
Hall D infrastructure and integration

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Hall D Collaboration Meeting

September 9-11, 2004

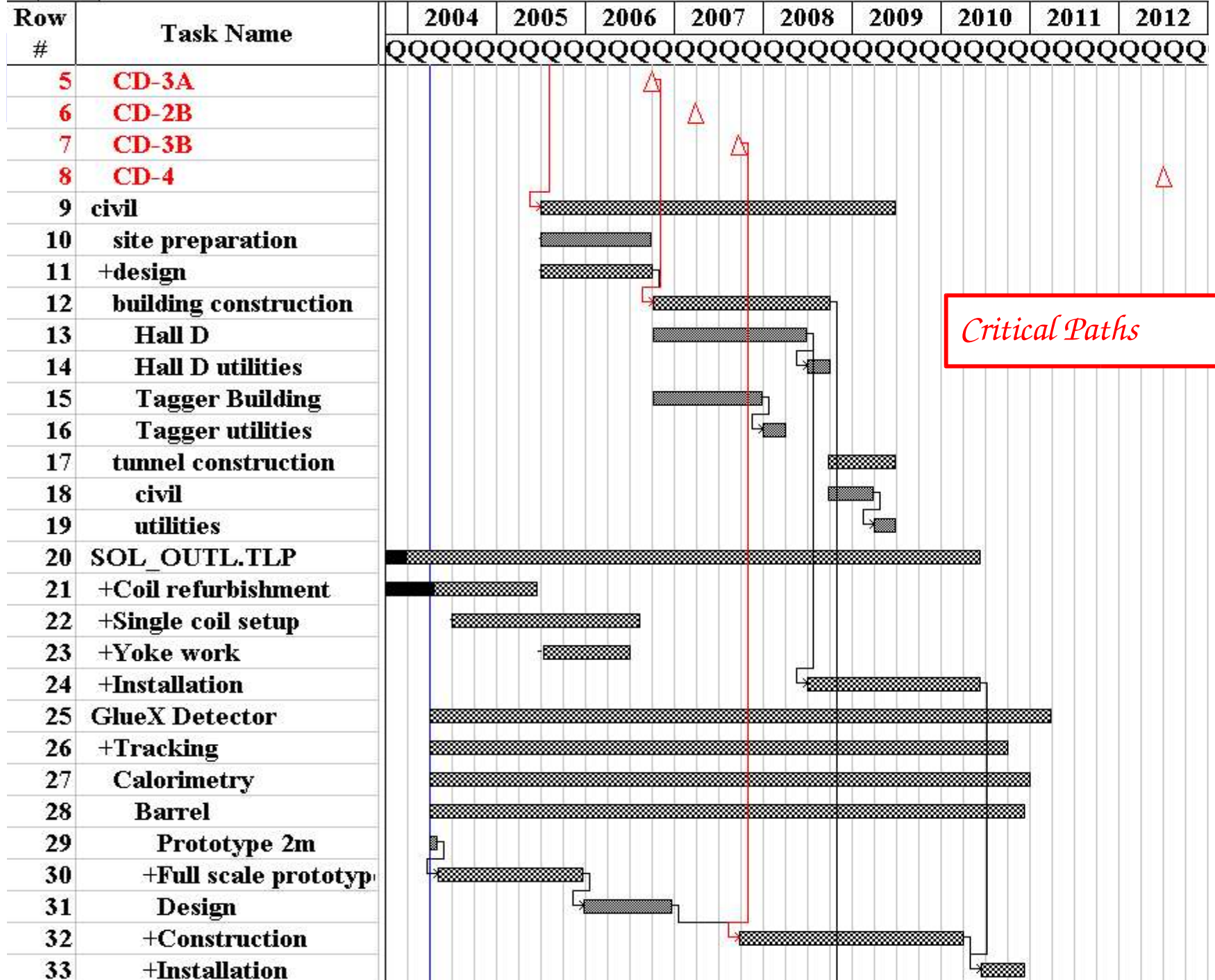
Detector Infrastructure

The issue of infrastructure includes details of how we assemble the detector as a whole, how we know where things are and monitor them, and how we service the detector under a series of failure scenarios.

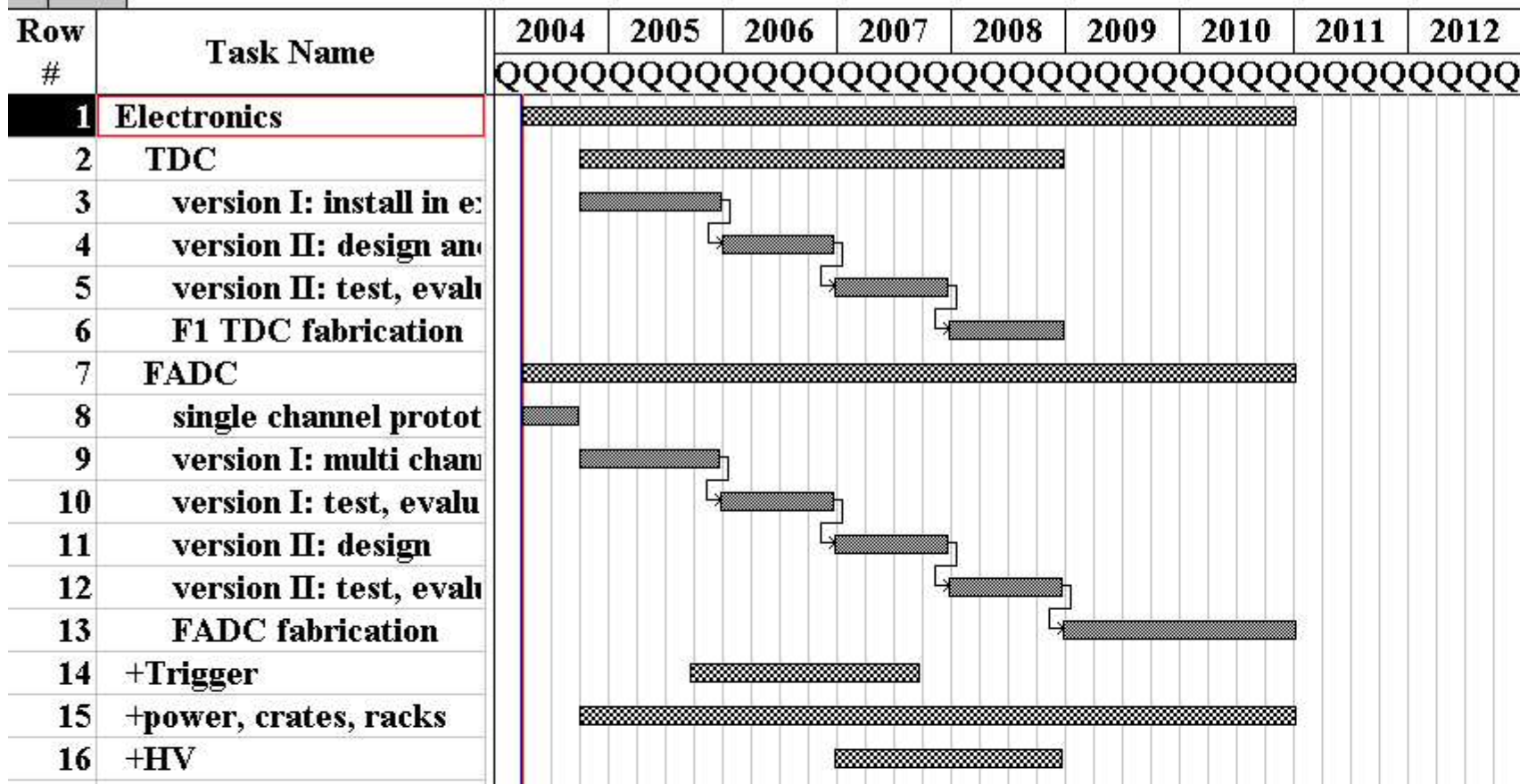
Bcal installation and DC alignment discussed in detail at May collaboration meeting

Summary by Curtis

Draft of Infrastructure Section for Design Report.



Electronics TDCs, ADCs timeline



*** Electronics Review Estimate ***

Divide and conquer

While we clearly want a plan for the entire detector, some aspects are more critical than others.

We have broken the detector into four sections.

- (1) Upstream Region – Backwards Veto*
- (2) Target Region – Vertex Chamber + Target*
- (3) Inside Magnet – CDC, FDC and BCAL*
- (4) Downstream – Cherenkov, TOF and Pb-Glass*

May collaboration meeting focused on (3).

Next: Focus on upstream and target regions, detectors

then downstream

Space definitions inside magnet

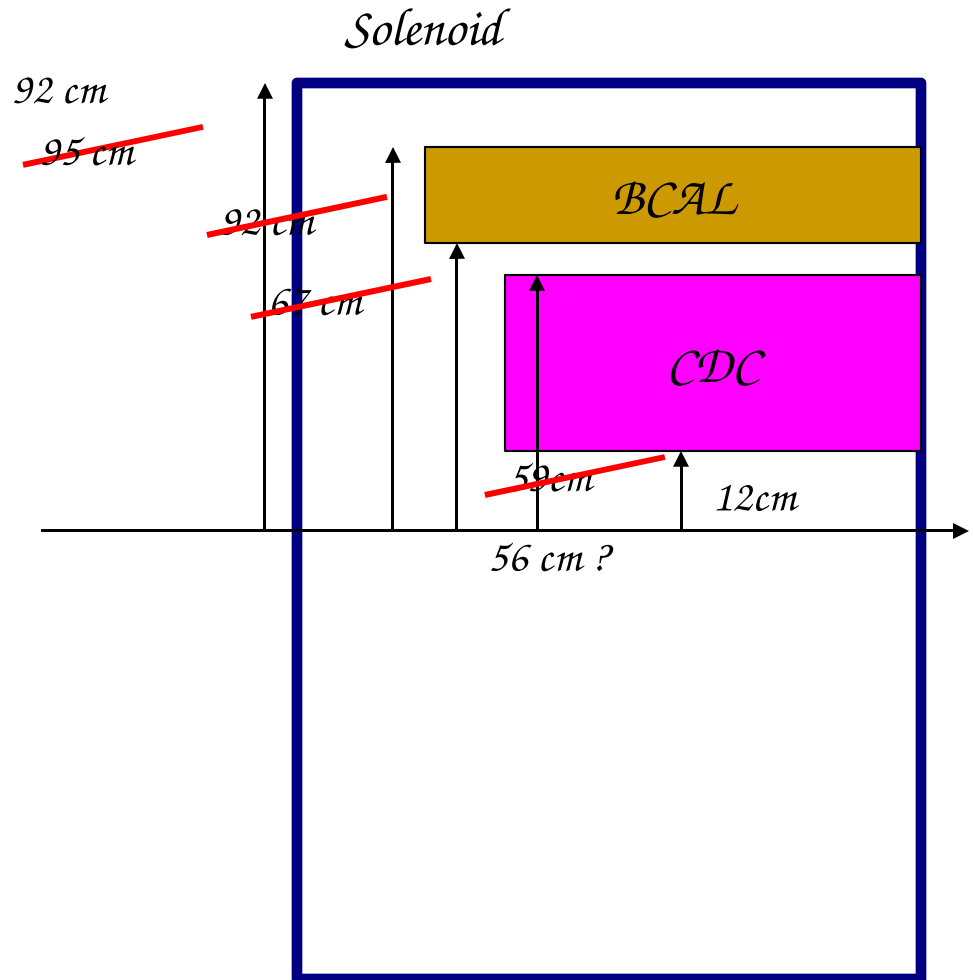
Have we allocated enough space for infrastructure?

Meeting in May at IU:

Move CDC in by 2 cm

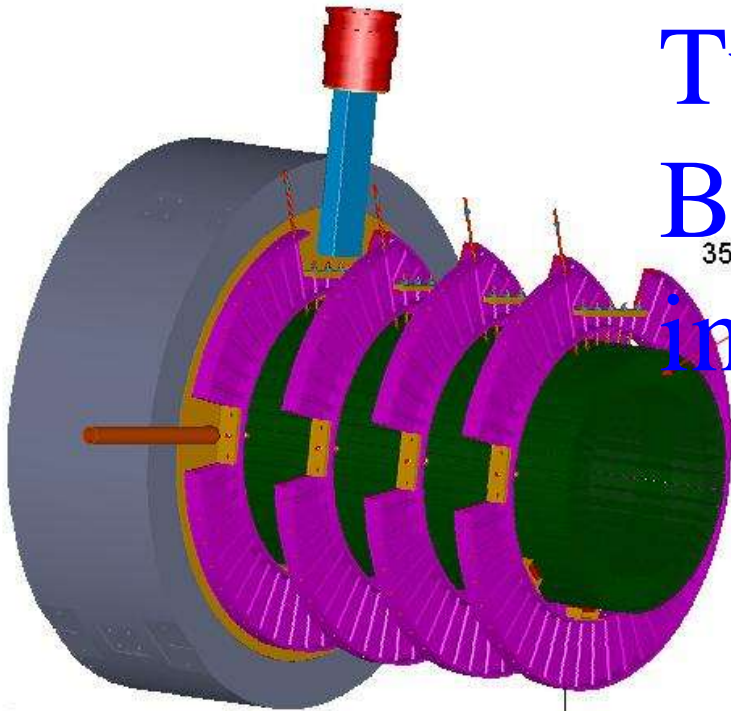
Move BCAL out by 2 cm

Detailed description of target, vertex detector, and beamline still needed.



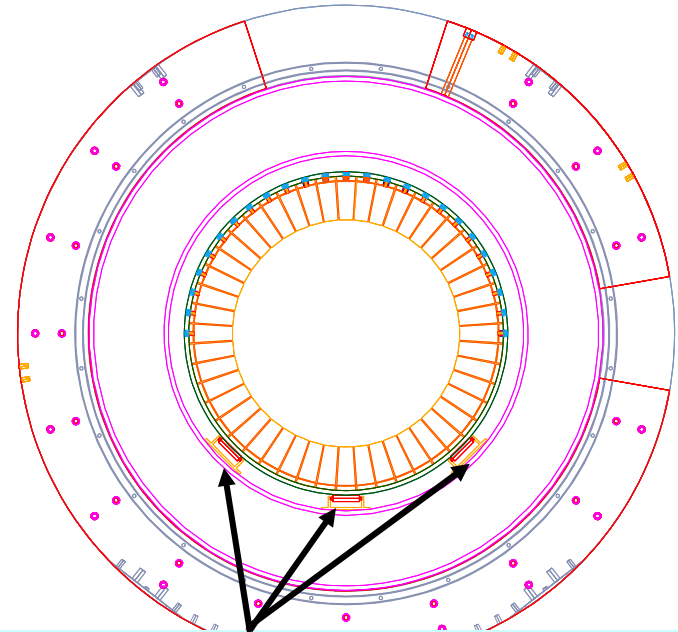
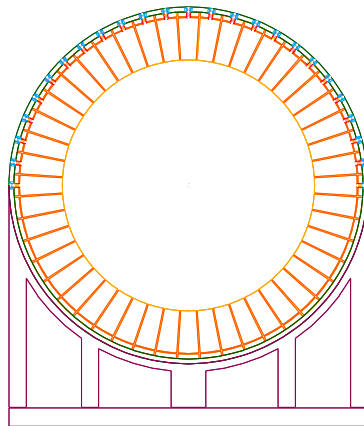
Two concepts for Bcal installation

35



Assembly in place
Attached to yoke
using ring-girders

Assembly outside
of magnet



3 Rollers Bolted to the Ring-girder

Alignment

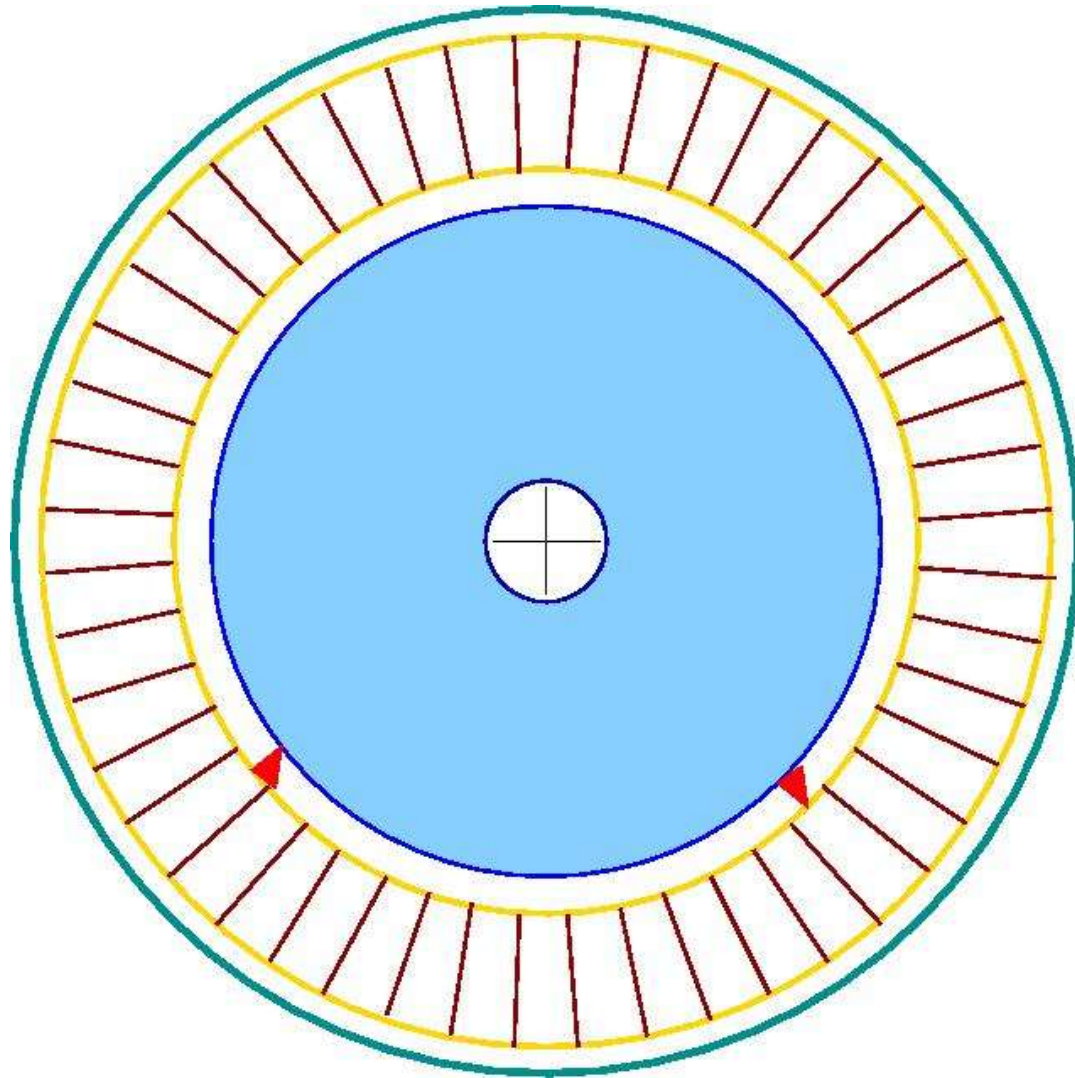
An over constrained rail system can freeze up and lock detectors in place. We need to design a flexible system that can reproduce positions to the mm level.

We want a hardware solution to provide alignment at the 50-100micron level.

We need a software solutions that verifies the hardware alignment. (Note that in zero-field, the chamber calibrations will be significantly different than in full field.)

Details need to be worked out!

Chamber Supports



The CDC and FDC are supported by the BCAL

Put a 5mm carbon fiber shell around the BCAL

Rail system attaches to shell.

Detector sizes, downstream

Sizes of Pb glass and TOF need to be finalized.

Cerenkov counter currently defines beam height, and sets location of Pb glass and TOF counters

Use of a DIRC could

- Decrease minimum size of Pb glass array

- Increase B field at location of Pb glass and TOF pmts.

Beam height

Detector Concept	Beam Height (m)
Gas Cerenkov (nominal)	3.5
Pb Glass (nominal)	~2.0
DIRC concept	~2.0
Magnet with iron yokes	2.0

Interface issues

Mechanical

Detectors must fit together

Electrical

Grounding, power consumption, E&M waves

Environmental

Heat production, settling over time

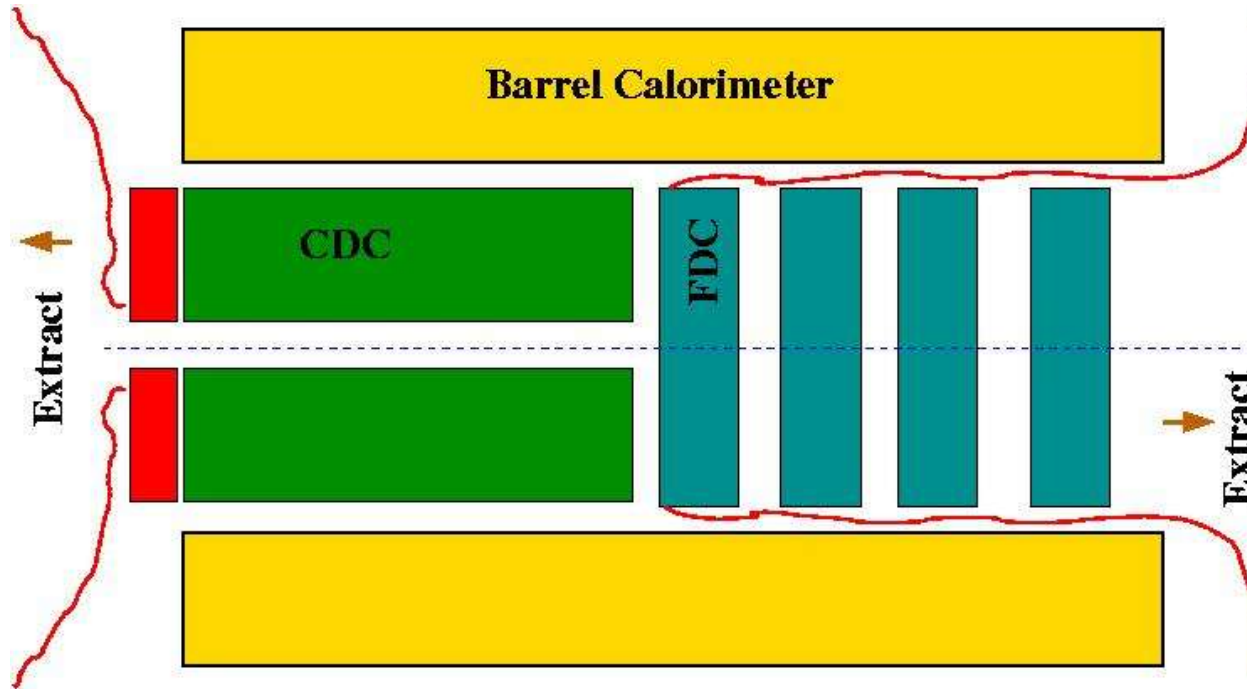
Magnetic

Fringe field from solenoid, magnetic shielding effect on other detectors

Physics

Production of backgrounds

Chamber Extraction

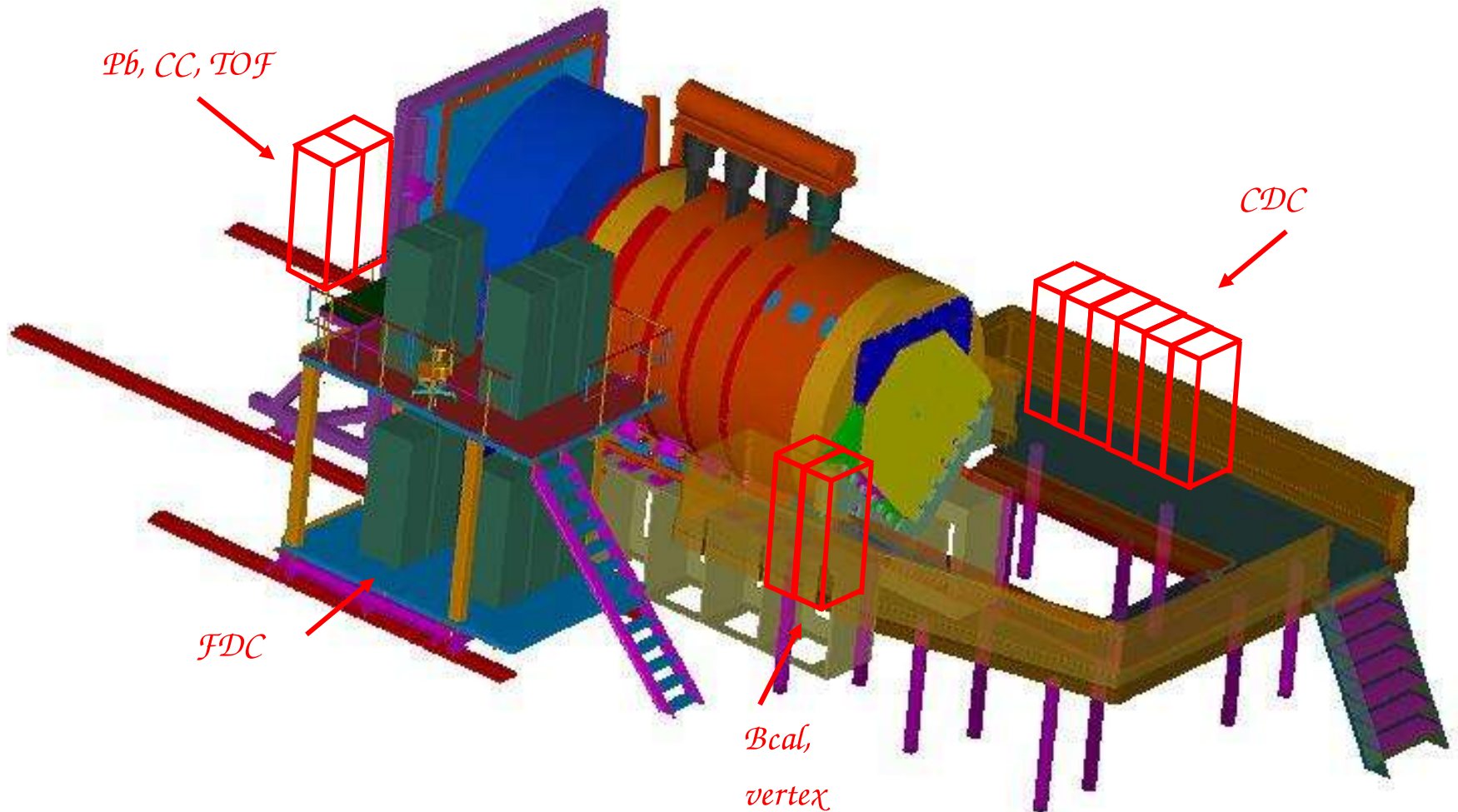


The chambers will come out of opposite ends of the magnet. Cable detectors accordingly

Electronic racks

24 racks of readout electronics

No supporting electronics



Connections for power and grounding

Package of utilities in the hall needs to be specified as input to civil construction (e.g. fire protection, HVAC systems, electrical power, cryogenics, trenches in the floor, etc.)

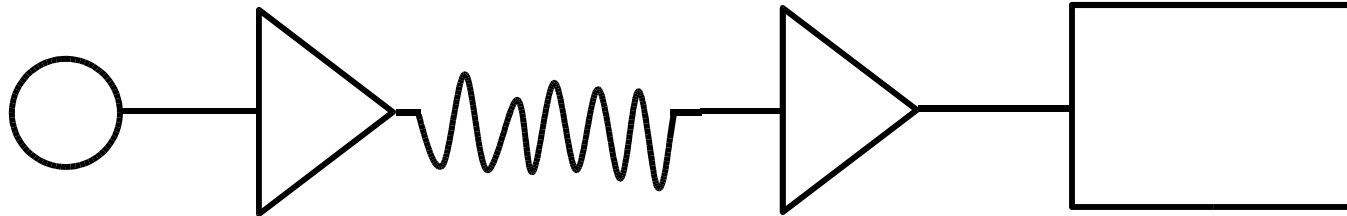
Chris Cuevas has been developing a scheme for A/C power distribution and grounding in the hall.

Hold your breath for details following....

Signal interfaces

detector

electronics



source

pre-amp

cable

post-amp
/ shaper

Readout
ADC or
Disc, TDC

Example:

SiPMs

amplifier
in base

cable

shaper

Need interface documents for each detector

Summary

Physical space

Issues fairly well understood inside magnet where space is constrained and alignment issues are critical.

Target region is being filled out with more detail.

Cherenkov is less well defined.

Preliminary schedules should be checked against realistic construction scenarios.

Electronic interfaces need further refinement.