



## **Minutes of the 25<sup>th</sup> Resources Review Board Meeting** **Held at CERN on 23<sup>rd</sup> October 2007**

### **Present:**

#### *Europe*

C.-E. Wulz (Repr. Bundesministerium für Bildung, Wissenschaft und Kultur, Wien)  
J. Lemonne (FWO, Brussels)  
J. Sacton (FNRS, Brussels)  
M. Kadastik (NICPB, Tallinn)  
D.O. Riska (Helsinki Institute of Physics, Helsinki), J. Tuominiemi  
J. Zinn-Justin (CEA, Gif-sur-Yvette), M. Dejardin  
F. Le Diberder (IN2P3, Paris), Y. Sirois (LLR, Palaiseau)  
K. Ehret (BMBF, Bonn), M. Fleischer (DESY, Hamburg), T. Hebbeker (RWTH, Aachen)  
K. Zioutas (G.S.R.T., Athens)  
G. Vesztergombi (KFKI-RMKI, Budapest)  
F. Ferroni (Repr. INFN), M. Diemoz (INFN-Roma)  
A. Bernotas (The Lithuanian Academy of Sciences, Vilnius)  
J. Królikowski (Repr. Ministry of Science and Higher Education, Warsaw)  
Y. F. Kozlov (Federal Agency for Science and Innovations, Moscow), V. Savrin (Skobeltsyn Inst. of Nuclear Physics, Moscow)  
A. Sissakian (JINR, Dubna), I. Golutvin  
A. Petrov (Permanent Mission of the Russian Federation, Geneva)  
J. Fuster (MEC, Madrid), T. Rodrigo (IFCA-CSIC, Santander)  
C. Adusumalli (ETH, Zurich), F. Pauss (ETH, Zurich)  
Q. Ingram (PSI, Villigen)  
R. Wade (STFC, Wiltshire), J. Seed, R.M. Brown (RAL, Didcot)

#### *North America*

E. Henry (DOE), G. Rai, S. Gonzalez, T. Ferbel, J. Butler (FNAL), D. Green  
M. Pripstein (NSF), J. Whitmore (NSF)

#### *Asia*

Y. Zhang (National Science Foundation, China), W. Shen, P. Ji  
P. Dhekne (Bhabha Atomic Energy, India), A. Gurtu (TIFR)  
N.-J. Cho (Ministry of Science and Technology, Korea), Y.I. Choi, K. Song  
Y.B. Hsiung (National Taiwan University, Taipei)  
I. Turk Cakir (Turkish Atomic Energy Authority, Turkey)

#### *CERN*

R. Aymar, J.-J. Blaising, J. Engelen (chairman), D. Jacobs, C. Jones (secretary), S. Lettow,  
B. Salami (repl. P. Geeraert), J. Salicio Diez, S. Schmeling, E. Tsesmelis, E. Van Hove, F. Sonneman

#### *CMS*

T. Virdee, A. Ball, P. Bloch, L. Foà, A. Petrilli, G. Tonelli

G. Lafferty (Chairman of the M&O Scrutiny Group)

#### *Apologies*

D. Denegri (Repr. Ministry of Science and Technology, Zagreb)  
E. Gazis (National Technical University, Athens)

## 25<sup>th</sup> Meeting of the CMS Resources Review Board RRB, 23<sup>rd</sup> October 2007

### 1. Introduction

J. Engelen, Chief Scientific Officer

The Chairman, J. Engelen welcomed the delegates to this 25<sup>th</sup> and Jubilee meeting of the CMS RRB.

### 2. Approval of the Minutes of the 24<sup>th</sup> Meeting (CERN-RRB-2007-003)

The minutes of the 24<sup>th</sup> meeting were **approved** with no comments. J. Engelen thanked C. Jones for having taken these minutes. There were no matters arising.

### 3. Status and Financial Plan of the Experiment, T. Virdee, Spokesperson

Papers CERN-RRB-2007-085

Presentation CERN-RRB-2007-086

#### 3.1 Collaboration News

T. Virdee noted that a new group and a new country had been voted full membership of CMS, namely the University of Gent, Belgium, and Lithuania. An application for full membership had been received from Wayne State University, Detroit. An application for associated membership had been received from the Central Laboratory of Mechatronics and Instrumentation, Bulgarian Academy of Sciences. CMS now consisted of 2317 scientific authors from 38 countries and 176 institutions. T. Virdee showed the current organisational chart. There had been no major changes since the previous RRB.

#### 3.2 Construction Progress

T. Virdee reminded the members of the structure of the CMS detector. He noted that the current planning was to have the detector, including one EE and pixels, closed and with the field and starting to take cosmics on in April 2008.

CMS had made significant progress over the last 6 months. The main highlights were:

- 1) **Surface: Completion of the silicon strip tracker**, with a substantial fraction operated at multiple temperatures, including operating temperature (-15°C), with excellent performance. Now ready for installation at Point 5. Pixel construction was showing good progress towards timely completion.
- 2) **Surface: All surface-mountable muon chambers have been installed.** YE-2, YE-3 disks equipped with RPCs.
- 3) **UXC: Barrel ECAL - construction and installation completed**, excellent quality, and followed immediately by a smooth transition to Endcap ECAL work.
- 4) **UXC: YB-1, YB-2 Barrel yoke wheels lowered.** Muon chambers had been commissioned with cosmics in SX.
- 5) **UXC: commissioning with cosmics of detectors** underground proceeding. Monthly CMS Global cosmics runs were started in May; combined triggering and readout of multiple detectors was proceeding.
- 6) **UXC: the plus end has been opened** for consolidation and preparation for cosmics data taking end-Nov., moved with cable chains attached.
- 7) **UXC:** With a significantly enlarged team, much progress on **installation of services on YB0**, following stringent QA/QC philosophy. Some delay - called up contingency: lower YB- wheels.
- 8) **UXC: HF raising and shielding closure test** was introduced and completed. Lessons learnt reduce risks when closing for beam in 2008.
- 9) **UXC: Beam pipe installation** on minus-end completed (off the critical path), with much learnt. This should help in installation of remaining sections.
- 10) **USC: All magnet ancillaries lowered & re-installed.** Low-current power tests begin in November.

11) **USC/SCX**: Broad progress in **commissioning the Level 1 Trigger and final data acquisition system**, including all links, and installation of the first 800 computers serving as readout or filter farm units.

12) Preparation and use of **Computing Infrastructure** continued (including production of over 150 million simulated events), and was now being tested in CSA07, a 50% (of 2008 requirement) round-the-clock month-long data challenge to exercise the CMS Computing Model. The reliability of data transfers and the site availability were being improved.

12) Preparation of **Offline Software**: software releases were now synchronised with CMS needs for commissioning, online (HLT) and offline (reconstruction and physics). They were improving release procedures and code performance.

13) The **High Level Trigger Exercise** was completed, demonstrating the foreseen capabilities (40ms/Lvl-1 triggered event) using close-to-final code. Preparation for physics analysis at startup advanced, with a focus on calibration, alignment, and analysis of early data.

T. Virdee then illustrated this progress with a series of interesting photographs. He described the commissioning of the sub-detectors, and then the commissioning of the software, computing and physics analysis software. He then moved on to the preparation being made for physics.

CMS has prepared a formal internal document to cover the needs for the Maintenance and Operation of the CMS Detector. This has been discussed within the collaboration in final draft and they aimed for approval in the CMS Collaboration Board in December 2007. A large effort, estimated at about 550 FTE per year, would be needed across the full Collaboration for the first two years of running, 2008 and 2009. A fair share of the service work was envisaged for all CMS members averaged per Institution at the level of 6 months of 100% effort every 2 calendar years. Physics analysis tasks, and other similar tasks, were not considered service work. This mandatory level of service work will be reviewed at the end of the period. Web tools to manage the planning and accounting were being evaluated.

### 3.3 Conclusion

After a review of the latest schedule T. Virdee concluded this part of his talk as follows:

- CMS has made significant progress during the summer. There were no significant technical issues.
- The current critical path went through Installation of services on YB0. Points to watch were the ECAL, Endcaps EE & ES assembly and the readiness of infrastructure.
- CMS was on track to be closed and taking cosmics at 4T in April 2008 in anticipation of collisions.
- CMS would be ready for, and was eager to lay hands on collision data at design energy.
- With 100pb-1 they could measure the Standard Model and establish CMS as a physics-producing engine. They could also look for hints of new physics.
- With 1fb-1 they would enter the Higgs discovery era. With a few fb-1: firm discovery. "SUSY" was explorable over very large area with 1fb-1; possible new resonances.

T. Virdee noted an excerpt from LHCC Report to RRB. "There are no serious technical impediments to CMS completing the initial detector in time for the first LHC run in 2008."

### Discussion

J. Engelen asked whether there were any questions after the status and technical parts of this presentation, including any questions concerning the LHCC deliberations that members had received.

M. Pripstein enquired how many installation shifts they were currently running, given that the schedule was now slightly more relaxed. T. Virdee replied that they were still working two shifts and also on Saturdays.

### 3.4 Financial Plan

T. Virdee turned to the financial matters (starting at slide 46 of his presentation). He reminded delegates that at in October 2006, (RRB 23): “Upon the recommendation of the CERN management, CMS prepared a global financial plan up to 2010, evaluating not only the shortfall for the low luminosity detector, but also the funds needed to introduce the staged items for the design luminosity ( $10^{34} \text{ cm}^{-2}\text{s}^{-1}$ ). The items under consideration were presented in a prioritized way in 3 steps:

- Step 1: complete the low luminosity detector (17.5 MCHF).
- Step 2: complete the DAQ (8.4 MCHF).
- Step 3: upgrade to design-luminosity detector (16.6 MCHF).

The re-scoping of the forward RPC (RE) system was also proposed and is to be built via in-kind contributions.”

T. Virdee noted that the October 2008 RRB, in one year’s time and upon completion of the low luminosity detector, would be an appropriate moment to “close the books” on construction expenditure for the Low Luminosity detector.

The current status for each Funding Agency was shown in considerable details in Table 2 (slide 47) and in CERN-RRB-2006-105.

The re-scoping of the RPC system was now proposed to be done in two phases, the first for the geometric region at lower eta ( $|\eta| < 1.6$ ) and the second for the region at  $1.6 < |\eta| < 2.4$ . The current cost estimates were 4.21 MCHF for phase 1 and 2.74 MCHF for phase 2. Currently 5 countries were planning to fund this work namely: Belgium, China, India, Iran and Pakistan (see slide 48 for the detailed finances and comments). In addition some groups currently working on the barrel RPC system were also considering participating in the RE re-scoping project.

T. Virdee summarized the status of Additional Funding for steps 1, 2, and 3, although they were focussing mainly on steps 1 and 2. They were very grateful to CERN for smoothing the cash-flow situation and to the many Funding Agencies who had contributed so far. This status is show in the following table with changes since the April RRB marked in bold.

He summarized the situation as follows:

- CMS was grateful to the many agencies that have already made commitments to the various Steps.
- CMS now urgently requested the others to make commitments to at least Steps 1 & 2 and to the re-scoping of the RE system as soon as possible after this RRB.

The construction, installation and commissioning of the low luminosity CMS detector was now close to being completed. CMS was very grateful to all the Funding Agencies for the support provided over the long construction period.

### Discussion of the Financial Plan

T. Virdee then returned to the table giving the status of the additional funding for steps 1, 2 and 3 (slide 49 reproduced on the previous page of these minutes). He wished to give delegates a chance to comment on the status as recorded.

	<b>Step 1</b>	<b>Step 2</b>	<b>Step 3</b>	<b>Comment</b>
<b>Austria</b> <b>Belgium-FNRS</b> <b>Belgium-FWO</b> <b>Brazil</b> <b>Bulgaria</b>	136 <b>136</b> Not Applicable	56 <b>56</b>		Discussing  Request made for Step 2 Awaiting response
<b>CERN</b> <b>China</b> <b>Croatia</b> <b>Cyprus</b> <b>Estonia</b>	4,569 Endcap RPC 15 5	297 Endcap RPC <b>8</b>	1,119 Endcap RPC	Discussing request  Awaiting response
<b>Finland</b> <b>France-CEA</b> <b>France-IN2P3</b> <b>Germany</b> <b>BMBF</b> <b>Germany</b> <b>DESY</b>	272 Not Applicable 919 Not Applicable	49 2,000 2,000	Not Applicable <b>637</b> Not Applicable	Funding in 2010 and 2011 Discussing  Step 1&2 almost paid, Rest - Commitment New Agency
<b>Greece</b> <b>Hungary</b> <b>India</b> <b>Iran</b> <b>Ireland</b>	Endcap RPC Endcap RPC Not Applicable	Endcap RPC Endcap RPC <b>4</b>	Endcap RPC Endcap RPC <b>16</b>	News in Oct RRB Discussing Request submitted, News in Oct RRB Discussing
<b>Italy</b> <b>Korea</b> <b>Mexico</b> <b>New Zealand</b> <b>Pakistan</b>	2,500 Endcap RPC Not Applicable Not Applicable Endcap RPC	Endcap RPC <b>12</b> Endcap RPC	Endcap RPC Endcap RPC	Step 1 likely to be partially covered Discussing Awaiting response Step 2 OK, Step 3 discussing Commitment made
<b>Poland</b> <b>Portugal</b> <b>RDMS-DMS</b> <b>RDMS-Russia</b> <b>Serbia</b>	<b>132</b> <b>108</b> <b>20</b>	<b>49</b> <b>21</b>		+ve response, request in 2008 Likely OK for Steps 1&2 Discussing Discussing
<b>Spain</b> <b>Switzerland</b> <b>Taipei</b> <b>Turkey</b> <b>United</b> <b>Kingdom</b> <b>USA-DoE /</b> <b>NSF</b>	344 Not Applicable 121 575 5,252	140 124 45 202 1,722	466 762	likely OK for Steps 1 & 2 Apply in 2008 Request for Steps 1&2 in 2009/2010 Awaiting response
<b>Sum</b> <b>Requested</b> <b>% covered</b>	<b>15,100</b> <b>17,530</b> <b>86%</b>	<b>6,900</b> <b>8,400</b> <b>82%</b>	<b>3,000</b> <b>16,600</b> <b>18%</b>	

J. Zinn-Justin reported that for steps 1 and 2 they would provide in 2007 more than half of that requested and they would complete this in 2008. They expected that by 2009 to be able to afford step 3.

J. Sacton commented on the 420 KCHF assigned in the table to them for step 3. He noted that this was not completely decided. J. Lemonne added that the FWO groups would like to participate in the re-scoping of the forward RPC and to see the contribution for step 3 used for this purpose. This was however only true for the FWO contribution.

F. Le Diberder announced that the 2 MCHF from IN2P3 should be in their account within a few days. T. Virdee thanked him saying that this really helped considerably.

N-J. Cho noted that the Korean contribution would contribute 522 kCHF in cash including the contribution to the CtC 2. He guaranteed that the Korean government would send this money by 2011. J. Engelen thanked him very much for this and hoped that a way could be found to bring the 2011 date forward.

C.-E. Wulz reported that discussions within Austria were now finished and that the Ministry had agreed to pay all three steps in four instalments starting in the year 2008. This implied that everything would be paid by 2011. J. Engelen thanked her very much for this positive and welcome statement.

There being no further interventions J. Engelen concluded this financial discussion by noting that CMS was not yet entirely funded but that the derivative was positive. At some point the books would have to be closed with a balance that was not negative. He felt that the pledges made within the preceding six months had been a very good sign.

#### **4. LHCC Deliberations (paper only)**

Paper CERN-RRB-2007-089

**LHCC Scientific Secretary, E. Tsesmelis**

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

#### **5. Financial matters**

Paper CERN-RRB-2007-087

**B. Salami, CERN Finance Dept.**

Presentation CERN-RRB-2007-088

B. Salami presented an update to the financial situation reported in the above paper, in which the information was correct to the end of August 2007. The full details can be found in his slides and in his paper.

He confirmed that they had received all due contributions to the common fund and to commissioning and integration.

For the M&O-A additional contributions had been received as from 1<sup>st</sup> September 2007 from Brazil (25 kCHF), China (68 kCHF), Germany (288 kCHF), Italy (248 kCHF), Korea (100 kCHF), Poland (83 kCHF), RDMS-DMS (13 kCHF) and Spain (236 kCHF) for a total of 1 06 MCHF.

Outstanding contributions to the M&O-A amounted to 1.7 MCHF, for which 1.4 MCHF related to 2007 and 0.3 MCHF to previous years (Bulgaria, Italy, Cyprus, Korea, Mexico).

#### **Discussion**

J. Engelen thanked him for this clear presentation. There were no questions.

## 6. Construction Budgets

Papers CERN-RRB-2007-081

**Resources Manager, A. Petrilli**

Presentation CERN-RRB-2007-082

### 6.1 Draft Budget for 2008

A. Petrilli reported that his document summarized the funding requirements for all the payments planned in 2008 to follow the CMS construction schedule. He noted that, in 2008, the CMS initial detector would be completed and all sub-detectors would be in the integration and commissioning phase. The document covered requests for all subsystems for funds available under the CMS MoU, Cost to Completion and Step 1 and 2 (cf. CMS Status Report, CERN-RRB-2007-085). The Draft Budget for the year 2008 was based on the overall planning as presented in the Status Report and the Global Financial Plan of the experiment (cf. CERN-RRB-2007-085), including funds not yet pledged.

The present estimates for all payments in 2008 added up to 10 MCHF. Together with the payments made by the end of 2006 (486 MCHF), the 2007 budget planned payments (40 MCHF), the total estimated payments by the end of 2008 would total some 536 MCHF. This was close to 100% of the funding requested under MoU, CtC and Step 1.

This Draft Budget was based on the breakdown of items in the CMS Construction MoU and its All-Silicon Tracker amendment. As for the past, all figures shown as Payments expected in 2008 were to be considered as best estimates at this time because the actual expenditure would depend, case by case, on commercial tenders received, contract negotiations, currency fluctuations and actual payments during 2007.

A. Petrilli presented, in slide 8, an overview of the 2008 construction budget with planned payments of 10.5 MCHF. He commented that the present Draft Budget was not balanced: some 2.6 MCHF were not covered. All of the funds requested for Step 1 were needed to cover the foreseen deficit. These funds had to be committed as soon as possible and were needed for payments in 2008 in order to maintain the construction schedule.

Annex 10 of CERN-RRB-2007-081 summarized the Draft Budget for 2008 by Funding Agency and by sub-system. The RRB was invited to approve the Draft Budget for CMS Construction in the Year 2008.

### Discussion

J. Engelen asked members of the RRB for comments or questions at this stage. He asked how CMS intended to handle this deficit. A. Petrilli noted that part of this 2.6 MCHF had just been pledged at this board so the actual deficit would be less than the 2.6 MCHF indicated here. The second stage would be to use the step 2 money to cover the shortfall of step 1 so that they could complete the detector. This implied they would have to delay the purchase of the computers which was not good.

The RRB approved the 2008 CMS Draft Construction Budget.

## 7. M&O Budgets

Papers CERN-RRB-2007-083

**Resources Manager, A. Petrilli**

Presentation CERN-RRB-2007-084

### 7.1 Status of M&O MoU Signatures

A. Petrilli presented the status of signatures of the M&O MoU and reported that there had been no changes since the April 2007 RRB.

## 7.2 2008 M&O Budgets

A. Petrilli presented the Draft Budget for both Category A and Category B M&O expenses. The sharing of the M&O-A expenses was based on the PhD count. The list of PhDs participating in CMS had been updated as required by the M&O MoU. The sharing of M&O-B expenses was based on responsibility for all subsystems.

Both M&O-A and M&O-B expenses had been presented to the RRB Scrutiny Group for M&O and their feedback had been taken into account. For readability, he presented all figures by Funding Agency. Details were also available by Institute. For invoicing purposes, CMS would follow the same arrangements as for the previous year.

In detail, the changes to the budget compared with that presented at RRB 24 in April 2007 were as follows:

For the M&O-A:

- A.1.11 BRM/BCM maintenance added
- A.4.01 System management re-profiled
- A.4.05 Software licenses removed
- A.7.05 Cranes spares purchased in advance, 2008 onwards lowered
- A.7.08 Survey strengthened by 0.5 FTE
- Budget overall stable

For the M&O-B:

- All subsystems reviewed
- Budget decrease of ~500 kCHF in 2008.

The 2008 M&O-A budget came to a grand total of 11.96 MCHF, including power for 1.8 MCHF (see slide 7). The M&O-B budget amounted to 5.8 MCHF, 56 FTEs of technical manpower at CERN and 96 FTEs in the CMS institutes for the core computing (slide 8). The 2008 Total M&O Budget was presented by Funding Agency in slides 9 and 10.

The Outstanding Contributions to the M&O were summarized in slide 11. For the years 2002 to 2006 the percentage still outstanding in each year was 3.8%, 4.0%, 1.8%, 2.6% and 0.9% respectively. The total currently outstanding amount for 2002-2006 was 302 kCHF. Funding Agencies with outstanding contributions were kindly requested to rectify the situation as soon as possible.

A. Petrilli noted the evolution of the M&O. The M&O category A estimates were stable overall since the April RRB. As the number of PhDs had gone up, the cost per PhD was very similar to the number for last year. The M&O category B estimates were also overall stable since the April RRB. Changes were due to re-profiling to reflect the CMS startup.

The RRB was invited to approve the Draft Budget for M&O Category A for the year 2008 and to take note of the Draft Budget for M&O Category B for the year 2008 and its sharing amongst the CMS Funding Agencies.

### Discussion

J. Engelen thanked him for this report and suggested that discussion be postponed until after the report from the Scrutiny Group Chairman.

### 7.3 M&O Scrutiny Group Report

Paper CERN-RRB-2007-112

### G. Lafferty. Scrutiny Group Chair

G. Lafferty, chairman of the M&O Scrutiny Group, presented some remarks specific to the CMS experiment, having already presented the general part of his report during the RRB Plenary



Session. The Scrutiny Group had several meetings over the summer with A. Petrilli, A. Ball and L. Taylor and had examined the M&O-A budget essentially line by line.

Conscious that service contracts were consuming an increasing fraction of the M&O, the Scrutiny Group had organized special sub-group to look at service contracts for all of the experiments in order to be sure that they were delivering good value for money and the services which were required. They were content that this was working quite well as a model for providing these services.

CMS asked, as had ATLAS, for a moderate increase in the number of FTEs for core computing to be put on Category A. The Scrutiny Group had looked at this in some detail and was convinced that this was a good way to fund the personnel for these core computing tasks. The on-line and DAQ build-up had been re-profiled to take into account the delays in the machine and this reduced somewhat the requirements for replacements over next year and the following years, and produced a smooth profile in the replacement profile over the years, which was quite satisfactory.

Gas for the RPCs was more expensive than normal. There were technical problems with re-circulating the gas which were now being addressed by a joint working party with both ATLAS and CMS. Good progress was being made and hence one should expect that these costs would come down in the future when they could re-cycle the gas, which, since they are CFCs, was good for the environment.

A. Ball provided a good case why it was necessary to spend 150 kCHF on spares for the cranes, in order to make sure that they were able to get these cranes repaired and in operation as soon as possible if anything were to go wrong. The Scrutiny Group gave approval for this at an early stage in the scrutiny this year and one would expect to recuperate these costs over the years by reducing the yearly requirement for cranes.

Overall the Scrutiny Group was content with the number and would like to recommend them for approval by the RRB.

## **Discussion**

J. Engelen thanked G. Lafferty for the Scrutiny Group report and asked whether there were any comments or questions either to A. Petrilli or to G. Lafferty.

J. Sacton noted that in table 9 of the presentation of A. Petrilli there were two lines for Belgium. However under category B there was only one line. A. Petrilli replied that the total was correct but he had not had enough information to split the line into two. They would discuss outside the meeting.

J. Engelen asked whether there were any objections to the approval of the 2008 M&O Budget. The budget was **approved**.

## **8. Composition of the Scrutiny Group in 2008 J. Engelen**

J. Engelen returned to the issue raised in the Plenary Session by G. Lafferty, namely that of replacing some members of the Scrutiny Group whose term of appointment was at an end. J. Engelen was looking for a replacement for the scientific secretary. He was also still looking for a delegate to represent the smaller member states. M. Pripstein noted that the USA had already started the process of selecting a candidate to replace the USA member and would provide the name shortly. There was also a member need to represent France or perhaps a large member state.

G. Lafferty emphasized the importance of finding members who would perform this work seriously and willingly. J. Engelen would communicate with members of the RRB via email whilst they were establishing the new composition.

**9. Summary, Future Activities & A. O. B. J. Engelen**

J. Engelen summarized the meeting by noting that CMS had presented very good progress, and it was also clear that this needed to be sustained until the very last day in order to be ready to start data taking the moment that data became available. One could live with the financial situation at the moment but there were certain problems that continued to be important to solve. Next year they would have to close the construction book and there would be a real problem if the hard currency were not to be there. He was nonetheless confident that the prospect of a period of new physics into which they were entering would bring enthusiasm to solve the remaining problems.

<p>The next RRB meetings in 2008 are provisionally scheduled to take place at CERN on <b>Monday 14<sup>th</sup>, Tuesday 15<sup>th</sup> and Wednesday 16<sup>th</sup> April 2008</b> and on <b>Monday 10<sup>th</sup>, Tuesday 11<sup>th</sup> and Wednesday 12<sup>th</sup> November 2008</b></p>
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There being no questions and no further business, the Chairman thanked the participants and closed the meeting.

C. Jones  
November 2007