

Report of Forward Calorimeter Advisory committee

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Committee

- Christopher Hearty
- Giuseppe Finocchiaro
- Eugenio Paoloni
- Matteo Rama
- Bill Wisniewski

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SLAC

Original charge

Provide input on the following questions:

- 1) Five times background seems to be a reasonable criterion for radiation hardness, providing a safety margin for the survival of the detector. However, as a criterion for optimizing detector cost/performance, this seems less clear. What should the criterion be for this optimization?
- 2) Can the present backgrounds be significantly mitigated?
- 3) A set of costs for various forward calorimeter technologies has been developed, based on some assumptions. Are these assumptions and costs plausible? If not, what revisions should be made?

The focus should be on the baseline choice in the TDR. Independent of this choice, the TDR will also include a discussion of potential alternatives and the R&D being pursued.

Meetings

- A meeting on 21-March-2012 was held at the collaboration meeting, with Bill on the phone and everyone else present.
- The second meeting, via EVO, was held on 28-Mar-2012.
- One decision arising from these meetings was that BGO and PWO would not be considered for the TDR baseline.
- Frank and Claudia subsequently met with Francesco, and concluded that the cost of the full LYSO option was not supportable, leaving only the hybrid CsI(Tl) + LYSO option or pure CsI as choices for the TDR baseline.

New charge

- Recommend which technology should be the baseline for the TDR.
- The committee, without the EMC group, had a phone meeting on 23-Apr-2012, and produced the following recommendation.

Recommendation

Dear Claudia and Frank; you recently asked the forward calorimeter advisory committee to provide some input as to which technology should be the baseline for the purposes of the TDR. The committee met on April 23 to discuss this issue. Our recommendation is that the hybrid LYSO / CsI(Tl) solution be selected as the baseline, because it is the more established technology. Of course, work needs to continue on understanding and reducing backgrounds, and on verifying that this solution (and the barrel) function in the presence of achievable backgrounds.

The committee did not discuss how many rings of CsI(Tl) should be present in the baseline. The studies to decide this should be completed prior to the TDR, or at the minimum, specified in the TDR.

As you know, several technical issues remain with respect to pure CsI, including the radiation hardness and the photosensor, and the common issue of performance in the presence of backgrounds. There is also some uncertainty about the actual cost of the crystals. The R&D plan to address these issues should be presented in the TDR. If the R&D establishes that the pure CsI is a viable solution, it could be the technology actually built. It could also be used as an upgrade to the hybrid solution, replacing some or all of the CsI(Tl) crystals.

Some notes

- A pure LYSO calorimeter would have better performance in the presence of backgrounds than either of the options eventually considered. However, we did not see a comparison of the performance of the hybrid option versus the pure CsI. Our recommendation is not based on the performance, but rather on the maturity of the technologies.
- It was not obvious to us how to select the baseline number of rings of CsI(Tl). One option will have to be costed for the TDR.