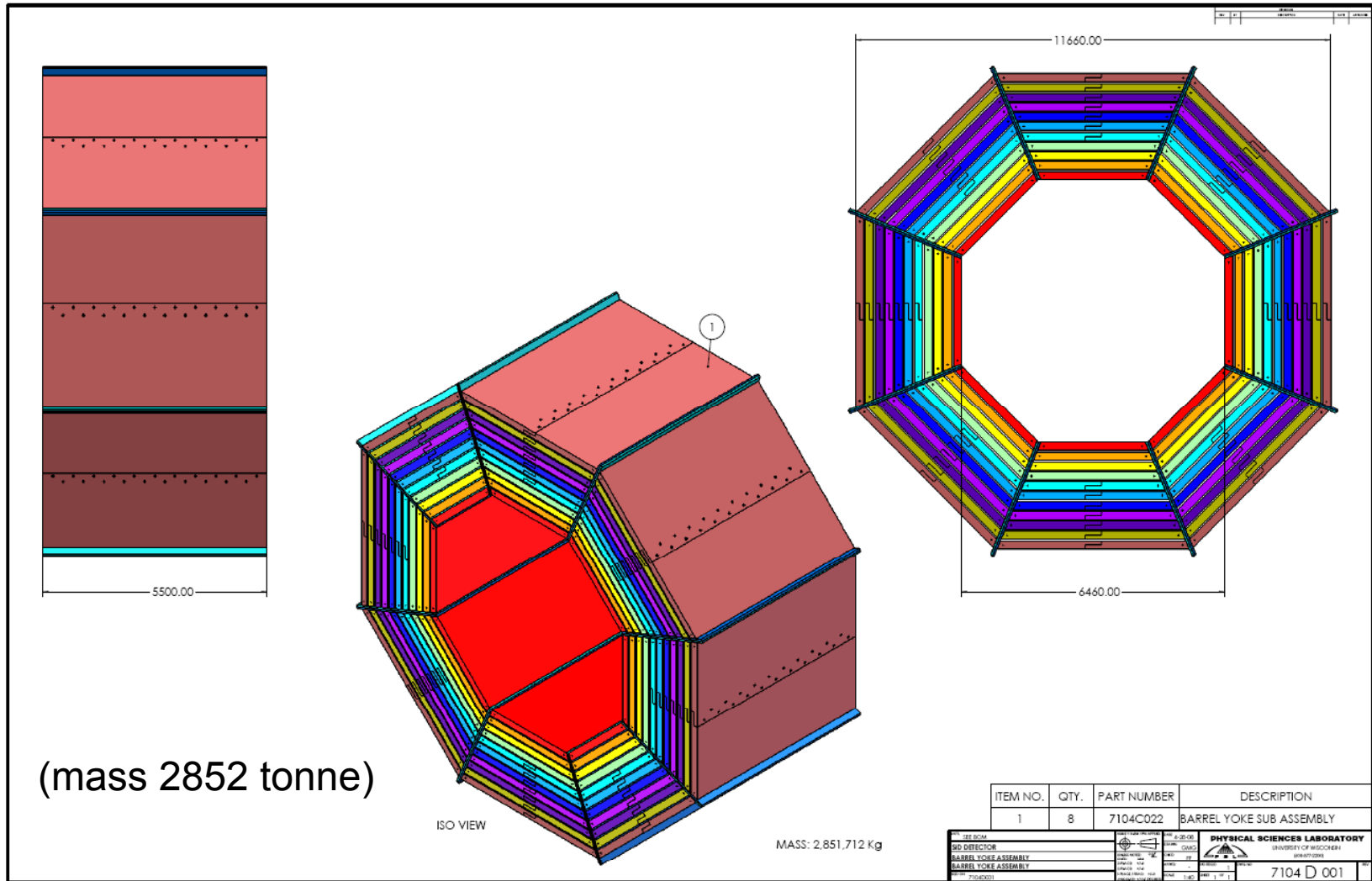


Hcal Modules



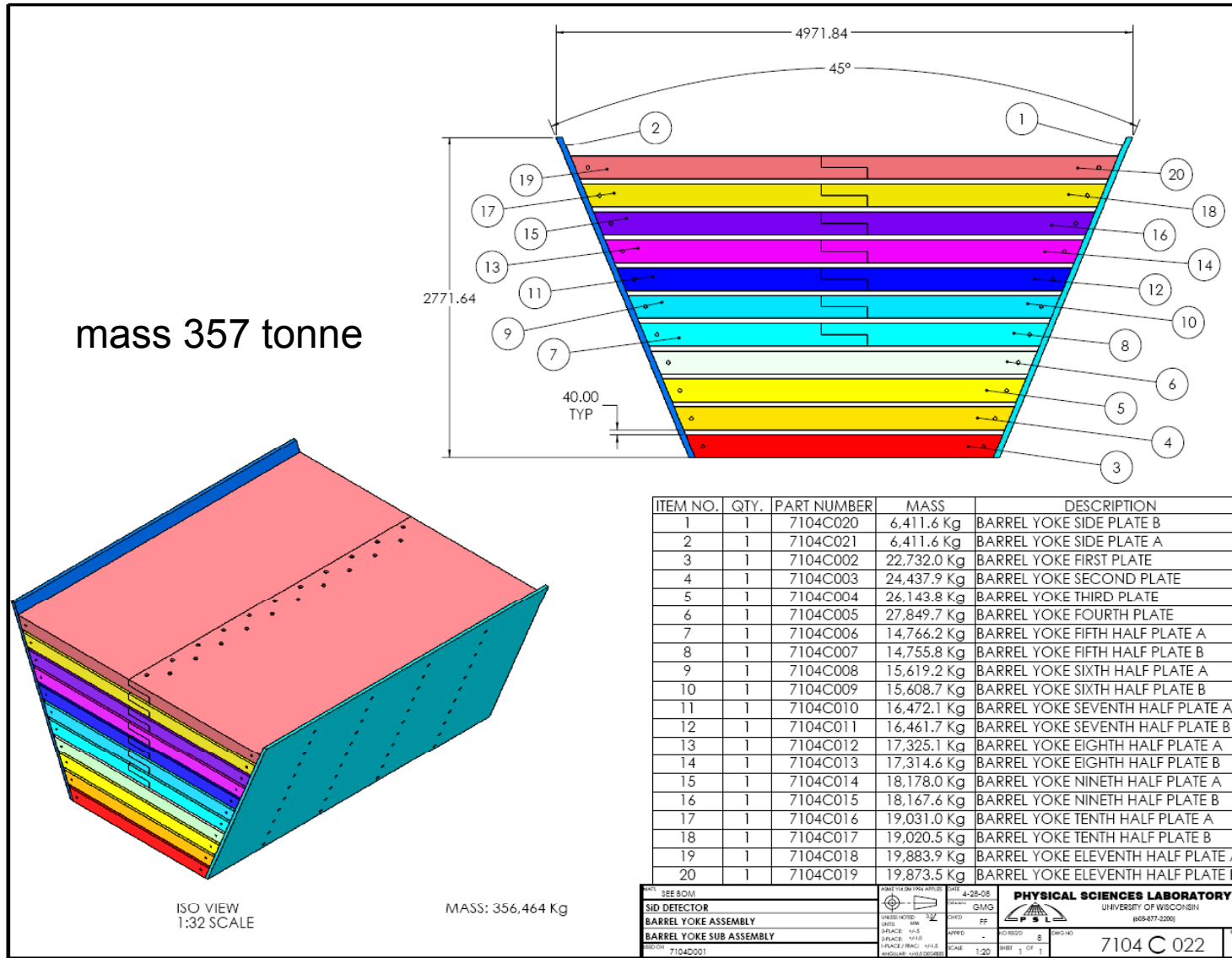


Iron Barrel Assembly



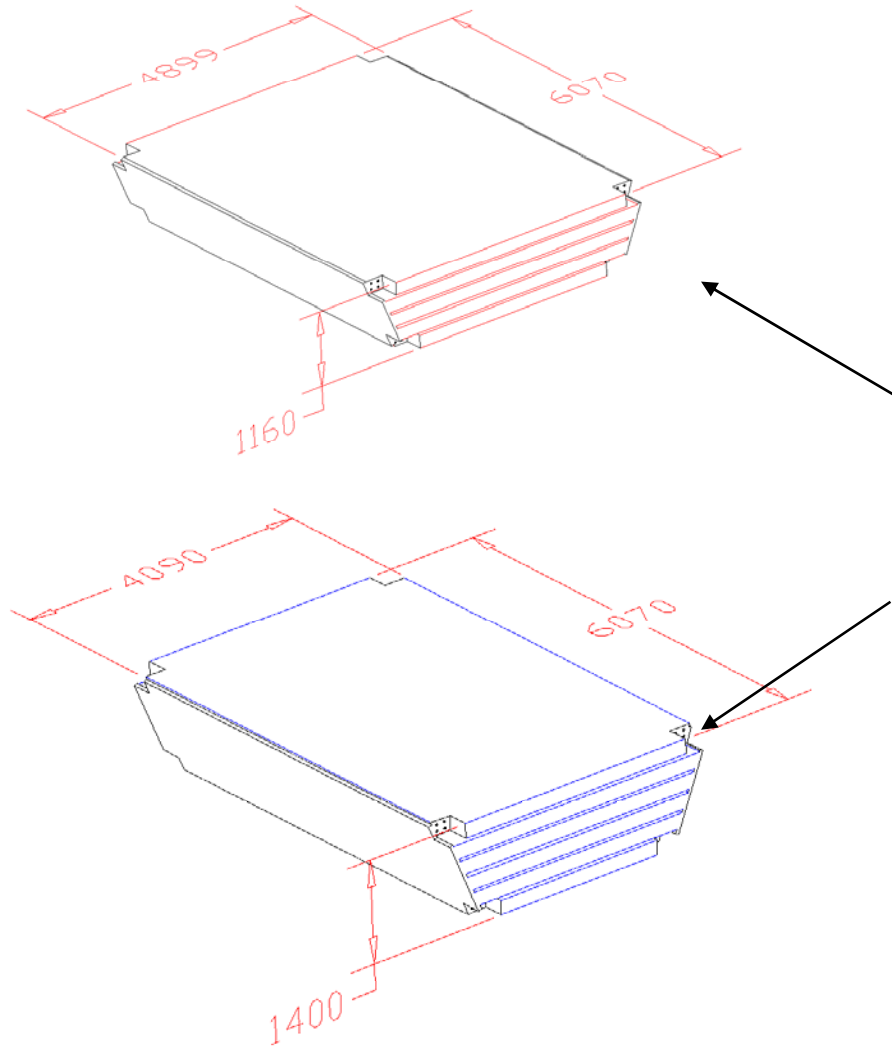


Iron Barrel Module





Proposal for Barrel Iron – Two Independent Rings

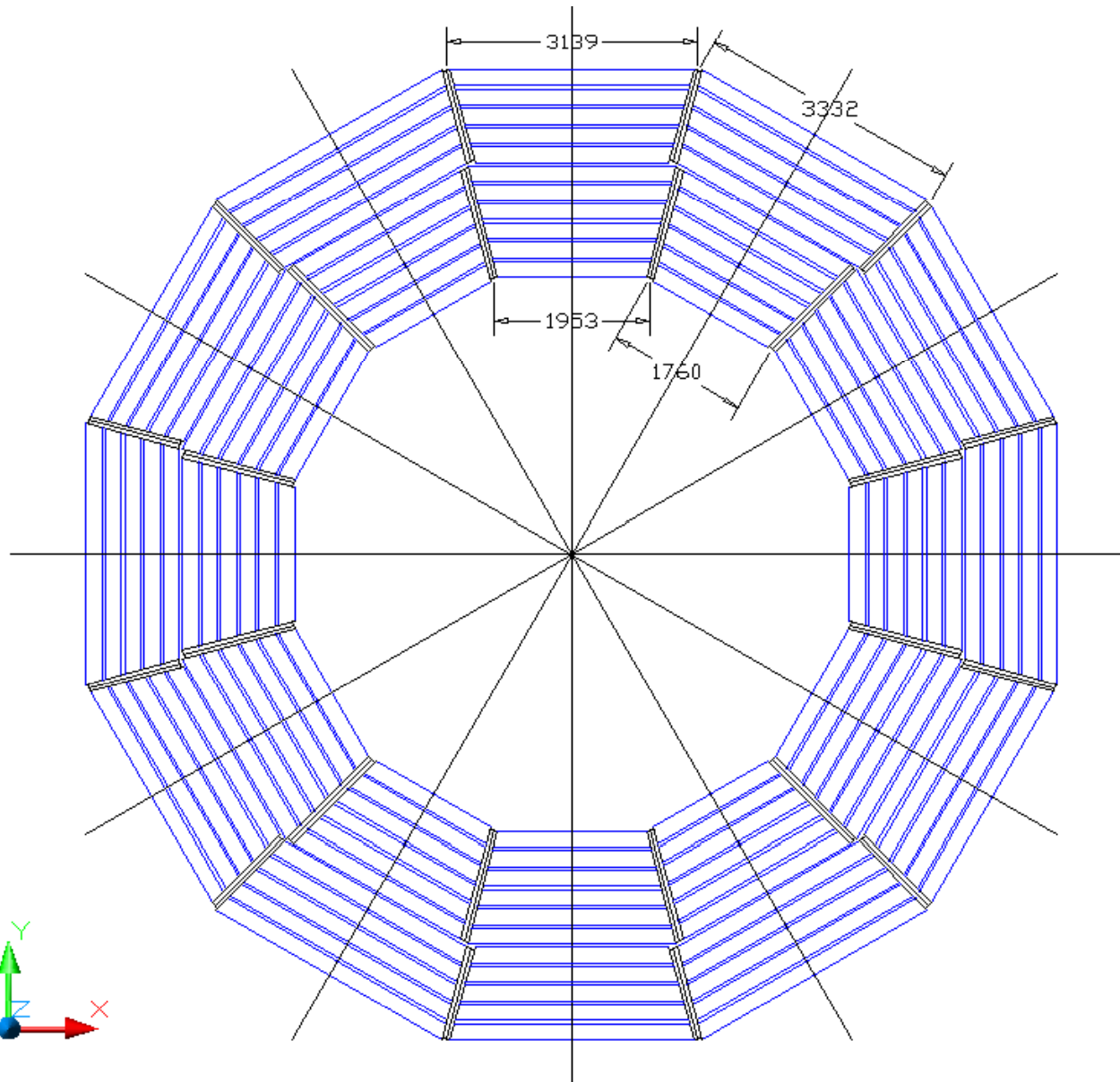


Outer block 211 tonne

Inner block 203 tonne



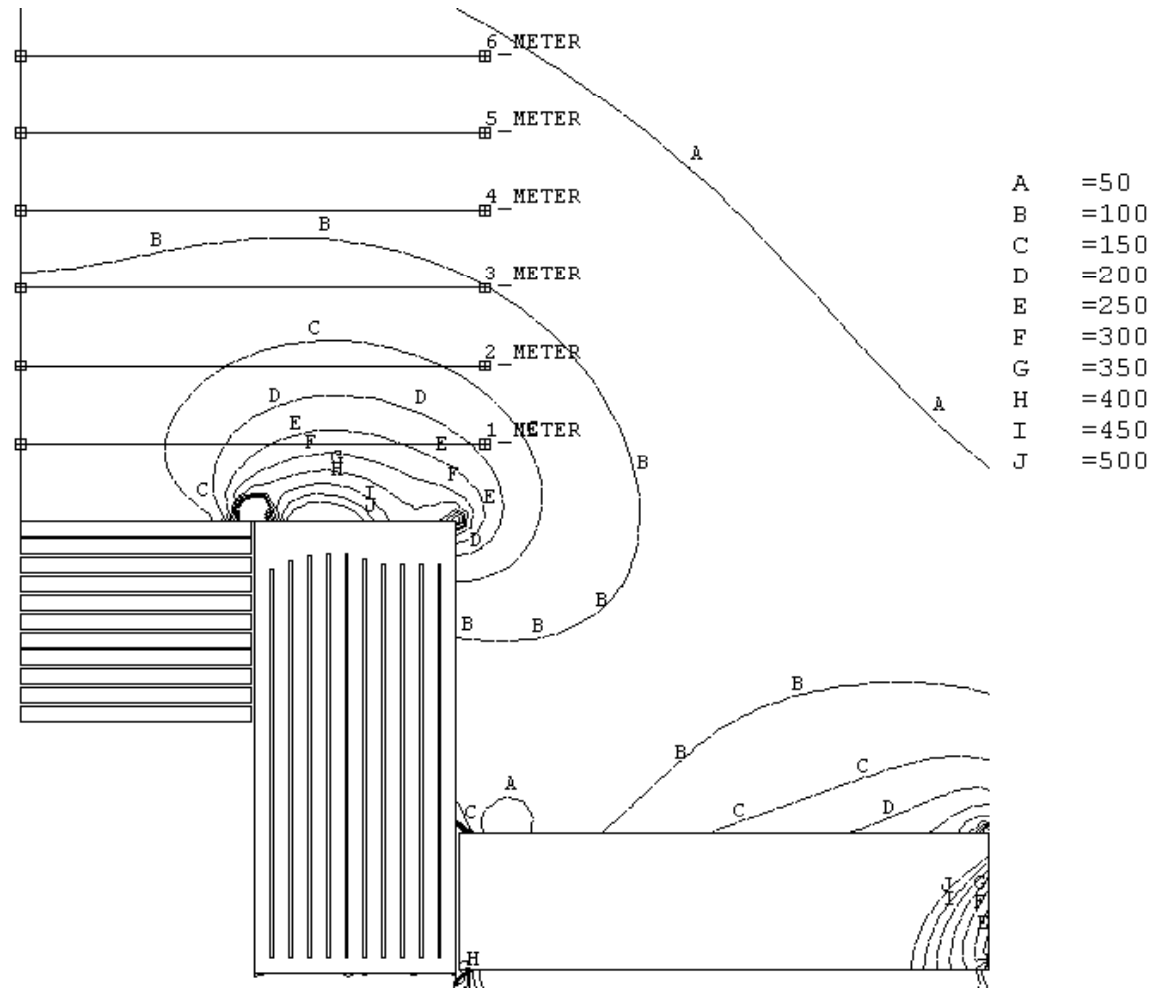
Proposed Return Barrel Iron





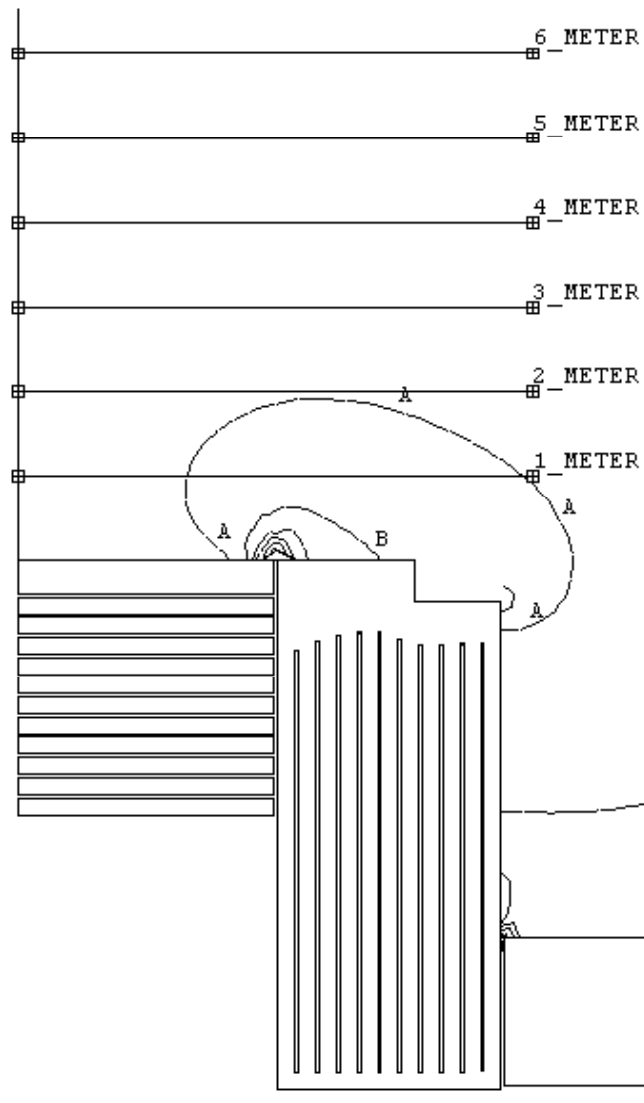
Fringe Field Map

Barrel: 11 - 200 mm plts
Endwall: 11 - 200 mm plates





Fringe Field Map for Proposal Iron Geometry



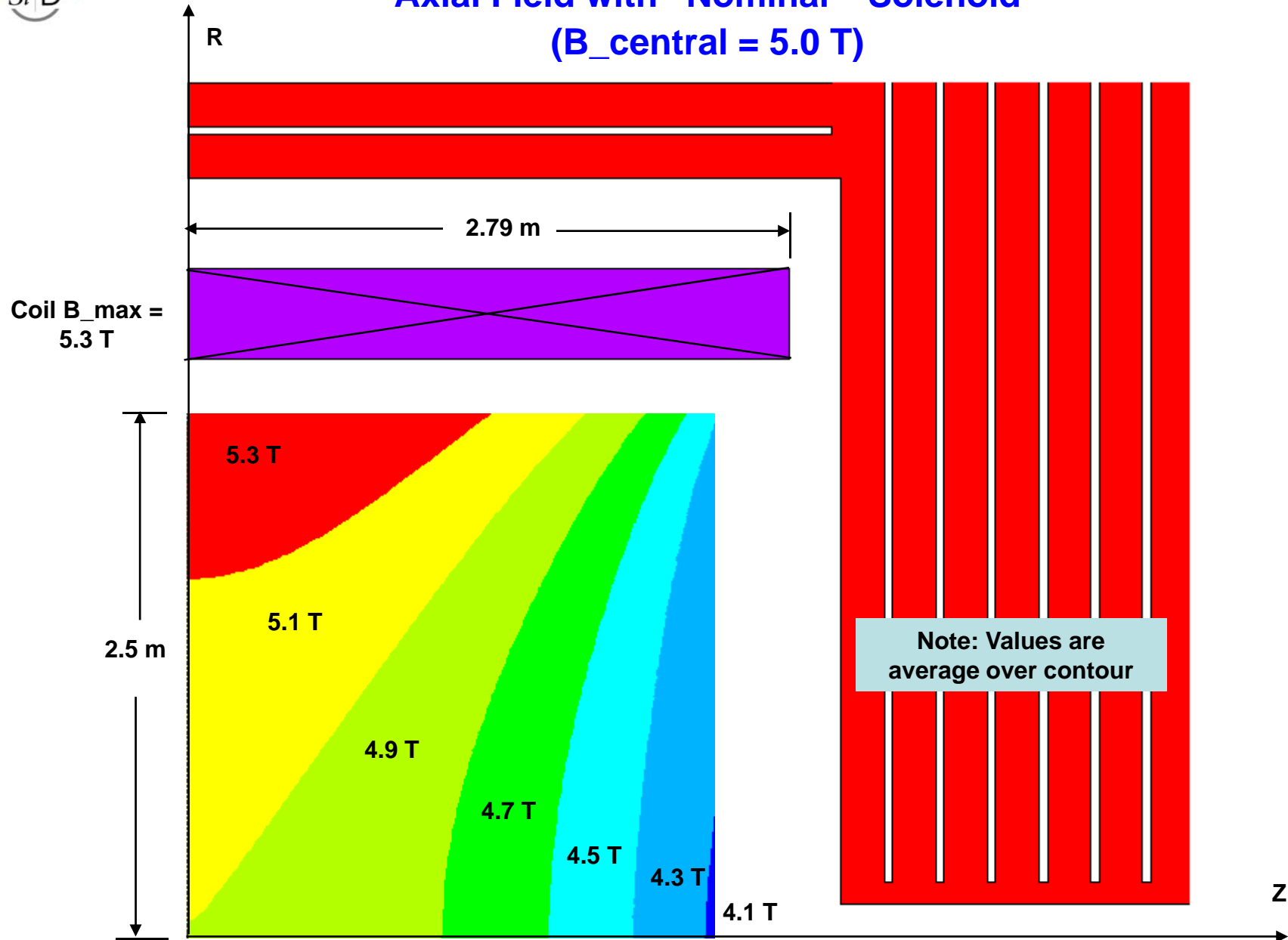
Barrel: 11 - 200 mm plts + 1 - 400 mm plt
Endwall: 11 - 200 mm plts

A	=50
B	=100
C	=150
D	=200
E	=250
F	=300
G	=350
H	=400
I	=450
J	=500

**total mass of barrel and
endwall = 8880 tonnes**

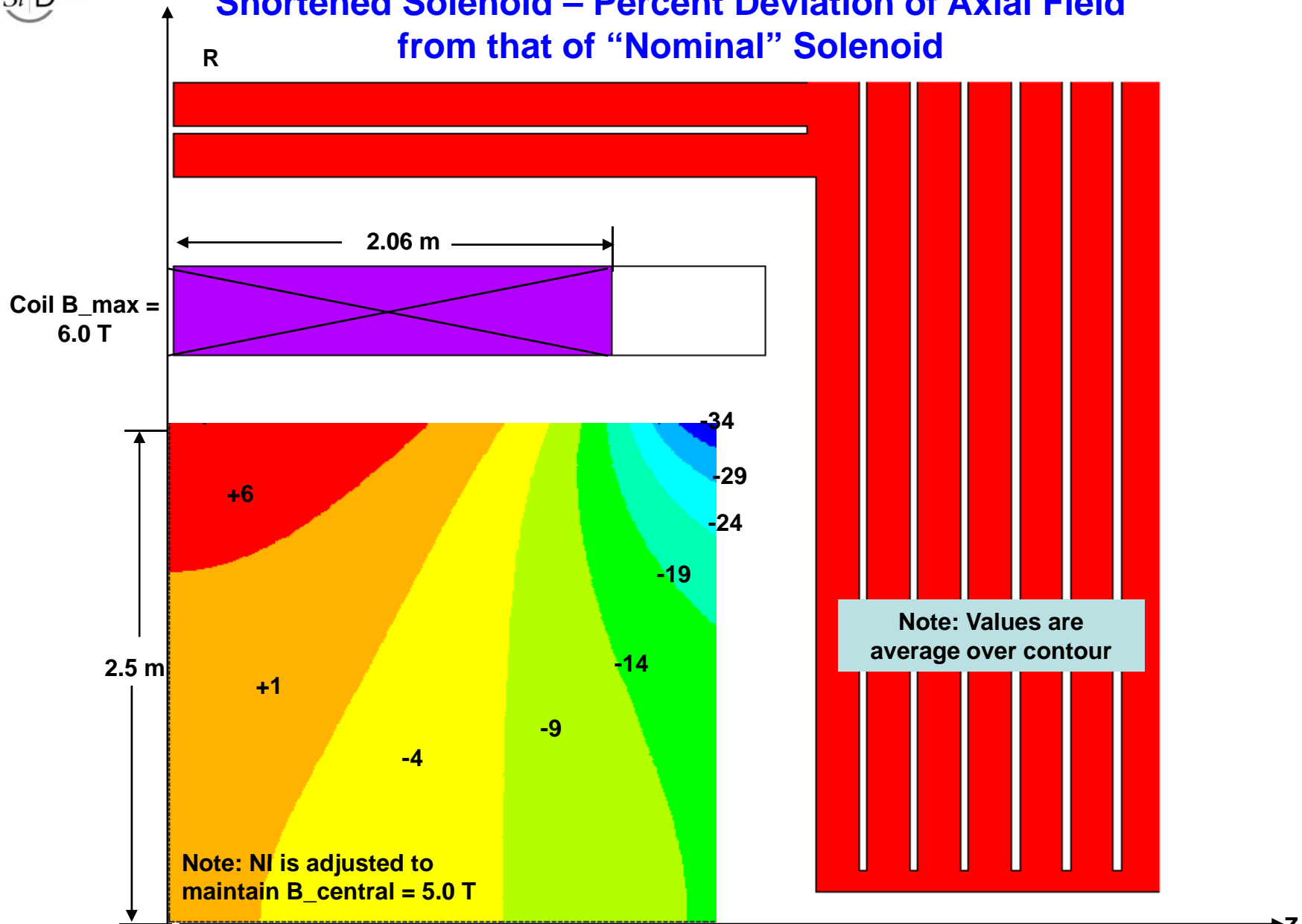


Axial Field with "Nominal" Solenoid ($B_{\text{central}} = 5.0 \text{ T}$)



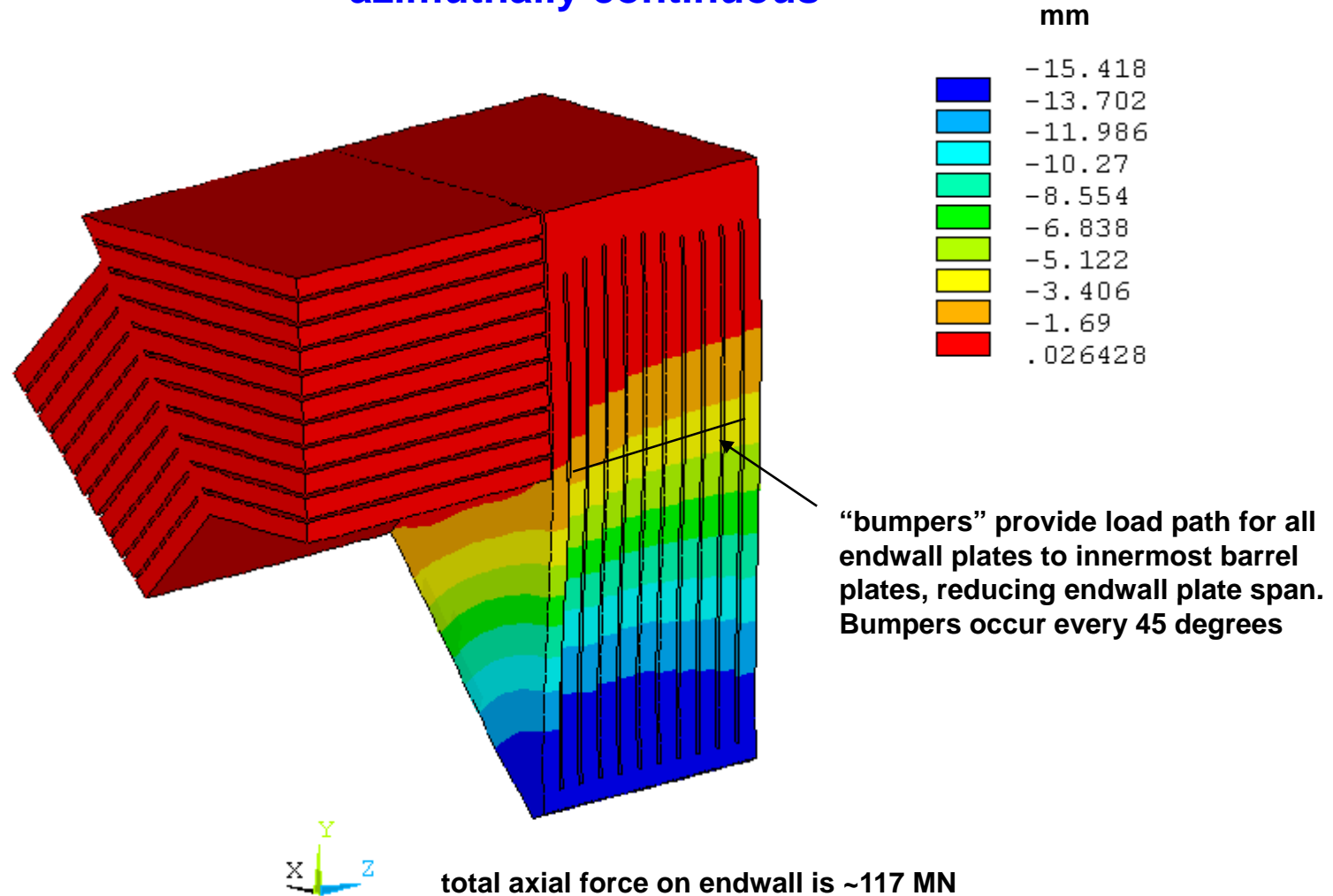


Shortened Solenoid – Percent Deviation of Axial Field from that of “Nominal” Solenoid





Axial Displacements of Endwall for 11-200 mm Plate Geometry – Assumes endwall plates are azimuthally continuous





Other Engineering Related Talks

- Marty → Global Issues, Costs
- Marco → MDI, IR Hall
- Wes → Solenoid, Superconducting Cable