

CMS Upgrade MB Responses to SLHC Proposal:

07.13 3D detectors for inner pixel layers -- D. Bortoletto & S. Kwan

It is our intent to approve this proposal. Please see the comments from the referees.

Specific requests before final approval are:

1. Explain how commercialization could follow from the proposal.
2. Define clear milestones so judgements can be made about the viability –or not- of this technology for applications in a CMS upgrade
3. Include a plan to follow the R&D up through a final prototype, including services.

3D detectors for inner pixel layers

CMS ref: 07.13

Contact: D. Bortoletto, S Kwan

Ref 1

my overall comment is that, it makes good sense for CMS to gain a direct insight into this technology, and that the groups involved should be able to do this well

so, I would recommend approval

More generally, however, I think we need to have some measure of the costs associated to the various R&D programs we approve: I am sure that in this case they remain sensible, but how do we ensure this is generally the case?

I worry a bit of a possible situation in which we realize after the fact that large resources are no longer available because they have been spent in R&D...

Ref 2

It is definitely of interest for the tracker to study 3D detectors. 3D detectors could indeed be a possible option for the inner pixel layers.

The two groups proposing this R&D, FNAL and Purdue, are certainly capable to perform this study and the proposal looks reasonable.

They propose to study mainly the detectors structure itself produced with different layout or different processing. While this is certainly of large interest one should not overlook other issues.

In the abstract they talk of a possible participation in the commercialization of the technology. I believe this is not enough. Although the detector areas needed for the inner layers are not very large the availability of these sensors from industry could be the show stopper. Therefore commercialization must be part of the proposal.

They propose to build and test pixel modules. We should ask them to take care of all system aspects connected with this technology, e.g. cooling, etc. The outcome if positive should be a final prototype which could be compared to other options in all aspects.

Apart from my comments above I propose to encourage them to go ahead with this study!

In general for all proposals I do think that we should force the proponents to study a technology with all consequences and do not leave out any connected issue. After this round of R&D we should have fully worked out options (including cost estimates) to allow us to pick the most promising ones. If a part of such a technology is left out we are losing valuable time. In that sense I would make the institutes responsible for this technology and charge them with the task to come up with a final prototype system.

Other comments

This does not seem likely to be relevant in the short term, eg for a Phase I of an upgrade. It seems a more speculative R&D project. It could be interesting but how should it be prioritized with respect to other R&D? What effort and specialised infrastructure (electronics, hybrids, DAQ) are needed to evaluate these sensors, especially in test beams?

The expected outcome, and the precise timescale, are not so clear. At what point, for example for an upgrade in 10 years after LHC start-up, can a decision be made as to whether this is a viable technology for an SLHC Tracker?