



SiD

New Baseline: Engineering Constraints and Designs

Kurt Krempetz



SiD Engineering Group

Engineers

- ANL
 - Victor Guarino → Hcal
- FNAL
 - Bob Wands → FEA
 - Kurt Krempetz → Integration
 - Walter Jaskierny → Solenoid Electrical
- PSL
 - Farshid Feyzi → Muon Steel
- SLAC
 - Jim Krebs → EndDoors
 - Marco Oriunno → Ecal
 - Wes Craddock → Solenoid
- RAL
 - Andy Nichols → Tracking

Physicists

Bill Cooper

Marty Breidenbach

Tom Markiewicz

Phil Burrows



Moving Forward

- Subsystem Liaisons
 - Vertex → Bill Cooper
 - Silicon Tracker → Tim Nelson
 - Ecal → Marty Breidenbach
 - Hcal → Andy White
 - Muons → Henry Band
 - Forward → Bill Morse
 - MDI → Tom Markiewicz



“Old” Global Parameters

- **DOD**

Table 1 Key parameters of SiD starting point. (all dimension are given in cm.)

SiD BARREL	Technology	Inner radius	Outer radius	Z max
Vertex detector	Pixel	1.4	6.1	6.25
Tracker	Silicon strips	20.0	126.5	± 167.9
EM calorimeter	Silicon-W	127.0	140.0	± 180.0
Hadron calorimeter	RPCs	141.0	250.0	± 277.2
Solenoid	5 Tesla	250.0	330.0	± 277.0
Muon chambers	RPCs	333.0	645.0	± 277.0
SiD FORWARD	Technology	Inner Z	Outer Z	Outer radius
Vertex detector	Pixel	71.9	172.0	71.0
Tracker	Silicon strips	26.7	165.4	126.5
EM calorimeter	Silicon-W	168.0	182.0	127.0
Hadron calorimeter	RPCs	182.0	277.0	140.7
Muon chambers	RPCs	277.5	589.5	645.0
LumCal	Silicon-W	170.0	183.0	19.0
GamCal				
BeamCal	Silicon-W	321.0	334.0	18.0



Global Parameters

New Proposed Stretched Detector

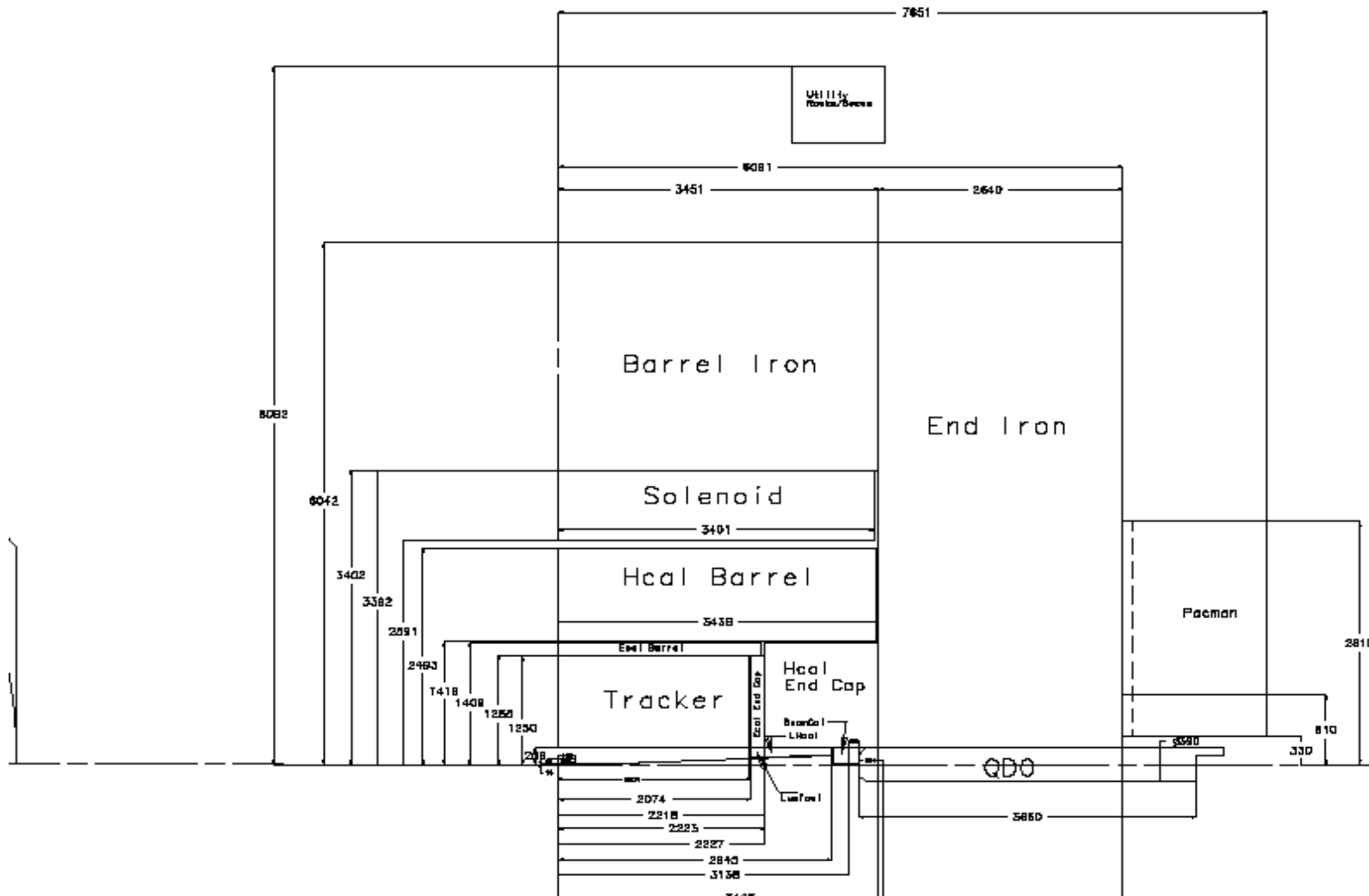
Detector	Radius (m)		Axial (z) (m)	
	Min	Max	Min	Max
Vertex Detector	0.014	0.060	0.000	0.180
Central Tracking	0.206	1.250	0.000	2.024
Endcap Tracker	0.207	0.492	1.063	2.054
Barrel Ecal	1.265	1.409	0.00	2.183
Endcap Ecal	0.206	1.250	2.074	2.183
Barrel Hcal	1.418	2.493	0.000	3.436
Endcap Hcal	0.206	1.404	2.223	3.436
Coil	2.591	3.392	0.000	3.402
Barrel Iron	3.402	6.042	0.000	3.451
Endcap Iron	0.230	6.042	3.452	6.091

Inter-Detector Gaps	m
DR_GAP_Trkr_EMCal	0.015
DR_GAP_EMCal_Hcal	0.010
DR_GAP_Hcal_Cryostat	0.010
DR_Gap_Cryostat_Steel	0.010

Gap between Barrel and End cal
 DR_Gap_BEcal_ECEcal=.015m
 DR_Gap_BHcal_ECHcal=.015m
 DZ_Gap_CT_ECEcal=.020m
 DZ_Gap_BEcal_ECHcal=.040m
 DZ_Gap ECEcal_ECHcal=.005m
 DZ_Gap_BHcal_EndIron=.015m



Proposed "New" Global Parameters



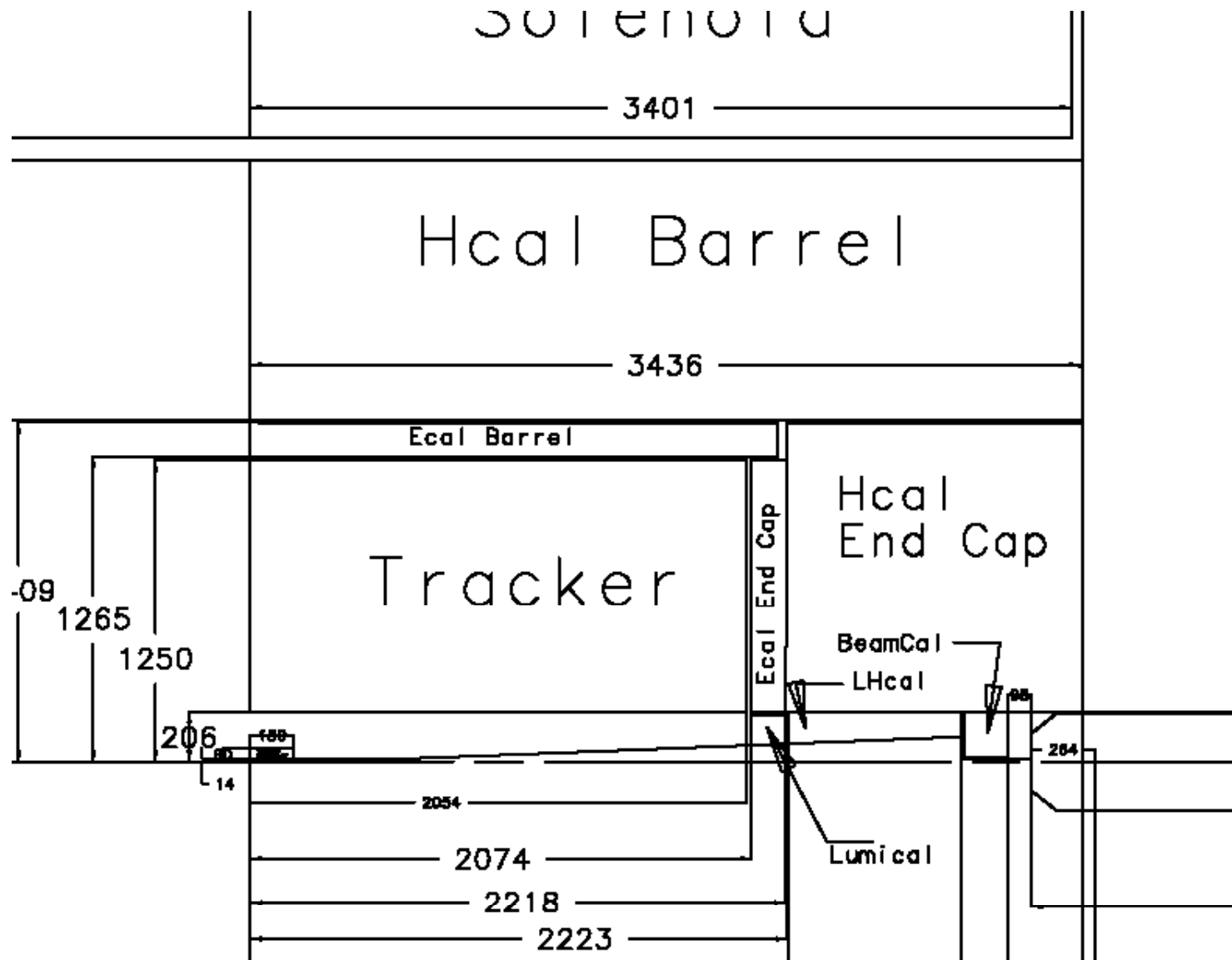


Design Issues

- Barrel Detectors Longer
 - Tracker → More Material
 - Ecal, Hcal, Muon Systems → More Dead Space
 - Heavier Detector
- Solenoid
 - Radius Grows
 - Stored Energy Higher
- Maintenance Issues
 - End caps need to open further → More Hall Space
 - Vertex/Tracker maintenance
- QD0 Support Changes
- Costs Rise



Proposed “New” Global Parameters





Summary of Ongoing Work

- Marco and Nicolas visited (PLANSEE) Tungsten Plate manufacturing plant in France to understand manufacturing limitations.
- Marco and Kurt worked up labor cost estimates for Ecal.
- Farshid contacted KHI to understand Steel Plate manufacturing constraints.
- Nicolas and Marco been looking at the design of Hcal using Bronze plates.
- Ang Lee and Kurt have generated a FEA of the Beam tube and exoskeleton.
- Bob generated a new Return Iron geometry and ran FEA understanding magnetic fringe fields.
- Wes has been working on Superconducting Cable Designs.
- Marco and Tom created preliminary layout forward region for the stretched detector.
- Bill has created a preliminary layout of a stretched tracker.
- Marty been studying the parameter space and costs.



Summary

- Lots of work ahead
- Many details need to be agreed upon by the Engineering Group and Subsystems so “consistent” globe parameters can be decided.