



LHCb

27 June 2008

**Minutes of the 20th LHC Resource Review Board Meeting  
(CERN, Geneva, 16th April 2008)**

**Present:**

Y. Zhang (National Natural Science Foundation of China, China)  
H. Li (National Natural Science Foundation of China, China)  
O. Liu Xizhen (National Natural Science Foundation of China, China)  
F. Le Diberder (CNRS/IN2P3, France)  
E. Aslanides (IN2P3 - Centre de Physique des Particules de Marseille (CPPM), France)  
K. Ehret (DESY, Germany)  
F. Ferroni (INFN, Italy)  
P. Campana (INFN, Italy)  
A. Van Rijn (Nikhef, Netherlands)  
J. Krolikowski (University of Warsaw, Poland)  
F. Buzatu (Institute of Atomic Physics, Romania)  
V. Savrin (SINP MSU, Russia)  
J. Fuster (CIEMAT, Spain)  
A. Bay (EPFL-Ecole Polytechnique Fédérale de Lausanne, Switzerland)  
J. Seed (STFC, United Kingdom)  
A. Golutvin (Imperial College London, UK)  
V. Gibson (Cambridge University, United Kingdom)  
M. Pripstein (National Science Foundation, United States Of America)

G. Lafferty (University of Manchester, Scrutiny Group Chair)  
R. Heuer (DESY, Director-General Designate)

**CERN**

J. Engelen, S. Lettow, E. Tsesmelis, R. McLaren, J-J. Blaising, J. Salicio-Diez, S. Schmelling, S. Moos, P. Geeraert, E. Van Hove.

**EXP**

T. Nakada (CERN and Switzerland CHIPP), O. Ullaland, W. Witzeling, R. Forty, M. Pepe-Altarelli

**Apologies**

A. Sissakian (JINR, Dubna, Russia)

Documents can be found in the RRB indico pages; accessible via the LHC-RRB home page  
<http://committees.web.cern.ch/Committees/WelcomeLHCRRB.html>

**1. Welcome.** J. Engelen, Chief Scientific Officer

J. Engelen welcomed delegates to the 20<sup>th</sup> meeting of the RRB. He introduced the new scientific secretary, R. McLaren.

**2. Approval of the minutes of the last meeting.** J. Engelen, Chief Scientific Officer  
CERN-RRB-2007-122 (report)

The minutes of the last RRB were approved without comment.

**3. Status of the experiment.** T. Nakada, Spokesperson  
CERN-RRB-2008-041 (report) CERN-RRB-2008-096 (presentation)

T. Nakada reported that the service infrastructure had been installed and safety system was operational. The construction of the shielding wall was delayed due to the time needed to repair a cooling pipe. The wall should be completed by the end of April.

The vacuum pipe and VELO vacuum tank was fully commissioned last autumn and is ready to be used. This was recently evacuated and vacuum quality remains good. Beam Condition Monitors, produced by the Dortmund group have been installed around the beam pipe. The magnet is fully commissioned and its control system has been tested from the CERN Control Centre.

Turning to the detectors, T. Nakada reported that the both halves of the VERtex Locator have been successfully installed. Commissioning is in progress but is somewhat slower than foreseen since without the LHC machine vacuum the VELO cooling system cannot be operated and only a few modules can be switched on simultaneously.

RICH-1: The remaining parts are now all at CERN, this includes the quartz windows, photon funnels and lower HPD box. Installation will be completed by the end of April. The commissioning for the HPD upper box has started and all HPDs are functioning as designed.

RICH-2: Completed and commissioning in progress. Unfortunately, 17 HPD's have had to be replaced and a few more HPDs may need to be replaced during the 2008/09 shut down.

Outer Tracker: Detector installation completed > 80% of the FE electronics boxes have been installed (100% by the end of April) commissioning is continuing with cosmic muons (special trigger).

The cause of gain loss, which has been reported in several occasions in the past, has been traced down to the glue used. One long module, with identical material to the production module, was built using Trabond rather than Araldite. This is being tested and no sign of gain loss has been seen.

Silicon Tracker: On the A side 100% of the TT Si sensor ladders have been installed and tested with only a few connection problems which are being resolved. For the C side, 80% have been installed and tests are in progress. All IT sensor boxes (12) have been installed and connection tests have started.

Calorimeter System: All the detector and electronics have been installed and cabled. The

commissioning is well advanced. Cosmic rays have been seen by all four detectors of the Calo system. Calo system is now able to provide L0 cosmic signal for the global commissioning.

Muon System: All MWPCs installed for M2-M5. Commissioning is in progress for connection, timing, HV, readout, etc. L-0 cosmic signal with M4-M5 coincidence showed clean cosmic rays with a low number of hits. The Muon system is now able to provide L-0 cosmic signal for the global commissioning.

Installation of the infrastructure for the M1 wall, i.e. gas pipes and cables are in progress. The cable chains have been installed. M1 chambers are not needed for the 2008 run.

Trigger and Online: All the Level-0 trigger boards are in hand and being commissioned. In the global commissioning, Level-0 decision was made based on Calo or Muon L-0 cosmic signals and many of the detector subsystems were successfully readout.

Online System: Work is centred on consolidating the installed equipment. Starting with 20% of network switch and CPU farm capacity sufficient for the 2008 run. The rest will be purchased toward the end of 2008 ready for the 2009 run.

Computing: Physics quality software is in place. The event reconstruction ready for real data, and the track finding has proved to be robust against misalignment. Tracking framework is now identical for offline and HLT. Measured B field implemented and ready for test.

LHCb Common Computing Readiness Challenge: Simulating real data taking situation with four experiments IP8-control-room to Tier-0 and to several Tier-1's with nominal DAQ rate = 35 kB/event @ 2 kHz: 70 MB/sec alternating 6 hours on 6 hours off (50% duty cycle) start event reconstruction automatically at Tier-1 successfully executed.

As an early programme, low pT phenomena, QCD, and other Standard Model physics are being investigated. CP violation in  $B_s \rightarrow J/\psi \chi\chi$  might provide an exciting result at a very early stage of the experiment, as suggested by recent CDF and D0 results.

Turning to Cost and Funding T. Nakada reported that there was no significant change since the last RRB in October 2007. LHCb is fully funded, with the second instalment from US-NSF for the extra contribution to the CPU's via Syracuse (200 kUSD) is expected by Nov 2008.

At the last RRB, the issue of the replacement of the VELO detectors was raised. All of the 42 sensor modules will need replacement after an integrated radiation of around  $6 \text{ fb}^{-1}$ .

21 modules were foreseen as spares - in case of a severe beam related accident - and will be covered by the VELO groups. According to the MoU for M&O, Annex 7, the remaining 21 modules can be considered as a common item. A document including the cost estimate was endorsed by LHCC.

T. Nakada asked the RBB to take note that after  $6 \text{ fb}^{-1}$  not only the Si sensors but also the detector bases will be activated and it may be necessary to follow lengthy radiation safety procedures for the replacement operation; this could exceed the normal annual shutdown

period. A decision will be taken once there is a better knowledge of the irradiation at LHC and of the shutdown scenario. If required, a new funding method would be discussed for the replacement detector bases.

Lastly he addressed the issue on the replacement for UX85/3 (3rd Be section of the beam pipe) which had seen leaks due to the non-conformal Be material. There is currently being solved by varnishing. However, there is no long term guarantee under irradiation. The CERN vacuum group (AT-VAC) has asked LHCb to procure a replacement piece and investigations are continuing in collaboration with AT-VAC. The current indication is that procurement could be possible within the available funds from CERN.

Concerning collaboration issues, there is a new collaborator: Moscow State University, Russia with 3 PhD's and PhD students. Their Area of contribution would be Muon and VELO and some additional Tier-2 activity.

New management will take over from 1 May 2008. The new Spokesperson will be A. Golutvin. The new Deputy Spokesperson will be A. Schopper. The current Technical and resource coordinators, W. Witzeling and O. Ullaland respectively, will remain unchanged.

T. Nakada concluded by saying that

- All the subsystems needed for the 2008 run have already been installed, except 1/4 of TT ladders and RICH-1 mechanics (quartz windows, photon funnels and the lower HPD box) which are expected to be complete by the end of April.
  - M1 installation will continue as long as possible, but not needed for the 2008 run.
  - Commissioning work is in progress and Level-0 trigger now provides cosmic muons (with Calo- or Muon system).
  - Preparation for early physics is underway.
  - Eagerly looking forward to the first data in summer.
  - VELO replacement modules for beyond  $6 \text{ fb}^{-1}$  needs from the collaboration 496 kCHF.
- LHCb would like the RRB to agree in principle to the pro rata share of this, spread over the coming 5 years, i.e. 4.5% of M&O Cat.A.

### Questions and discussion

M. Pripstein (NSF, USA) enquired if the welders of the cooling tubes had done other work in LHCb, T. Nakada replied negatively. He also asked how much time was necessary for the replacement of the VELO; would this exceed the normal shutdown period? J. Engelen commented that the LHCC had endorsed this proposal in their report CERN-RRB-2008-017. T. Nakada replied that times were known for mounting the modules on the detector base and completing the cabling. However, it was uncertain how long it would take for the base plate to cool down after radiation.

F. Ferroni (INFN, Italy) asked if there was a problem with the HPDs. T. Nakada replied that some of the HPDs which have been replaced show a dark current which indicates backscattering due to a reduction of the vacuum inside the tube. This affects around 20% of the tubes. This phenomenon seems to be limited to the early batches, which have different components. This issue has been raised with the company producing the HPDs. The first half of the RICH box does not show the problem. Investigations are on-going.

J. Engelen confirmed that the procedure outlined for financing the replacement of the VELO was endorsed by the RRB.

**4. LHCC deliberations (paper only).** E. Tsesmelis, LHCC Scientific Secretary  
CERN-RRB-2008-017 (report)

Delegates had no further comment to make and the RRB took note of the report of E. Tsesmelis.

**5. Financial matters** P. Geeraert, Head, CERN Finance Dept.  
CERN-RRB-2008-005 (paper) CERN-RRB-2008-010 (presentation)

P. Geeraert's first slide showed that for the Common fund Romania and Ukraine and have outstanding contributions for 17k and 13k respectively. Otherwise the common fund has been fully paid.

M&O\_A: Contributions have been received from Ireland and Germany (MPI) totaling 46 kCHF. There are outstanding amounts from before 2008 from Romania, Russia and the Ukraine totaling 287 kCHF. For 2008 there is 1.4 MCHF outstanding, i.e. around 41% has been paid, which is the normal pace of payments.

**Questions and discussion**

Referring to the slide of outstanding contributions for M&O\_A J. Krolkowski (University of Warsaw, Poland) commented that the footnote detailing the Polish funding agencies included Warsaw, which was not a member of LHCb.

**6. Construction Budgets.** O. Ullaland, Resources Coordinator

CERN-RRB-2008-043 (report) CERN-RRB-2008-044 (presentation)

O. Ullaland stated that the common funds and core money have been used for all projects except TDAQ which will still be spending in 2008/9.

**7. Maintenance and Operation budgets.** O. Ullaland, Resources Coordinator

O. Ullaland showed the following table for M&O category A:

	Budget 2007	Spent 2007	Difference
Detector related	983.0	992.7	-9.7
Secretariat	189.0	149.9	39.1
Communication	12.0	5.3	6.7
Core computing	0.0	0.0	0.0
Online	580.0	378.5	201.5
Test beams	40.0	47.8	-7.8
Laboratory	45.0	52.8	-7.8
General services	373.0	368.7	4.3
	2,222.0	1,995.7	226.3

and remarked that, due to the re-scheduling of startup of the LHC, there were some over spending in support tasks and some under spending in operation tasks.

He proposed to keep the surplus in 2007 (226 kCHF) as a buffer for (mainly) Online in 2008 and would report back to RRB in November and compensate in the 2009 budget.

He then showed the approved M&O category A budget for 2008, a total of 2.3 MCHF and the projected budget for 2009, 2.6 MCHF.

Turning to core computing, O. Ullaland stated that the CORE computing software manpower needs for 2008 is 37 FTEs; this requirement should remain unchanged for the next few years. 4 FTEs are currently missing and LHCb hopes find voluntary contributions from collaborating institutes thus avoiding using service personnel which would be charged to Category A. More work on the estimates for 2009 will be performed before the autumn RRB after discussions in the National Computing Board, the Scrutiny Group and the upcoming Collaboration Board.

In conclusion, O. Ullaland thanked the funding agencies for their continuous support which had been invested in a beautiful detector, ready to take data.

### Questions and discussion

M. Pripstein (NSF, USA) asked how the Outreach funds were used and the plans for the future. O. Ullaland replied that budget was only 20 kCHF, which limited activities. In 2008 part of the funds were used for the presentation of LHCb on the CERN open day and for improving the web page. These funds may also be used to fund summer students.

G. Lafferty commented that LHCb had been asked to prepare a paper on Outreach for the Scrutiny Group meeting in May.

### 8. Summary J. Engelen, Chief Scientific Officer

J. Engelen summarised that the LHCb experiment was in an excellent position to take data this year. The technical issues have been clearly reported and are under control. He thanked T. Nakada for his dedication and efficiency as spokesperson and wished his successor, A. Golutvin all the best in the future.

There being no further business, the chairman thanked the participants and closed the meeting.