TOTEM 04.09. 2008

Minutes of the 2nd LHC Resource Review Board Meeting (CERN, Geneva, 15th April 2008)

Present:

J. Niederle (Institute of Physics, AS CR, Czech Republic)
D-O. Riska (Helsinki Institute of Physics, Finland)
U. Dosselli (INFN, Italy)
F. Ferroni (INFN, Italy)
M. Pripstein (National Science Foundation, United States Of America)

CERN

J. Engelen, S. Lettow, E. Tsesmelis, D. Jacobs, R. McLaren, G Lafferty, J-J. Blaising, J. Salicio-Diez, S. Schmeling, P. Geeraert, E. Van Hove

TOTEM

M. Lo Vetere (INFN Genova, Italy)
K. Eggert (CERN)
S. Giani (CERN)
E. Radermacher (CERN)

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 2nd meeting of the TOTEM 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-2007-124 (report)
The minutes of the last RRB were approved without comment.

3. Status of the experiment. E. Radermacher, Technical Coordinator
CERN-RRB-2008-047 (presentation)

E. Radermacher reminded the meeting of the position of the Roman Pots with respect to the CMS experiment. He went on to describe the operation of the pots. The first Pots will be

installed in May and 3 more assemblies will be in position before the start of the LHC. The 16 layer Motherboard is under test.

Since October several hybrids with edgeless Si detectors have been irradiated at different fluencies. A study of their efficiency demonstrates that operation after 10^{14}p/cm2 is still possible but needs 450 V bias for full efficiency.

E. Radermacher then gave details of the plan for commissioning of the Roman Pots

Before the LHC start:

- Finish cabling and piping at the 220 m stations;
- Commission the motors and calibrate the LVDTs and the resolvers in sector 4-5;
- Test first assembly of 10 Si detectors with cosmics;
- Install this assembly in a horizontal pot in sector 4-5 middle of May;
- Commission the C3F8 cooling end of May;
- Test detectors with test pulses, DCS and DAQ;
- Commission motor control with CCC in June;
- Install one assembly in a horizontal pot at 220m in 5-6 in June;
- Install 2 assemblies in vertical pots at 220m in 4-5 and 5-6;
- If possible, install more assemblies in a technical stop.

After the LHC start:

- Get all assemblies in running condition;
- Start moving process of the pots together with CCC:
  - Read the BPMs and verify with CCC the beam position;
  - Approach the pots by 35 mm (= safe position)
  - Move the horizontal pots nearer to the beam up to the machine limit to see the diffractive peak – verify the rates;
  - Move the vertical pots nearer to the beam such that the rates are equal in both pots. Go to 10-15 σ from the beam center;
  - Calibrate RP rates with BLMs during these processes;
  - Compare beam position from pot positions with BPMs;
  - For an interlock test (to be agreed with the machine) need to move pot nearer to beam center;
  - First movement and interlock tests can be done with a single beam.
- Verify efficiency, trigger, DAQ, DCS etc.;
- If satisfactory take data.

Turning to the T1 CSC chambers, 50 are now at CERN and 20 are in the final stages of production. All CSCs will be verified for dark current, tested with cosmics or test beam and then mounted in a structure. Some problems have been encountered in the installation of the T1 telescope and the mounting procedure is being improved.

The commissioning of the T1 telescope is planned as follows:

Before the LHC start:

- Review installation and fixation of truss and modify if necessary;
- Finalize the Hybrid, AFEC and CFAC production and install all electronics;
- Test all CSCs with cosmics/test beam;
- Mount CSCs in a ¼ telescope support and cable it;
- Install ¼ telescope in CMS end cap before end of June (depends on CMS planning) or in a technical stop;
- After survey verify all signals via test pulses, check gas flow and quality, cooling and temperature etc.;
- Commission DCS, DSS and DAQ.

After the LHC start:

- Repeat the commissioning with beam. Measure efficiency, cluster sizes, trigger rates etc;

The T2 GEM chambers, 40 + 10 spares, have been produced at Helsinki. Laboratory tests of GEM, with the horseshoe card, have successfully demonstrated low noise. It is hoped to install the first arm of the T2 telescope before LHC start-up.

Plans for the commissioning of the T2 telescope are

Before the LHC start:

- Finalize the Hybrid, the horseshoe and 11th card production;
- 11th card layout to be redone. The layout was started at CERN but it was decided to move to micro-wiring technology in Italy. The card is due in 4-5 weeks but this has caused some delay;
- If all electronics is ready, mount it and test individual GEMs and complete telescope;
- Install 1 telescope on the platform in the CMS surface hall;
- Install the platform in CMS end of June (depends on CMS planning) or in a technical stop;
- After survey verify all signals via test pulses, check gas flow and quality, cooling and temperature etc.;
- Commission DCS, DSS and DAQ.

After the LHC start:

- Repeat the commissioning with beam. Measure efficiency sizes efficiency, cluster sizes, trigger rates etc;

E. Radermacher finished his presentation with some conclusions and the outlook

- TOTEM proposes a modest but nevertheless ambitious program.
- TOTEM intends to install at least 2 Roman Pot detectors before end of June. Two or more detectors could be installed later depending on the accessibility to the tunnel.
- TOTEM intends to install at least one T2 telescope on the + side of CMS before end of June. This heavily depends on the availability of the electronics and the CMS

planning.
• TOTEM intends to install ¼ T1 telescope on the + side of CMS before end of June. This heavily depends on the fixation scenario to be adopted and the CMS planning.
• More T1 and T2 telescopes can be installed at a later date.
• With the few Roman Pots some early physics (elastic scattering and diffraction) is possible independent of the machine optics.

Questions and discussion

U. Dosselli congratulated TOTEM on the progress and asked if there was a plan for the installation and commissioning. J. Engelen emphasised that a detailed plan with milestones was essential both for monitoring progress and for coordinating with similar activities in CMS. He also remarked that TOTEM relied on state-of-the-art electronics which emphasized the requirement for a concrete plan.

U. Dosselli commented that most interesting measurements will come from high beta mode and asked if there was agreement on when it would be possible to switch to high beta. E. Radermacher replied that, depending on the quality of the machine, 90m optics would be requested in 2009; for the 1540m perhaps 2010 or 2011. K. Eggert added that interesting large t physics would be possible even without all Pots being equipped.

J-J Blaising asked if radiation tests of the detectors had revealed the maximum integrated luminosity. TOTEM replied that the vertical Pots were not an issue, but the horizontal Pots would function up to a few fb^{-1} which should cover the first couple of years of operation. There is also an INTAS proposal to go to higher radiation silicon detectors.

4. LHCC deliberations (paper only). E. Tsesmelis, LHCC Scientific Secretary
CERN-RRB-2008-018 (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-2008-011 (paper)

P. Geeraert reported that the common fund has a positive balance of 186 kCHF. Since the last RRB, a contribution of 122 kCHF has been received from the NSF.

D-O. Riska asked what action would be taken concerning outstanding contributions from two institutes. J. Engelen replied that TOTEM was looking at different solutions to the problem.

G. Rafferti reported that, following an action item from the November RRB, the Scrutiny Group had reviewed TOTEM and agreed on the final figures. This resulted in a set of figures to be presented to the RRB.

6. Construction Budgets & **M&O Budgets** K. Eggert, Spokesperson and S. Giani, Resources Co-ordinator
CERN-RRB-2008-051 (report) CERN-RRB-2008-049 (presentation)

K. Eggert reported that RFKI (Budapest) is now a member of TOTEM. In 2008 they will contribute 80 kCHF to the construction costs. The collaboration board has decided that the construction budget will be committed to Roman Pot electronics. In addition they fund a physicist working full-time at CERN.

He then showed a detailed slide of the financial matrix, comparing the original MoU, the projection and paid. The main increase was from Roman Pots, from 2.4 to 3.2 MCHF. After the last RRB, CERN granted an additional 430 kCHF. K. Eggert thanked CERN and Prague for their efforts. NSF is financing the development of the Silicon detectors.

200 kCHF has been paid to date, plus 120 kCHF for the Common Fund. Penn State will ask NSF for 100 kCHF. Brunel will deliver Silicon detectors.

All contributions have been received for the common fund; the balance is in agreement with the CERN Finance department.

The budget balance for Cost to Completion still has 820 k CHF outstanding, in addition there were some unknown costs which include the costs of safety, detector controls and radiation monitors. Several agencies had contributed to cover the missing Polish contribution.

U. Dosselli expressed his thanks to CERN for its increased contribution.

M&O Budget for 2008 and proposed request for 2009

S. Giani showed several tables summarizing the 2008 budget, which had been reviewed by the Scrutiny Group and recommended for RRB approval. These included Cat. A, Cat B. and Cat. A+B by Funding Agencies.

He then reported that the total M&O budget envelope for the year 2009 is expected to be similar to 2008. The number of authors is being revised for the Cat.A request 2009, in consultation with the RRB Scrutiny Group and the Funding Agencies.

KFKI funds will allow them to participate to the M&O costs for 3 years. The sharing of Cat.B costs for Roman Pots will be reviewed including KFKI contributions.

He showed details of the TOTEM M&O total budget 2009 which is 689 kCHF. TOTEM collaborators were preparing the detailed list and related justifications for the budget request. The RRB Scrutiny Group would be provided with the related tables in the standard template well in advance in view of the Scrutiny Group review on 5-6 May 2008.

J-J. Blaising, replacing J. Engelen, asked if there any comments from the Scrutiny Group.

G. Lafferty replied that there was no need to say anything more at this stage. The Scrutiny Group would have the detailed tables over the next couple of weeks, review them in early May and deliver a full report in November.

7. Summary J-J. Blaising, Head PH Department

J-J. Blaising concluded by noting that significant progress in the construction and installation of TOTEM had taken place since the last RRB. There was also good progress in the delivery of electronics, which was on the critical path. There were concerns about the T2 boards, but this was under control. J-J. Blaising remarked that it was encouraging to see that there is a clear plan for commissioning and early physics but emphasized that it is important that TOTEM provided a clear plan for completion to the LHCC and that they followed up on the running plan for 2009. He welcomed KFKI to the collaboration. Finally he noted that TOTEM had finalised the M&O budget request for 2008/9 but that some work was needed to solve the issue of the deficit of the construction budget.

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