

**CMS****6 May 2014**

**Minutes of the 38<sup>th</sup> LHC Resource Review Board Meeting  
(CERN, Geneva, 28<sup>th</sup> April 2014)**

**Present:**

C. -E. Wulz (Institut fuer Hochenergiephysik /HEPHY, Austria)  
J. Lemonne (FWO, Belgium)  
G. Wilquet (FNRS, Belgium)  
A. K. Maciel (RENAFAE, Brazil)  
S. Novaes (UNESP, Sao Paulo, Brazil)  
Y. Zhang, S. Zhang (National Natural Science Foundation of China, China)  
M. Chen (IHEP, Beijing, China)  
J. Äystö (Helsinki Institute of Physics, Finland)  
M. Besancon, A.-I. Etienne, D. Vilanova (CEA/IRFU, France)  
U. Bassler (CNRS/IN2P3, France)  
R. Feldmann (Federal Ministry of Education and Research, BMBF, Germany)  
M. Fleischer (DESY, Germany)  
H. Mählke, M. Groll (BMBF/DESY-PT, Germany)  
A. Stahl (RWTH Aachen, Germany)  
C. Fountas (University of Ioannina, Greece)  
G. Vesztegombi, T. Csörgö (Wigner RCP-RMKI, Hungary)  
K. A. P. Sinha (Department of Atomic Energy, DAE, India)  
A. Zoccoli, F. Bedeschi, N. Pastrone (INFN, Italy)  
H.J. Jang, M. Lee (KISTI, Korea)  
K.W. Lee, J. Son (National Research Foundation, Korea)  
S. Choi (University of Seoul, Korea)  
W.A. wan Ahmad Tajuddin (University of Malaya, Malaysia)  
G. Herrera Corral (CONACyT, Mexico)  
G. Barreira (LIP, Portugal)  
S. Salikhov (Ministry of Education and Science, Russia)  
V. Matveev (JINR Dubna, Russia)  
V. Savrin (Moscow State University, Russia)  
F. del Aguila (Ministry Economy and Competitiveness - U. Granada, Spain)  
J. Alcaraz Maestre (CIEMAT, Madrid, Spain)  
P. Fischer, C. Sommer (Swiss National Science Foundation, Switzerland)  
K. Clausen, Q. Ingram (Paul Scherrer Institut, PSI, Switzerland)  
R. Wallny (IPP, ETH Zurich, Switzerland)  
F. Canelli (University of Zurich, Switzerland)  
G. W-S. Hou (National Taiwan University /NTU, Taiwan)  
G. Blair (STFC, United Kingdom)  
A. Medland (STFC, United Kingdom)

G. Hall (Imperial College London, United Kingdom)  
S. Rolli, J. Stone, M. Procario (Department of Energy, United States of America)  
D. Marlow (Princeton University, United States of America)  
P. McBride (Fermilab, United States of America)

CMS: A. Ball, K. Borras, T. Camporesi, A. Charkiewicz, D. Contardo, J. D'Hondt, M. Girone, A. Petrilli, P. Sphicas  
CERN: S. Bertolucci, C. Decosse, S. Foffano, T. Lagrange, S. Lettow, L. Mapelli, J. Salicio Diez, E. Tsesmelis, E. van Herwijnen (Scientific Secretary), E. van Hove

Scrutiny Group: C. Touramanis, E. Iacopini

Excused

Y. Sirois (IN2P3, France), M. Awang Bulgiba (University of Malaya, Malaysia), H. Hoorani (Quaid-i-Azam University, Pakistan), J. Królikowski (University of Warsaw, Poland), S. Gonzalez (National Science Foundation, United States of America)

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

**1. Introduction** S. Bertolucci, Director of Research and Scientific Computing.  
S. Bertolucci welcomed delegates to the meeting of the CMS LHC Resource Review Board.

**2. Approval of the minutes of the last meeting.** S. Bertolucci, Director of Research and Scientific Computing.  
CERN-RRB-2013-131  
The minutes of the last RRB were approved without comments.

**3. Status of the experiment.** T. Camporesi, Spokesperson  
CERN-RRB-2014-024, CERN-RRB-2014-025 (slides)

In summary:

- **LS1: successful so far.** The critical moment will be powering of the magnet in November.
- **The exploitation of Run1 data is proceeding well.** Expect to have published > 400 papers on Run I data
- **The preparation for RUN2 is picking momentum.** CSA14 and extensive cosmic ray campaign will allow readiness of Detector, SW, Alignment, Calibration by January 2015
- **Phase 1 upgrade proceeding well & according to schedule.**
- **Phase 2 upgrade Technical Proposal being prepared for next RRB.** Now fully in R&D phase, studies on physics performance ramping up as well effort on better understanding of costs.

CMS would like to thank all those Funding agencies which have already contributed to the Phase 1 upgrade, in particular for common items.

CMS also would like to thank those funding agencies which have started supporting the necessary R&D effort which is needed to correctly define the detectors/technologies for the High-Lumi LHC upgrades.

*A. Medland thanked T. Camporesi for a very clear presentation on what are really three experiments in one. Concerning the L1 trigger upgrade, he was surprised to see mention of a stage 1 development in the trigger upgrade program because it had not been presented before at the RRB and asked if T. Camporesi could explain what the reasons are for this stage 1 development and how confident he was that the issues that have given rise to this risk mitigation can be solved in a timely fashion. T. Camporesi said that there is very good news from the machine concerning scrubbing techniques and their understanding of why the scrubbing at 25ns saturated things at the end of 2012 raising hopes of a good performance with 25ns spacing. However, looking at the machine development at the end of 2012 one cannot exclude that the machine might have to resort to running at 50 ns spacing. If this were to be the case, and one would exceed at 13TeV a luminosity of  $3.5 \times 10^{33} \text{ cm}^{-2} \text{ s}^{-1}$  (which is one half of the 2012 luminosity) this would create difficult running conditions for the L1 trigger, especially for objects like single electrons and single photons. To be able to run with high pileup, isolation constraints have to be applied. This can be done using hardware that is going to be produced anyway for the final trigger. 8 new boards will be produced that allow the information from the calorimeters to be digested by the sophisticated Virtex 7 boards that are being produced for the final trigger. This will increase the flexibility of the L1 trigger and can help cope with this possible new running condition. All of the trigger menus assume that this intermediate trigger will have the capability of having improved isolation criteria for electrons and photons and will be able to perform a rather sophisticated pileup subtraction at L1 for the jet triggers. This is the reason behind this development that will also boost the commissioning of the final electronics for the final trigger because it is a similar module.*

*A. Medland thanked T. Camporesi for his explanation. He noticed that the timescale is already very tight and asked whether this project can be commissioned in time and what would be the consequences if not? T. Camporesi replied that there has been a very complete review process within the experiment also involving various funding agencies which are involved in developing the calorimeter trigger in order to prepare a resource loaded schedule. This guarantees the delivery of the intermediate trigger configuration for the start of 2015 and is in line with the delivery of the full trigger for the start of 2016. He acknowledged a substantial injection of resources in terms of expertise in software and firmware development, particularly from the US.*

#### **4. LHCC deliberations (paper only). E. Tsesmelis, LHCC Scientific Secretary** CERN-RRB-2014-026

The LHCC report focuses on the physics aspects, the status of LS1 and the preparations for Run 2 of the LHC, as reported by the spokesperson. It also reports on the upgrades. The Upgrade Cost Group finds the costs and risks of the L1 Trigger TDR to be reasonable and recommends the document for approval. The Technical Proposal for Phase 2 is in preparation and the LHCC expects it to be submitted by the collaboration in the second half of this year. The Committee considers that CMS has made excellent progress in all aspects of the experiment and congratulates the Collaboration on its various achievements.

**5. Financial matters.** T. Lagrange, Head of CERN Finance and Procurement Department  
CERN

CERN-RRB-2014-027, CERN-RRB-2014-028 (slides)

Since the cut-off date an additional 2M CHF has been received. That leaves outstanding for M&O A for member states: 4.5M CHF (normal for this stage of the year) and for non-member states: 11M CHF over the 2 years which means roughly 30% of the contributions have been received.

**6. M&O Budgets.** A. Charkiewicz, Resources Manager

CERN-RRB-2014-030 (slides), CERN-RRB-2014-029, CERN-RRB-2014-055, CERN-RRB-2014-056

In summary:

- The Phase 1 Upgrades TDRs have all been finalized and approved
- The related Addenda are all finalized and transmitted for the approval of FAs (except the Level 1 Trigger)
- Expenditures for both Subsystem Upgrades and Common Items are in line with the established spending profile
- Funding for Phase 1 is considered secured for both Subsystems and Common Items although some contributions to the Common Fund are still outstanding
- Thanks to all those Funding Agencies which have paid their full due to the Upgrades Common Fund and especially those that have made additional contributions to Upgrade Common Items

*C. Touramanis enquired about the new cooling system and the need for an extra dry air system. Is this something that is too small to appear anywhere or will it come later? A. Ball replied that to maintain the Tracker in cold conditions in a robust fashion an additional dry air system is needed. This consists of releasing existing dry air capacity to flush the insulated cooling bundles that feed the Tracker. These have to be kept at low humidity as well as the tracker itself. Discussions with the Engineering Department are ongoing about the best way to provide such a system. When these have finished a cost estimate will be provided.*

*M. Fleischer likes the tables provided in the documents sent to the RRB numbers 029 and 055. The document 055 contains a nice perspective for the coming five years of funding. He requests that in future those years will continue to be filled in. It would also help a lot to put in that table one actual year or one past year in order to get a calibration point on the real cost of the year and the anticipated costs of the future years. S. Bertolucci replied this is a good suggestion that will be extended to all experiments.*

*M. Fleischer said for information that the Addenda for Pixel, HCAL and the Common Items were received, approved and signed last weekend at DESY.*

*A. Medland remarked that most of the funding for Phase I upgrades has been secured but not all. He asked what the plan is for funds which may not be secured and how this will be managed. A. Charkiewicz replied that although there is 2.9 M not yet paid into the Common Fund for the moment there is no reason to believe that these funds will not be paid. An advance has been made by CERN against a pledge from the US assuring a secure cash flow. There are a few contributions which are not confirmed by a signed Addendum yet but this does not cause concern until 2018. A. Medland remarked that 2018 is a long way away for*

*these costs to be outstanding. He would like to see a little more urgency to see that those funds are brought back. A. Charkiewicz replied that most of the contributions have been paid and some of them have been invoiced so the payments are coming. Invoices are sent in agreement with the Funding Agency. The payment process is sometimes lengthy because the approval process in certain ministries can be lengthy. However, the situation today is not like one year ago when there was concern that funds might be missing.*

**7. Summary.** S. Bertolucci, Director of Research and Scientific Computing.

S. Bertolucci said this was a good example of how to follow the process. He acknowledged the proposal from Germany, DESY, to have the tables regularly updated. He hopes that the cash flow stays in line and that the invoices are being paid and no extra costing will be incurred. There being no further business the Chairman closed the meeting. The next RRB will take place on the 13-15<sup>th</sup> October 2014.