Deciding on the PDR Baseline Design

We've been working for over two years to improve the design of TMS from the CDR. The detector now is quite different:

- Electronics – CAEN
- Coil and steel – Assembly plan, cooling, cassettes
- Module design – now a real design! manifolds bring fiber out
- Optical / electrical interface – no more buried electronics!
- Counter orientations – some horizontal counters

We've consistently:

- Balanced physics performance, construction/assembly, risks, schedule and cost in our discussions
- Taken on board each other's ideas and experience with previous experiments

Defining a baseline design

To finish the PDR by the end of the year we need to define the baseline design now.

The PDR will be explicit that two things can/will change based on new information:

- The stacking plan (steel flatness)
- Module orientation plan (physics optimization studies)

What follows is an attempt to define this baseline

- There will be additional decisions that fall within a single sub-system

This plan assumes that the upcoming magnet FEA and cooling studies produce no show-stoppers.

PDR: Requirements and Design

The PDR and upcoming reviews will focus heavily on the question of whether the design meets the requirements.

The design and requirements have been co-evolving.

- This process is meant to be iterative and recursive, so this is natural.

PDR Baseline design: Electronics

The electronics design presented by Thomas and Vittorio is the baseline for the PDR (caveats below).

I think the terrifying story from James about 10-20% failures after construction puts the buried electronics idea to rest, at least for now.

- Cassettes must be extractable
- Need to think further about connector robustness.

PDR Baseline design: Magnet

Tom and Marco's "triple 50" design is our PDR baseline for steel and coils. 50 mm gaps, 50 thin plates, 50 cm standoffs.

Our requirements here are about to soften (to 4.5 GeV from 5.0 GeV), which helps.

PDR Baseline design: Detector Size

- A smaller detector has advantages for cost and construction.
- A larger detector will be better for reasons we haven't characterized yet.

We will hear from Chris this afternoon, making the case that a 3m x 6m detector will meet the (new) physics requirements.

If we agree that it does, go with 3m x 6m. We should aim to decide on this at the next TMS meeting.

PDR Baseline design: Detector Location

Vertical position taken from Hiro's recent study (consistent with what we saw from KiYoung).

PDR Baseline design: Detector Modules

Following a decision on the detector width, we hear from our detector team on the final dimensions of strips, modules etc.

We confer with our physics studies experts about a baseline for how many horizontal counters. One every 10 planes?

Would like to add a detector requirement that TMS be able to identify whether tracks entering from the ND-LAr fiducial volume stop within it. (this is just obvious)

PDR: Requirements and Design

The PDR and upcoming reviews will focus heavily on the question of whether the design meets the requirements.

The design and requirements have been co-evolving.

- This process is meant to be iterative and recursive, so this is natural.

Reviewers can view their role as assigning a Pass/Fail and take a very legalistic approach.

- We need to be careful – pay attention to the requirements.

Next Steps

Finalizing the baseline design (ASAP)

Parallel work on PDR Sections with baseline design

Requirements finalized and into PDR (few weeks)

Outline of PDR physics studies section/assignments (next Fri)

PDR physics studies require simulation of baseline design

- Tagging/validating latest sim/reco code (few weeks)
- Defining and validation a new GEANT geometry (+ few weeks)