LHCb Technical Board 27 February 2003

Agenda

1. **Approval of last TB summary**
2. **Report on the Beetle review** (transparencies) — **J. Buytaert**
3. **Location of the computing farm** — **Ph. Gavillet**
4. **Level-1 front-end parameters** (transparencies) — **J. Christiansen**
5. **Report on the LHCC Comprehensive Review** (transparencies) — **T. Nakada**
6. **Photon detector**
   - **Message by the management** (transparencies) — **W. Witzeling**
   - **Status update and actions** (transparencies) — **D. Websdale**
7. **Short items**
   - **PRR on RICH2 superstructure and mirrors** (transparencies) — **O. Ullaland**
   - **Resource matters** — **A. Smith**
   - **The electronics workshop** (transparencies) — **J. Christiansen**

Participants: G. Carboni, J. Christiansen, H. Dijkstra, R. Forty, J. Harvey, D. Lacarrere, J. Lefrançois, R. Lindner, C. Matteuzzi, T. Nakada, A. Pellegrino, T. Ruf, B. Schmidt, O. Schneider, A. Schopper, A. Smith, U. Straumann, O. Ullaland, D. Websdale, W. Witzeling

Invited: J. Buytaert, F. Formenti (for point 1 of the agenda)
Ph. Charpentier, Ph. Gavillet, B. Jost (for point 2 of the agenda)

Excused: W. Flegel

1. **Approval of last TB summary:** The Summary of the TB on 23rd January 2003 was approved without comments.

2. **Report on the Beetle Review**: The current Beetle chip 1.2 is in a state suitable to read out the VELO detector, except the permanent gain degradation at V_{cc} above 2.6 Volt, which is just 0.1 V beyond the nominal supply voltage. There is a chance that the 'sticky charge' defect has been understood, but this needs full simulation followed by circuit changes to confirm its origin and to cure this fault.
   Significant changes to the comparator circuits (going from 3 bit to 5 bit settings) are proposed that are needed to use this chip for the binary readout of the VETO and the RICH MAPMT. To minimize the risks it was proposed to include two versions into one submission with only one design containing the changes related to the comparator. **This decision will be made in the next chip review one month before the submission of Beetle 1.3. J. Buytaert accepted to organize a meeting on the comparator status of the Beetle chip.**

3. **Location of the Computing Farm:** Ph. Gavillet summarized the service requirements for a computing farm built with 1500 CPUs. Two possible solutions for its location have been studied. Installing the farm in the surface building (SX) at point 8 would imply additional costs of approximately 1 million CHF to reinforce the floor and to provide the required services. The existing sub detector labs would have to be removed. The second possible area is the counting house in the UX cavern, it provides the space and the cooling capacity for 1500 CPUs in one barrack (D1). In case the farm has to be enlarged, there is additional space for 20 racks that could house another 600 CPUs in the second barrack (D2). **In view of the significant cost difference the TB concluded to install the Computing Farm in the UX cavern.** A possible layout of the rack distribution in the counting house shall be presented at one of the next TBs.

4. **Level-1 Front-end Parameters**: J. Christiansen presented the arguments for re-optimized parameters for the Level-1 front-end electronics. He proposed to increase the L1 buffer size by a factor 32, which leads to a storage of 58254 events. Furthermore, the maximal L1 acceptance rate is set to 40 KHz (20 KHz average) and the L1 accept minimum spacing to 20μs. These parameters are the preferred solution by the sub detectors. **The TB endorsed the proposed parameters for the Level-1 trigger.**

5. **Report on the LHCC Comprehensive Review** (and other issues): T. Nakada informed the TB about the very positive outcome of the LHCC comprehensive review in January. However, the referees expressed concerns on the present situation of the RICH photon detectors.

   The next meeting with the LHCC referees will be on the 24th March 2003. Subjects to be discussed are the LHCb action for the RICH photon detector project, milestone status and progress on the Trigger TDR.

   Due to his role as group leader of the EP software Group, J Harvey is no longer able to continue being the LHCb Computing coordinator. Since the experiment is now in the construction phase, the LHCb management proposes to restructure the LHCb computing project. Instead of having one Computing Coordinator, it is proposed to split the computing activities into three projects: Online, Offline Software and Offline Computing. The project leaders shall become members of the Technical Board. The management proposes for ratification by the CB following project leaders: B. Jost for Online, Ph. Charpentier for the Offline Software and N. Brook for the Offline Computing.

   T. Virdee, on behalf of the LHC experiments, will give a presentation on the requirements from the experiments in Year 1 at the Chamonix LHC performance workshop in March 2003. Some changes have been suggested for the transparencies related to LHCb and it has to be clearly stated that LHCb is not in favor of 75ns bunch spacing.

6. **Photon detector:**
   Message by the management: W. Witzeling presented the assessment by the LHCb management on the status of the RICH photon detector project. The December milestone was missed and the review in January 2003 concluded that no proven solution exists by now. The outcome of the review must be communicated to the LHC referees together with an action plan in March 2003. The photon detector decision has to be taken in

September 2003 in order to have a fully functioning RICH system at the startup of LHC in April 2007. Highest priority must be given to establish a proven solution based on MaPMT by September 2003. Therefore the following actions were proposed:

- Concentrate on 8-dynode MaPMT with Beetle 1.2 readout
- Establish analog and binary read-out performance until May '03
- Results to be fed into the performance study of particle identification
- Build a 3 x 3 matrix for MaPMT
- Costing of analog and binary solutions must be updated
- RICH group must conclude on manpower allocation to these tasks this week
- Criteria on quality of assemblies, performance and long-term stability of the HPD to be established as part of the action schedule

In order to take a final decision on the photon detector in favor of the HPD, the quality of the assemblies and the performance on long-term stability must be proven according to clearly defined and agreed criteria.

Status update and actions: D. Websdale presented an update on the status of the HPD and MaPMT. Several successful tests have been performed on the latest delivered HPD prototype. A second prototype is expected for the first week of March after solving a vacuum problem caused by an impurity in the Indium seal of the quartz window. The remaining issue for the HPD is the quality of the assemblies, in particular the bump bonding.

The mother- and daughter boards for the Beetle 1.2 have been received at Edinburgh. Analog and binary readout on up to 12 8-dynode MaPMT can be performed channels and the principle for the combination of Beetle 1.2 and 8-dynode MaPMT can be proven.

In response to the assessment on the status of the RICH photon detector project by the LHCb management, D. Websdale discussed the MaPMT plans and presented a list containing tasks to be done together with commitments of the institutes involved. This list will be finalized before end of March. To qualify the HPD bonding using the 40 MHz chip and sensor, tests with thermal cycling and mechanical adherence will be performed. O. Ullaland has provided an example of guidelines for tests on the quality of the bump bonding which have been established and used by ESA. A meeting will be organized by the RICH group to establish an agreed test procedure.

7. Short items

PRR on RICH2 superstructure and mirrors: O. Ullaland summarized the production readiness review on RICH 2 mechanics, held at Rutherford on the 19th February 2003. Major items were the Super Structure and the mirrors, but the interface to neighboring sub detectors and the work leading up to the PRR for the mirror support and adjustment system where discussed in addition. W. Witzeling, as the referee of the PRR, congratulated the RICH group to their excellent work for preparing this PRR. A report will be published soon.

Resource matters: The next RRB will be held on the 31st March 2003 and A. Smith will contact each institute to discuss the cash flow and spending profile for each detector, as this will be raised at the next RRB meeting.

The electronics workshop: J. Christiansen summarized the last electronics workshop held between the 4th and 6th February 22003. Beside specific sub-detector problems several other aspects such as cabling, TFC, and front end ASICs were discussed.

Next Technical Board: Thursday 20 March 2003 at 14:00 in Room 1-1-025