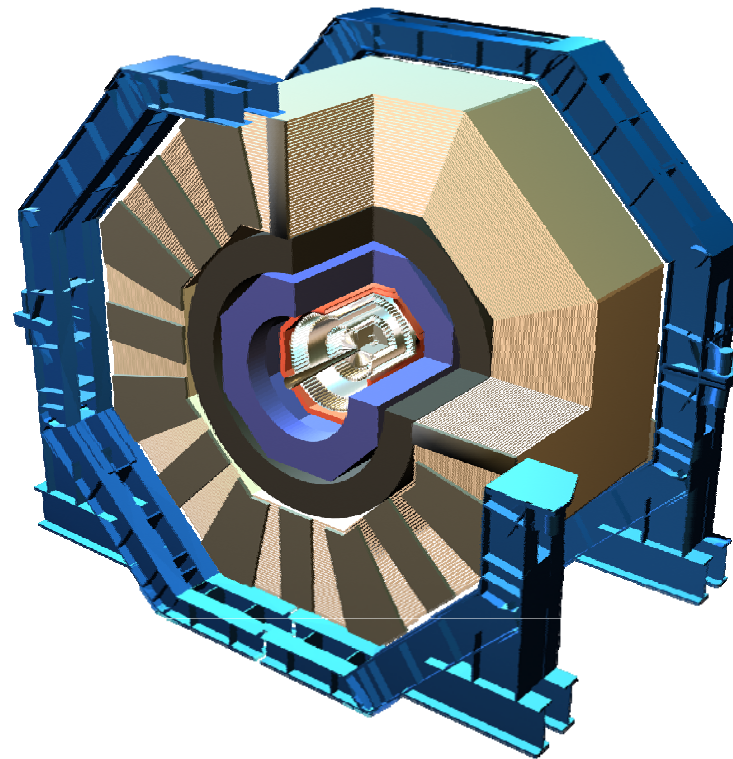




SiD Solenoid Status and Plans

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Baseline Solenoid Design Summary

- 5 Tesla
- 5m Diameter Clear Bore
- 5m Long
- 6 Layers
- Stored Energy 1.4 GJ
- Possible Integrated Dipole
- Details in two reports;
 - A 5 tesla Solenoid for SiD
 - A Detector Integrated Dipole for the Silicon Detector at the International Linear Collider



Baseline Design Return Flux Summary

- Octagonal Barrels and Endcaps
 - Steel plates
 - 10 cm thick (with 5 cm gaps for muon chambers)
 - 23 layers
 - Barrel: $R = 3.428\text{m}$ to 6.828m ; 5.6m long
 - Endcaps: $Z = 2.847\text{m}$ to 6.247m
 - Estimated Total Weight~ 6,000 tons



CMS/SiD Comparison

CMS	SID
• 4Tesla	5Tesla
• 5.9m diameter clear bore	5m
• 13m Long	5m
• 4 Layers	6 layers
• Stored Energy 2.8 GJ	1.4 GJ

CMS Solenoid has been successfully tested to 4 Tesla



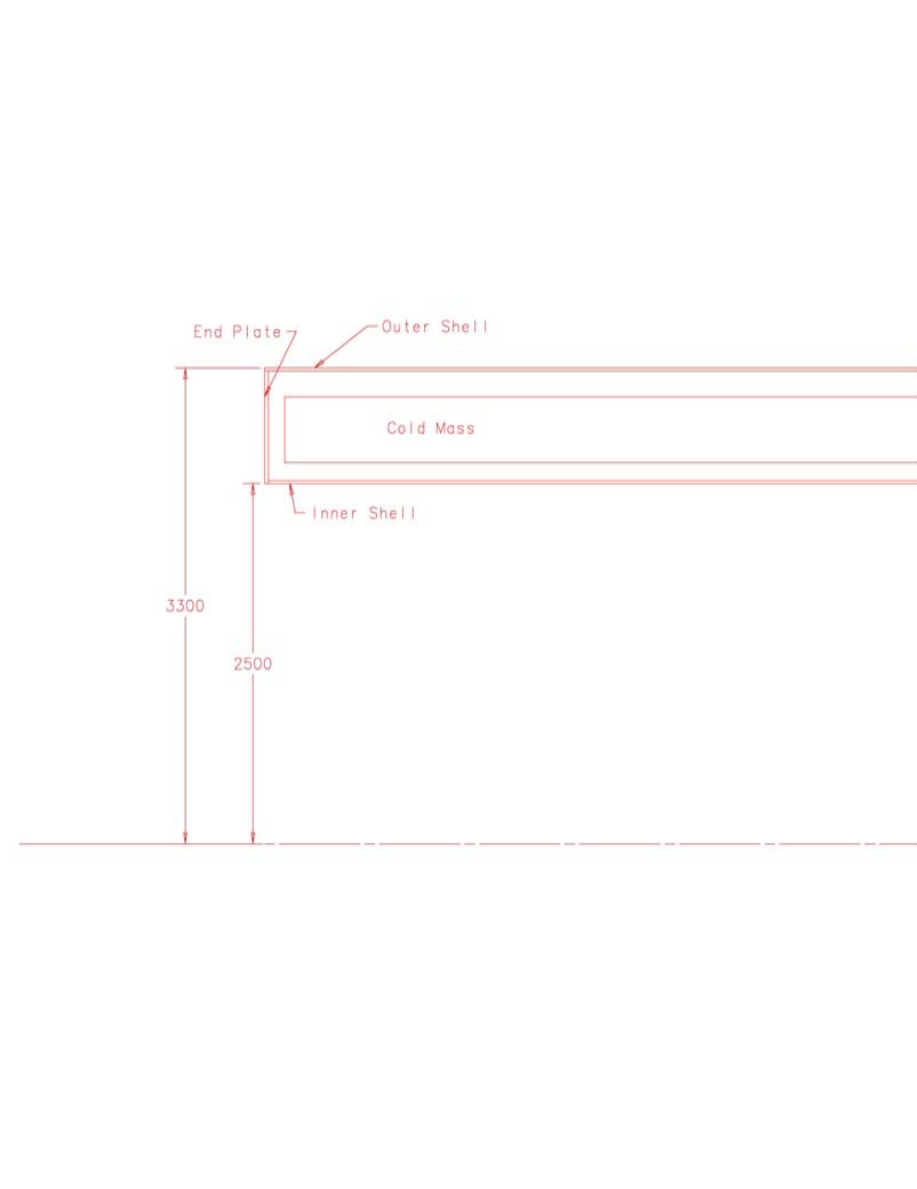
Moving Forward Next Step

- Many specifications are needed from other Subsystems
- Specifications Required
 - Loads being supported
 - Motion System requirements
 - Routing of Cable, Cryogenics, Power, Air, etc.
 - Clearances required
 - Handling Load (G-force) Requirements



Magnet Geometry

- Vacuum Shell
 - Inner Cylinder Shell
 - Outer Cylinder Shell
 - End Plates
- Penetration
 - Power Lines
 - Cooling Lines
 - Venting Lines
 - Vacuum Pumping Lines





Solenoid Vacuum Shell Material

- Stainless Steel vs. Aluminum

- SS

- Higher Strength
 - Higher Modulus (Stiffer)
 - Easier to Weld
 - Better Mechanical Properties > Impact, Thermal Expansion, Fatigue

- AI

- Cheaper Material Costs
 - Easier to Machine
 - Less Weight



Solenoid Vacuum Shell Loads

- Vacuum Loads
 - ~ 1000 tons-Inner Shell
 - ~ 1300 tons-Outer Shell
- Magnet Coil/Cold Mass
 - ~130 tons
- Magnet Loads
 - ~500 tons
- HCal/ECal
 - ~700 tons



Vacuum Shell Calculations

- Vacuum Shell Thickness- Vacuum and Venting Loads Only
 - Assuming SS304
 - Venting Condition 5 psi
 - Inner Cylinder Shell=.75” (19mm)
 - Outer Cylinder Shell=.875” (22mm)
 - End Plates= 1.125” (29mm)



Understanding SiD/CMS Differences To Do List

- Higher Field
 - Superconductor Studies
- More Layers
 - Cold Mass Stiffness Studies
 - Thermal Studies
- Larger Axial Decentering
 - Support Studies



Conclusions

- A lot of work ahead
- Specifications and Decisions needed