

LHCb Technical Board 27. and 30. November 2000

Agenda

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| 1. News on LHC schedule | H.J.Hilke |
| 2. Comments on referee questions and answers from LHCb groups | |
| 3. Status of MoU, | H.J.Hilke |
| 4. Status of beampipe activities, | G.Corti |
| 5. Status of simulations on Tracking, | M. Merk |
| 6. Position in z of RICH2, | R.Lindner |
| 7. Photodetectors for RICH: Assessment of progress, | D.Websdale |
| 8. AoB | |

Participants: J. Christiansen, G. Corti, H. Dijkstra, W. Flegel, R. Forty, J. Harvey, H.J. Hilke, B.Koene, D. Lacarrere, J. Lefrançois, R. Lindner, C. Matteuzzi, T. Nakada, T. Ruf, B. Schmidt, O. Schneider, A.Schopper, O.Steinkamp, I. Videau, D. Websdale (part time)

- LHC Schedule: H.J. Hilke informed the TB about the status of the LEP dismantling and its influence on the LHC schedule. Due to the prolonged LEP running, the dismantling has been shifted by three month, but C. Joram and D. Lacarrere will try to absorb the delay, in order not to shift LHCb installation. According to the DG's presentation on 21/11/00, commissioning is planned for 2005, a single beam in April 2006 and collisions after July 2006. Some $1-2 \text{ fb}^{-1}$ should be accumulated by the end of 2006 and $\sim 10 \text{ fb}^{-1}$ in 2007. R. Cashmore commented on Nov 24th, that collisions in 2005 would be unlikely, but not impossible. Under these conditions, LHCb will not change its overall planning, but may envisage a delayed purchase of a significant fraction of the CPUs for DAH and Trigger.
- Comments on referee questions and answers from LHCb groups: J. Lefrancois explained the ideas concerning the Engineering Design Reviews (EDR) for the Calorimeter systems. The Calorimeter group plans such reviews for the electronics but not for the ECAL and HCAL detector modules, as these are based on wellunderstood designs. An EDR for the Preshower could be envisaged as well as a subsequent Production Readiness Review (PRR). D. Websdale presented the RICH group recommendation for their review procedures. Review procedures will involve experts external to the LHCb RICH group. The TB concluded that in general the LHCb detector groups themselves should decide to which degree a review should be carried out and justify this towards the TB and the referees. In any case the final design checks could be made PRRs.
A. Schopper presented a detailed list for the Calorimeter milestones including the production period. D. Websdale showed a corresponding summary of the LHCb RICH milestones.

3. Status of MoU: H. J. Hilke reported that the RRB has approved the MoU in October on the condition that the underfunding of the experiment would be reduced to around 2% of the total cost. In addition, plausible actions on the subsystem level should be described for the case that the remaining underfunding could not be absorbed.

By reducing the cost estimate for the magnet by 1.5 MCHF (based on the tendering results for three of the four major items) and with additional contributions from Switzerland (400kCHF), CERN (350 kCHF) and MPG (100 kCHF), as well as the new commitment from the Ukraine (200kCHF), it has been possible to reduce the gap between cost and present funding from 5.6% to 2.3 %. A revised version (dated 13.11.2000), including these modifications, had been sent to the CB and TB for comments/approval. The hopefully final MoU, dated 24.11.2000, has then been presented to R.Cashmore. He has given his personal approval but proposed to contact some RRB Members, before sending copies to the RRB. The approval of the document by the RRB is expected before the end of 2000. It should then be sent to the Funding Agencies.

P.S. After the second TB session, HJH got positive feedback from R. Cashmore, permitting distribution of copies to the CB Members present in the CB session of December 1st; absent Members were sent a copy by mail. After further discussions with some RRB Delegates, indicating no objections, R.Cashmore decided to send the MoU directly to the Funding Agencies, which should happen before the end of the year.

4. Status of beam pipe activities: G. Corti presented background studies for 4 realistic beam pipe designs. Most secondaries are electrons/positrons of energies below 1 GeV, crossing mostly only one tracking station. The single action resulting in the largest reduction of background (~40-45%) is the replacement of stainless steel flanges and bellows by aluminium components. Further improvement can be obtained by replacing the first section by a beryllium cone. The comparison with the extreme case of an 'unrealistic' beam pipe made out of beryllium without any flanges or bellows indicates that further improvements should be achievable. On the other hand, a 'stepped' beam pipe of the HERA-B design shows no significant improvement with respect to our conical design, if the increased wall thickness necessary for outbaking is included.

5. Status of simulations on Tracking: M. Merk informed the TB about the status of the simulations for the various beam pipe options and different IT/OT boundaries. The improvements to be gained by replacing stainless steel flanges and bellows with aluminium components are important for occupancies, the fraction of 'hot events' and for track seeding, but relatively small for track following/pattern recognition efficiencies. Marcel also reported on the significant gain to be obtained by increasing the outer dimensions of the IT, which of course would result in significant cost increase. R. Forty presented the results on track seeding efficiency, indicating no noticeable effect of an upstream shift of the RICH2 entrance window by 7 cm .

The TB concluded that a strong effort should be maintained to further optimise the beam pipe wrt background production.

6. Position in z of RICH2: Earlier this year an increase of the depth of RICH2 by 120 mm had been agreed. R. Lindner presented a possible layout, which implements an upstream shift of the entrance window of RICH2 by 70mm and a downstream shift of the exit window by 50mm, thus placing RICH2 between $z=9450\text{mm}$ $z=11570\text{mm}$. This layout assumes that the thickness of Outer Tracker station 11 will be limited to 185mm inside and 330mm outside of the LHCb acceptance of $300\text{mrad} \times 250\text{mrad}$. The thickness of the Inner Tracker station 11 has to be kept $\leq 105\text{mm}$ in z, assuming no overlap with the Outer Tracker. Outer Tracker station 10 has to be shifted upstream by 70mm.

The TB agreed to this new layout. (Annex 1)

7. Photodetectors for RICH: Assessment of progress D. Websdale described the present situation of the HPD development. Very significant progress has been achieved on the pixel chip. First tests indicate that most functionalities are according to specifications. However, the milestone at the end of this year for the demonstration of a working HPD containing this new pixel chip can not be kept. Two options are conceivable: to cancel the HPD development and adopt the MAPMT as baseline or to continue the HPD as baseline with a revised schedule; in this case, the MAPMT could either be stopped or maintained as backup solution until a later date. A dedicated meeting is planned for January 24, to review in detail the status of the pixel HPD and of the MAPMT and to decide about the future steps. The TB was reminded of the fact that the production period of the HPD could be shortened by half a year at a relatively low cost of about 100kCHF.

8. AOB:

First circulating beam (LHC): In 2005 the first circulating beam would enter LHCb from the muon system end, because the transfer line for the other beam will be prepared last. In 2006, one could in principle choose any direction for the first beam. On the other hand, the operation period with a single beam should be reduced significantly in 2006. LHCb could decide later, whether it was sensible to specifically request the preferred beam direction.

Outer Tracker TDR: **The TB suggested that the present layout (in particular the inner boundaries) should be kept for the Outer Tracker TDR.** Only a rotation by 45° for station T11 might be included, to improve the occupancies. This would not exclude design changes at a later stage, if further studies demanded these.

Next Technical Board: There will be a special Technical Board on January 25th at 9:00 in 160-1-009, dedicated to the beam pipe/background and tracking issues and the layout of Inner/Outer Trackers.

R. Lindner/ 19.12.2000

Annex 1

