



ATLAS

01 August 2011

**Minutes of the 32nd LHC Resource Review Board Meeting
(CERN, Geneva, 12 April 2011)**

Present:

I. Blain (Natural Science and Engineering Research Council, Canada)
R. McPherson (University of Victoria, Canada)
Q. Chang (Natural Science Foundation, China)
Y. Zhang (Natural Science Foundation, China)
C. Jiang (Institute of High Energy Physics, Beijing, China)
O. Novak (Ministry of Education, Youth and Sports, Czech Republic)
V. Vrba (Institute of Physics, Czech Republic)
J.D. Hansen (Niels Bohr Institute, Denmark)
E. Augé (CNRS/IN2P3, France)
P. Rebourgeard (CEA/IRFU, France)
U. Bassler (CEA/IRFU, France)
C. Guyot (CEA/IRFU, France)
D. Fournier (Laboratoire de l'Accélérateur Linéaire, IN2P3, France)
S. Bethke (Max Planck Institute for Physics, Germany)
M. Nagel (BMBF, Germany)
K. Ehret (BMBF, Germany)
H. Mahlke (BMBF, Germany)
M. Fleischer (DESY, Germany)
P. Mättig (Wuppertal University, Germany)
E. Rabinovici (Hebrew University, Israel)
G. Mikenberg (Weizmann Institute, Israel)
F. Ferroni (INFN, Italy)
L. Rossi (Univ. of Genova/INFN, Italy)
H. Ishikawa (KEK, Japan)
K. Tokushuku (KEK, Japan)
H. Kamiyama (Mission of Japan)
F. Linde (NIKHEF, Netherlands)
A. Van Rijn (NIKHEF, Netherlands)
B. Jacobsen (The Research Council of Norway, Norway)
J. Królikowski (Univ. of Warsaw and Ministry of Science and Higher Education, Poland)
A. Olzewski (INP Krakow, Poland)
G. Barreira (LIP, Portugal)
F.D. Buzatu (Institute of Atomic Physics, Romania)
Y. Kozlov (Ministry of Education and Science, Russia)
D. Filatov (Ministry of Education and Science, Russia)
M. Itkis (JINR, Russia)
G. Kozlov (JINR, Russia)
V. Matveev (Institute of Nuclear Physics, Academy of Sciences, Russia)
V. Savrin (Institute of Nuclear Physics, Moscow State University, Russia)
A. Petrov (Mission of Russia)
Z. Hlavacikova (Ministry of Education of the Slovak Republic, Slovakia)
M. Mikuz (University of Ljubljana & Josef Stefan Institute, Slovenia)
D. Adams (Department of Science and Technology, South Africa)
K. Bharuth-Ram (University of KwaZulu-Natal, South Africa)
G. de Córdoba, (Ministry of Science and Innovation, Spain)
F. del Aguila (Granada University, Spain)
E. Higón-Rodríguez (IFIC Valencia, Spain)
E. Olsson (Swedish Research Council, Sweden)

T. Ekelöf (Uppsala University, Sweden)
T. Nakada (CHIPP, Switzerland)
A. Clark (DPNC, Université de Genève, Switzerland)
S.-C. Lee (Academia Sinica, Taipei)
A. Medland (STFC, United Kingdom)
D. Tovey (University of Sheffield, United Kingdom)
G. Crawford (DOE, United States of America)
S. Gonzalez (DOE, United States of America)
H. Gordon (Brookhaven National Laboratory, United States of America)
M. Tuts (Columbia University, United States of America)

CERN

S. Bertolucci, J. De Groot, T. Lagrange, R. McLaren, C. Saitta, J. Salicio-Diez, E. Van Hove

ATLAS

D. Charlton, F. Gianotti, G. Herten, A. Lankford, G. Mornacchi, M. Nessi, M. Nordberg

Scrutiny Group

B. Loehr, S. Schmeling

Apologies

E. Gazis (National Technical University, Athens, Greece)
P. Karlsson (Swedish Research Council, Sweden)
M. Goldberg (National Science Foundation, United States of America)
M. Pripstein (National Science Foundation, United States of America)
R. Heuer, E. Tsesmelis (CERN)

Documents can be found in the RRB indicio 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 32nd meeting of the ATLAS LHC Resource Review Board.

2. Approval of the minutes of the last meeting. S. Bertolucci, Director of Research and Scientific Computing.

The minutes of the last RRB CERN-RRB-2011-001 were approved without comment.

3. Detector consolidation and upgrade. M. Nessi, Technical Coordinator.

Slides of this presentation are on the RRB Agenda page

M. Nessi began with a summary of the data taking efficiency in 2011 and the activities during the winter shutdown. He continued with a detailed presentation of the status of each sub-detector and the magnets, highlighting the major concerns. He outlined the short term plans, discussed in detail the 2012-2013 shut-down activities, and presented a draft plan for operation and upgrades during the next 10 years.

There were no questions arising from this presentation.

4. Status of the experiment. F. Gianotti, Spokesperson.
CERN-RRB-2010-023 (report). Slides of this presentation are on the RRB Agenda page.

F. Gianotti's presentation focussed on three main areas:

- Collaboration and Management matters
- Status of the experiment and recent accomplishments:
 - Highlights from data-taking and operation
 - A few examples of physics and performance results
- Conclusions and final remarks

She concluded that:

- In the first LHC run, in 2010, ATLAS had recorded $\sim 45 \text{ pb}^{-1}$ of high-quality data
- The whole experiment works beautifully, from smooth and efficient operation of the detector, trigger and computing to the (fast) delivery of physics results. M&O funds and Computing Resources (THANKS !!) have been crucial for these achievements and have been well used.
- Excellent physics achievements have been made in only one year from first $\sqrt{s}=7 \text{ TeV}$ collisions:
 - The "rediscovery" of the Standard Model is essentially completed: jets, W, Z, top-quark, WW and di-bosons, first evidence for single-top, ...
 - Precision measurements (jets, W, Z, top, ..) have started; they will soon challenge the theory
 - Searches for new physics now exceed the Tevatron sensitivity in most cases (e.g. SUSY exclusion approaching masses of $\sim 800 \text{ GeV}$; some limits reach $\sim 2 \text{ TeV}$)
 - ATLAS has published/submitted more than 30 papers and produced 150 CONF-notes
- Very exciting prospects for 2011-2012 !
- In particular, the SM Higgs question will be settled

2013-2014 (LS1) shut-down:

- Mostly devoted to consolidation, maintenance and repairs
 - Clear plans have been made - see Marzio's talk.
 - Main items: new ID cooling plant, calorimeter LVPS, redundant magnet refrigerator.
 - These are M&O items crucial for safe operation of the detector (e.g. a magnet compressor failure would entail a 1-year long ATLAS stop).
 - They have been planned in M&O since a long time, scrutinized by SG, presented to RRB.
- Some unexpected problems appeared recently: we may need to extract the Pixel detector to replace the services (nSQP) - see Marzio's talk.
 - Cost: $\sim 3 \text{ MCHF}$. Thanks to CERN contribution and use of recently liberated deferral funds, no additional resources will be required from FA.
- We now plan to install the IBL in 2013-2014, as the next long shut-down has been postponed to 2017/2018 - see Marzio's talk.

- Note: IBL originates back to 2002 as part of M&O. It also benefits from some fresh project money from new groups who joined the Pixels efforts

For the 2013-2014 shut-down ATLAS is financially covered within the present funding plan. No additional money will be requested from FA.

Upgrade:

- ATLAS has plans for Phase 1 (LS2) and Phase 2 (LS3) - see Marzio's talk.
 - Preliminary cost estimate for Phase 1: ~ 33 MCHF
- We will consolidate these plans in the next months:
 - LHC schedule and luminosity projections are not finalized yet; they affect the plan
 - physics motivations must be compelling (and are luminosity dependent)
 - two Task Forces at work; we will submit an LoI in fall 2011
 - we will ask for funds at the October 2011 RRB, after the above issues are clarified
- MoU agreements:
 - CERN Management, in agreement with experiments, has proposed to extend the construction MoU (valid until end 2010) and use it as a framework for the Upgrade.
 - By itself it doesn't imply any financial commitments from FA.
 - Upgrade projects will be added, when the time is right, to this general MoU through dedicated Addenda to which only interested FA contribute
 - Common Fund (i.e. common items, expected to amount to ~15% of "CORE" for ATLAS) will also be submitted as 1-2 Addenda to which all FA contribute
 - Addenda to be signed by CERN and participating FA, and approved by the RRB

F. Gianotti, on behalf of ATLAS, thanked the Funding Agencies for their fundamental contributions to the success of the experiment and for their continuous support during more than 20 years.

G. Crawford was concerned that Funding Agencies were going to receive two requests for funding within a brief period; a TDR for Phase I in 2013 and Phase II in 2014. M. Nessi explained that the schedule for upgrades corresponds to increasing luminosity of the machine; Phase I is much smaller than Phase II.

T. Nakada asked if there was an offline constraint of 200Hz. F. Gianotti explained that ATLAS did not ask for more Computing Resources in 2011 and will stick to what is available. However above $10^{33} \text{ cm}^{-2}\text{s}^{-1}$ the limited trigger rate (200 Hz) would cut into physics (low-mass Higgs). A small increase in trigger rate (around 20%) could be possible within the present resources, because the experiment has made a lot of efforts to reduce the event CPU and size; more than that would require increased resources. In reply to a question from E. Augé, F. Gianotti explained that the limitation is mainly due to a lack of disk space.

M. Fleisher enquired if the reducing the event size would help; F. Gianotti replied that this had been partially implemented and efforts in this sense will continue. M. Fleisher explained that resources available for financing offline are from the same source as institutes collaborating in ATLAS; a decision to increase funding for computing would reduce the funds available for manpower.

Replying to a question from E. Rabinovici, S. Bertolucci clarified that there would be three years of physics; after that was uncertain. The current LHC is not the final LHC; it will require maintenance and upgrades; the next shut-down will be dictated by the machine rather than the experiments.

B. Loehr commented that the computer requirements are dependent on the number of overlay events per bunch crossing; these will increase. He asked what bunch spacing had been assumed. F. Gianotti replied that pileup depends mainly on the bunch intensity (no of protons/bunch, beam size etc.) and to a much lesser extent to the number of bunches. The assumption used in the studies made so far is up to 10-15 events per crossing. At the moment we are running with about 6 events per crossing.

5. LHCC Deliberations (paper only). S. Bertolucci, Director of Research and Scientific Computing (reporting on behalf of E. Tsesmelis, LHCC Scientific Secretary).
CERN-RRB-2011-043

S. Bertolucci reported that the LHCC considers that ATLAS has made excellent progress in all aspects of the experiment and the Committee congratulates the ATLAS Collaboration on its achievements.

6. Financial matters. T. Lagrange, Head of CERN Finance and Procurement Department
CERN-RRB-2011-046 (report).

T. Lagrange presented the changes with respect to the report on the 28th February. Concerning contributions for Common Fund, Construction Commissioning & Integration; there were cash contributions of 68 kCHF. There was now 3.4 M CHF outstanding.

Cash contributions for the M&O A, received after 1st March totalled 732 kCHF. Outstanding contributions from the Member States are 4.3 MCHF and 5.9 MCHF for non-member states.

7. Full Design Luminosity Detector. M. Nordberg, Resources Coordinator.
CERN-RRB-2011-026 (report). Slides of this presentation are on the RRB Agenda page.

M. Nordberg gave the 2010 final payments for the TDAQ, the Insertable b-layer (IBL), the forward luminosity detectors and the Pixel SQP repairs. He also presented the 2011 FDL budget update.

8. M&O Budgets. M. Nordberg, Resources Coordinator.
CERN-RRB-2011-028 (report). Slides of this presentation are on the RRB Agenda page.

Referring to 2010 M&O A Final payments, M. Nordberg highlighted the cost drivers that resulted in total payments of 14.7 MCHF. M&O B final payments totalled 5.7 MCHF. He then presented the preliminary estimates for 2012: 20.1 MCHF for M&O A and 6.1 for M&O B and illustrated the cost evolution from 2002–2015. M. Nordberg then concluded with the status of outstanding M&O A and B contributions.

M. Fleisher expressed his regret that the new LHC running schedule was not reflected in the report. He requested that the information presented in the April RRB should contain estimates based on the most recent version of the running schedule. M. Nordberg replied that the books for the previous year could only be closed end January; it is hard for sub-systems to predict at that moment in a reliable manner their expenditures for the current year, not to mention the year after. Moreover, the change in machine schedule could not be factored in for the April RRB due to the necessary interactions and discussions with the sub-systems and Funding Agencies involved. M. Nordberg concluded that for these reasons, reliable figures in April were very difficult to provide.

S. Bertolucci confirmed that the running schedule was not available at the end of January. Even after Chamomix, there were several issues to be resolved before the final schedule could be published. He felt that, although the information was not 100% complete, there was enough to provide the Funding Agencies to start planning their requests.

E. Augé was of the opinion that the April RRB was the right time to discuss the budget. However it is important that the final figures were available on a known timetable. M. Nordberg explained that the process begins in May, running until mid August when the final estimates are available. This information is immediately forwarded to the National Contact Physicists. A subsequent meeting in mid September checks that all Funding Agencies are informed.

S. Bertolucci asked the delegates if they considered this schedule was reasonable. E. Augé replied that it was tight, but manageable.

F. Ferroni made the point that the total money that could be committed to LHC would not increase in the next two years. If more money was spent on M&O, there would be less available for other activities. The question was whether the priorities should be decided by the experiment or by the Funding Agencies. S. Bertolucci answered that the experiments were attempting to define a list of priorities. M. Nessi emphasized that substantial reorganisation had already taken place in order to comply with the shutdown schedule and considerable effort had been made to stay within the current spending profile.

F. Gianotti reiterated that for 2013 – 2014 there were no additional requests for funding, despite new challenges. Another example she cited was the effort being made to limit additional computing resources in 2011-2012 to face the problems of pileup.

A discussion on smoothing budgets followed. Whilst Funding Agencies needed smooth budgets to allow them to plan cash flow, real running costs are uneven due to replacement/upgrades of systems, shutdowns and unplanned repairs. Funding Agencies wanted accurate and transparent reporting of costs that facilitated the Scrutiny process but stable budget requests. M. Nordberg said that, with the help of the Scrutiny Group and discussions with the Funding Agencies via the National Contact Physicists, efforts would be made in this sense.

M. Fleisher asked if the issues raised at the October RRB concerning safety costs were now understood. S. Bertolucci replied that there was now a separate line, across experiments, for safety which would harmonise reporting. B. Loehr commented that was still a slight difference between ATLAS and CMS; this is being addressed.

The RRB subsequently:

- Approved 2010 FDL Payments (#26, Table 1)
- Took note of the 2011 FDL Status (#26, Table 2)
- Approved M&O 2010 Payments(#28, Table 1, 2)

- Took note of M&O 2012 Preliminary Budget Estimates (#28, Tables 4, 5)

9. Summary. S. Bertolucci, Director of Research and Scientific Computing.

S. Bertolucci received the approval of the RBB for the proposal to extend the current construction MoU for five years and to add Upgrade projects to the general MoU through dedicated Addenda.