

# LHCb Technical Board 20. April 2001

## Agenda

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| 1. Approval of summary for last TB  |                        |
| 2. Discussion of the TDR for the Muon System  | B. Schmidt             |
| 3. Status of beampipe and background studies  | G. Corti               |
| 4. Status of Tracking studies, in particular<br>on the need for tracking station 11 | M. Merk<br>D. Websdale |
| 5. Detector technology for the Inner Tracker  | O. Steinkamp           |
| 6. Discussion of the TDR for the Vertex Locator                                     | T. Ruf                 |

**Participants:** G. Corti (for point 2), H. Dijkstra, W. Flegel, R. Forty, John Harvey, H.J. Hilke, B. Jost, B. Koene, J. Lefrançois, R. Lindner, C. Matteuzzi, M. Merk, T. Nakada, T. Ruf, B. Schmidt, O. Schneider, A. Schopper, O. Steinkamp, I. Videau, D. Websdale

Excused: J. Christiansen, D. Lacarrere

### 1. Summary of the last TB

The summary was approved after minor changes.

### 2. Discussion of the TDR for the Muon System

B. Schmidt summarised the status of the Muon System TDR and discussed the items, which are still in preparation or require further iteration. A second draft could be circulated on May 3rd. After a detailed discussion, the TB concluded that this first draft was already in good shape and that a second draft including a few improvements could be distributed directly to the Collaboration.

### 3. Status of the beam pipe and background studies

G. Corti informed the TB about an offer for the production of an Al/Be beam pipe. Two options are proposed using different production techniques, which differ by a factor of 1.5 in price. As the more expensive solution offered no advantage to LHCb, the 'cheaper' technology would be preferred. The Al/Be beam pipe would be divided into three sections, each section being assembled from pieces 30 cm long (Annex 2). Gloria also showed new result on the effects of various transition options. She concluded that the two bellows in the second beam pipe transition could be replaced by a cylindrical aluminum pipe. The average particle flux in the Inner Tracker would be reduced by some 10%.

### 4. Status of the Tracking studies, in particular on the need for tracking station 11.

M. Merk started his presentation showing several images of GEANT3 events, which demonstrate the origins of background particles in LHCb (Annex 1). He then discussed the occupancy in the Outer Tracker for the nominal luminosity ( $2 \times 10^{32} \text{ cm}^{-2} \text{ s}^{-1}$ ) and high luminosity ( $5 \times 10^{32} \text{ cm}^{-2} \text{ s}^{-1}$ ) for several beam pipe options. The average

station occupancy with beam pipe version 7.1 (Al/Be with Al transition) differs from having no beam pipe by a factor of 1.8. The occupancy of the OT above the IT could be reduced significantly (30%) by increasing the IT by 20 cm vertically. Increasing the 'side wings' of the IT would also reduce the OT occupancy significantly. These extensions could in principle be implemented with additional short straw tubes, but services (electronics, gas pipes) would be difficult and increase the radiation thickness. The TB therefore concluded that such a solution should be avoided.

Marcel also mentioned that the track seeding efficiency had been improved from 93.2% to 95% for physics tracks with a better algorithm.

More detailed information on Marcel's presentation can be found on:

[http://lhcbott.home.cern.ch/lhcbott/tracking/Meetings\\_Mar\\_27\\_2001.ps](http://lhcbott.home.cern.ch/lhcbott/tracking/Meetings_Mar_27_2001.ps)

D. Websdale presented the recommendation of the RICH group to remove Tracker station 11, if the space liberated (about 34 cm) would be used to extend RICH 2. The RICH particle ID performance at high momentum (>70 GeV) without T11 shows a small degradation, but this is recovered by increasing the photoelectron yield by 18%. **The TB concluded that it was favourable to the suppression of T11 and to allocating the space to RICH2.** This proposal should be brought up in the plenary session with the aim to decide at the end of the LHCb week. **In the meantime, possible interference between RICH2 and M1 should be checked and the exact extension of RICH2 be defined.**

The RICH 1 precision is not limited by the angular precision of reconstructed tracks and, therefore, the RICH group recommends removing the y-layers of T1 and T2 (<http://lhcb-rich.web.cern.ch/lhcb-rich/postscript/t11.ps>). After some discussion, the TB concluded that this would need further studies by the Tracking Task force.

##### 5. Detector technology for the Inner Tracker

O. Steinkamp presented a summary of the last Inner Tracker meeting, held on the 3<sup>rd</sup> April. The Inner Tracker group recommended to the TB an all silicon tracker as baseline for the IT, if the size of the IT would not have to be increased significantly. After some discussion, **the TB concluded that it fully supports the recommendation from the Inner Tracker Group to select an all-silicon tracker as the baseline for the Inner Tracker. It urges the IT and OT groups to proceed together with the Tracking Task Force with an overall optimization of the tracking system. In case this optimization – to be agreed by the TB – would lead to a higher cost of an IT of increased size, providing funds for the additional cost would be considered as responsibility of the whole Collaboration.**

##### 6. Discussion of the TDR for the Vertex Locator

T. Ruf reported on the organisation of the VELO TDR and summarised the missing parts of the present document. The ensuing discussion indicated that some significant improvements were still required before the next release. Draft 2 is foreseen to be submitted to the TB by May 3<sup>rd</sup> and to be discussed further during the LHCb week.

