CERN RESEARCH BOARD

MINUTES OF THE 186th MEETING OF THE RESEARCH BOARD
HELD ON FRIDAY 5 DECEMBER 2008

Present L. Alvarez-Gaume, R. Aymar (Chairman), J.J. Blaising, H. Breuker, J. Dainton, J. Engelen, M. Ferro-Luzzi, R. Forty (Secretary), A. Herlert, M. Huyse, P. Lebrun, S. Lettow, S. Myers, E. Perez, V. Vuillemin, T. Wyatt

Invited A. Rubbia (item 2), P. Collier (item 6)

Apologies E. Heijne, W. von Rüden

Items

1. Procedure
2. Application of ArDM for Recognized Experiment status
3. Report from the LHCC meetings of 24-25 September and 19-20 November 2008
4. Report from the SPSC meetings of 4-5 September 2008 and 5-6 November 2008
5. Report from the INTC meeting of 3-4 November 2008
6. Any other business
1. PROCEDURE

1.1 The minutes of the Research Board meeting held on 3 September 2008 [1] were approved without modification.

1.2 There was one matter arising from the minutes. In Item 1.3 a report from AB department was tabled at the last meeting, specifying the resources required for consolidation of the AD under two scenarios: end of operation in 2012, or in 2016. As the report had only just been received at the last meeting, the decision had been deferred to the current meeting. Since AD operation will be incompatible with the new PS2, this sets a clear end-point to the programme in 2017. It was agreed that the strategy to be followed should have the aim of maintaining the AD facility operational until then, but consistent with the budgetary constraints. This will involve implementing the consolidation work for items listed in the risk analysis that are considered to be high risk and have long implementation time, but accepting that some lower risk or shorter time scale items will only be implemented on an emergency-response basis, in case of need. On this understanding, the proposed AEGIS experiment is approved as AD-6.

2. APPLICATION OF ArDM FOR RECOGNIZED EXPERIMENT STATUS

2.1 A. Rubbia presented the status of ArDM, an experiment designed to make a direct search for Dark Matter through the detection of WIMP recoil in liquid argon [2]. R&D for this technique has previously been performed using smaller volumes of argon, but the experiment has now installed an 850 kg target mass, with both ionization and scintillation readout. The experiment is sited in building 182 at CERN, but is externally funded. After testing the feasibility of the proposed approach with a ton-scale detector at CERN over the next few years, the final detector (possibly with larger target mass) would be deployed in an underground laboratory.

2.2 The CERN rapporteur for this application, D. Froidevaux, could not be present, but his report was circulated [2]. The scientific case is strong, and complementary to the search for neutralinos at the LHC. Recognition of ArDM would facilitate the
discussion with those responsible for safety at CERN, as the experiment approaches operation. R. Aymar stated that since the experiment is sited at CERN, before operation commences a report on safety must be authorised by the Director General. J.J. Blaising responded that this formal procedure is in progress. The Research Board granted Recognized Experiment status to ArDM, with reference number RE18. This will be reviewed after a period of three years.

2.3 R. Aymar commented that, with the increasing interest in the Recognized Experiment status at CERN from experiments in astrophysics and other fields, the review process for such experiments could benefit from being strengthened in the future, in particular for those experiments with close contact to CERN.

3. REPORT FROM THE LHCC MEETINGS OF 24-25 SEPTEMBER AND 19-20 NOVEMBER 2008

3.1 T. Wyatt presented the report from the last two meetings of the LHCC, covering the status of the experiments, including how they are using the time made available in an extended shutdown following the LHC incident in September, and the LCG [2]. The Research Board took note.

3.2 A new proposal for R&D on Micro-Pattern Gas Detector technology [3] was recommended for approval by the LHCC. It aims for a world-wide coordination of the research in this field. The proposal was approved by the Research Board as RD51.

3.3 Status reports were given by three ongoing R&D projects, RD39 (cryogenic silicon detectors), RD42 (diamond tracking detectors) and RD50 (radiation-hard semiconductor devices). They were all recommended for continuation in 2009 by the LHCC, and this was endorsed by the Research Board.
4. REPORT FROM THE SPSC MEETINGS OF 4-5 SEPTEMBER AND 15-16 NOVEMBER 2008

4.1 J. Dainton presented the report from the latest meeting of the SPSC, including the annual reviews of NA62, NA60, OSQAR and HARP [2]. The SPSC congratulates the CNGS team for the successful delivery of beam to LNGS. The committee recommends continued support for the analysis programme of NA60. Concerning HARP, the SPSC is critical of the publication of several results while significant discrepancies remain with a second analysis of the same data. The committee considers that its review procedures for HARP are now concluded. The Research Board took note.

4.2 Concerning NA62, the experiment has made excellent progress towards the measurement of \( R_K = \frac{\Gamma(K \rightarrow e\nu)}{\Gamma(K \rightarrow \mu\nu)} \), with data taken over the last two years that is now being analysed, with a aim of reaching 0.5% precision on the ratio. The long term goal of the experiment is the measurement of the very rare decay \( K^+ \rightarrow \pi^+\nu\nu \), for which the R&D has been covered by proposal P326. Good progress has been made on the technical developments, and the proposal is now recommended for approval by the SPSC. R. Aymar stated that the scientific case for the \( K^+ \rightarrow \pi^+\nu\nu \) branching ratio measurement is excellent, and that the experiment should be performed at CERN. However, in the coming few years the CERN budget will be tightly constrained, so that during that time the support from CERN can only be expected to continue at its current level. The Research Board approved the proposal P326, subject to the definition of resource sharing within the collaboration. The experiment will continue to be known as NA62.
5. **REPORT FROM THE INTC MEETING OF 3-4 NOVEMBER 2008**

5.1 M. Huyse presented the report from the latest meeting of the INTC, including the status of planning for HIE-ISOLDE, along with technical and physics reports from ISOLDE [2]. The Research Board took note.

5.2 The new target for the nTOF facility has been installed. Proposal P249 for commissioning the target and beam characterization [4] was approved for $2.45 \times 10^{18}$ protons. It will be known as nTOF12.

5.3 Nine ISOLDE proposals were recommended for approval at the last INTC meeting, for a total of 180 shifts (out of 203 requested). They are listed in the following paragraphs.

5.4 **P226** Approaching the r-process “waiting point” nuclei below $^{132}$Sn: quadrupole collectivity in $^{128}$Cd [5] was approved for 24 shifts, and will be known as IS477.

5.5 **P250** Charge radii of magnesium isotopes by laser spectroscopy: a structural study over the sd shell [6] was approved for 10 shifts, and will be known as IS480. Two additional shifts from this proposal are allocated to IS427.

5.6 **P251** The role of In in III-nitride ternary semiconductors [7] was approved for 20 shifts, and will be known as IS481.

5.7 **P252** Coulomb excitation of neutron-rich $^{28,29,30}$Na nuclei with MINIBALL at REX-ISOLDE: Mapping the borders of the island of inversion [8] was approved for 24 shifts, and will be known as IS482.

5.8 **P166 Add. 1** Magnetic moments of Coulomb excited $2_1^+$ states for radioactive beams of $^{132,134,136}$Te and $^{138}$Xe isotopes at REX-ISOLDE [9] was approved for a further 6 shifts, and will continue to be known as IS415.

5.9 **P253** Measurement of the magnetic moment of the $2^+$ state in neutron-rich radioactive $^{72,74}$Zn using the transient field technique in inverse kinematics [10] was approved for 21 shifts, and will be known as IS483.

5.10 **P228** Shape determination in Coulomb excitation of $^{72}$Kr [11] was approved for 30 shifts, and will be known as IS478.
5.11 **P247** Thallium isobaric contaminants of neutron-deficient polonium beams from UCx-RILIS units at ISOLDE [12] was approved for 27 shifts, and will be known as **IS479**.

5.12 **P235 Add. 1** Identification and systematical studies of the Electron-Capture Delayed Fission (ECDF) in the lead region: Part II: ECDF of $^{178,182}Tl$ [13] was approved for a further 16 shifts, and will continue to be known as **IS466**.

6. **ANY OTHER BUSINESS**

6.1 The R&D collaboration RD18 (CRYSTAL CLEAR) was founded in 1990 to explore the use of inorganic scintillators for electromagnetic calorimetry. After the adoption of PWO in CMS, they have continued generic research work relevant to medical imaging, and more recently on the design of calorimeters for future accelerators. J. Engelen explained that collaboration’s status is currently listed in the CERN database as “completed”, and that they request to be listed as an active experiment. **This was agreed by the Research Board, on condition that the status of the experiment is periodically presented to the LHCC for review.**

6.2 P. Collier presented the accelerator schedule for the PS and SPS in 2009 [14], and the schedule was **approved**.

6.3 This was the last Research Board meeting to be attended by E. Perez, and she was thanked for her work as PS/SPS Coordinator. The new Coordinator H. Breuker was welcomed. The chairpersons of the SPSC and INTC, J. Dainton and M. Huyse, will also be stepping down at the end of the year, and were warmly thanked for their contributions. R. Aymar expressed his best wishes to the board for the New Year.

6.4 The **next meeting** of the Research Board will be held on 4 March 2009.
ENCLOSURES

1. Minutes of the 95th LHCC meeting (LHCC-2008-016/LHCC-95).
5. Draft Minutes of the 32nd meeting (INTC-2008-046/INTC-032).

REFERENCES

[2] Copies of the transparencies are attached to the agenda:
   http://indico.cern.ch/conferenceDisplay.py?confId=44593
OPEN SESSION

1. LHC Status Report: Lyn Evans
2. ALICE Status Report: Juergen Schukraft
3. ATLAS Status Report: Peter Jenni
4. CMS Status Report: Tejinder Virdee
5. LHCb Status Report: Andrey Goloutvin
6. TOTEM Status Report: Ernst Radermacher
7. LHCf Status Report: Oscar Adriani

CLOSED SESSION:


*part-time

Apologies: J. Haba, V. Kekelidze, J. Knobloch, E. Perez

1. PROCEDURE
   The Chairman welcomed the new members, Franco Bedeschi, Jerry Blazey, Claudia Cecchi, Jean-Francois Grivaz and Daniel Pitzl, to the Committee, and thanked the outgoing members, Silvia Dalla Torre, Francesco Forti, Junji Haba, Sijbrand de Jong, Vladimir Kekelidze, Rainer Mankel, Carsten Niebuhr and Bernard Peyaud, for their excellent contributions to the Committee over many years. The minutes of the ninety-fourth LHCC meeting (LHCC 2008-010 / LHCC 94) were approved.

2. REPORT FROM THE CHIEF SCIENTIFIC OFFICER
   The Chief Scientific Officer (CSO) reported on issues related to the LHC. First beams in the LHC were successfully steered around the full 27 kilometres of the accelerator on 10
September 2008. After ten days of operation, the LHC is now on stand-by following an incident in Sector 3-4 involving a large helium leak. Investigations have indicated that the most likely cause of the incident was a faulty electrical connection between two of the accelerator’s magnets. Before a full understanding of the incident can be established, however, the sector has to be brought to room temperature and the magnets involved opened up for inspection. The time necessary for the investigation and repairs precludes a restart before CERN’s obligatory winter maintenance period, bringing the date for restart of the accelerator complex to early spring 2009. LHC beams will then follow. Optimization of the planned shut-down period is being worked out. The LHC experiments are adjusting to the new shut-down plan and are preparing to make full use of it. Following the successful circulation of first beam in the LHC on 10 September 2008, the LHC will be officially inaugurated at CERN on 21 October 2008. Representatives of the governments of CERN’s Member and Observer States and other participating nations have been invited.

3. REPORT FROM THE ALICE REFEREES
The LHCC heard a report from the ALICE referees, concentrating on an update on the commissioning, preparations for the shut-down, the status of the computing funding and a report on the Technical Design Report for the Electromagnetic Calorimeter (EMCal).

The Committee heard a report on the commissioning of the ALICE experiment. The commissioning, together with the initial calibration and alignment of the detector, have progressed well. Since December 2007, three cosmic-ray commissioning runs have been undertaken, the last of which started in May 2008 and consists of a global commissioning, calibration and alignment production run. Particle fluxes through the ALICE experiment were observed during the TI2 dump tests in June 2008, the TI2 injection tests in August 2008 and from the first circulating beam in September 2008. The LHCC congratulated the ALICE Collaboration for successfully preparing the experiment for first LHC beams.

The referees also reported on preparations for the shut-down period. Cabling on the Miniframe, which carries the services to the ALICE central detector, will be modified during the shut-down in order to improve the access to the Time Projection Chamber (TPC). Repairs to TPC read-out electronics will be carried out during this period and the cooling fluid flow regulation to individual circuits of the Silicon Pixel Detector (SPD) will also be improved during the shut-down.

The LHCC heard an update on the ALICE computing resources. The global short-fall for the computing resources remains about 40% of the pledged funding for the 2009-2011 period. Proposals to address this short-fall are being evaluated and the LHCC will monitor progress in future sessions.

The referees reported on the ALICE EMCal Technical Design Report. The physics motivation for the EMCal is to enhance the experiment’s capabilities for jet quenching measurements, as well as to enable triggering on high-energy jets, to improve jet energy resolutions and to augment existing ALICE capabilities to measure high-momentum photons and electrons. The calorimeter is based on the Shashlik technology – a layered lead-scintillator sampling calorimeter with longitudinal wavelength shifting fibre light collection – and will be installed in the ALICE central detector. Following further deliberations, the LHCC referees will make a full report at a future session of the Committee.
4. REPORT FROM THE CMS REFEREES
The LHCC heard a report from the CMS referees, concentrating on the status of the experiment and the plans for the shut-down period.
The Committee heard a report on the status of the CMS detector. The LHCC congratulated the CMS Collaboration for successfully completing the installation of the detector and for preparing the experiment and the entire data chain for first LHC beams. The CMS detector performed well for the first LHC beams. Good progress was reported on the Preshower (ES) detector. Assembly of the ES is well-underway and the first instrumented absorber is now inside the environment-controlled TIF area. Full tests with the final off-detector electronics and DAQ are commencing. It is expected to have the ES ready for installation by the end of 2008. Installation of the CASTOR calorimeter and parts of the TOTEM T2 Telescope were installed just prior to the LHC start-up. All detectors of the Beam Radiation Monitoring (BRM) system were installed in time for the LHC start-up. Commissioning of the CMS magnet to the operating field of 3.8 T needs to be continued. At values just below 3 T, field-induced effects on the PM54 lift and relative movements of the Forward Hadronic Calorimeter HF, Collar Shielding and CASTOR table were observed. This must be understood and rectified. After reaching 3.8 T, CMS plans to commence a CRAFT commissioning run with cosmic-rays.

The referees reported on the CMS shut-down plan. The technical planning is adapting to the untimely long shut-down resulting from the LHC incident of 19 September. Much work was foreseen for January-March 2009, including installation and commissioning of the ES, as well as consolidation / repairs to the electrical distribution system, to the detector gas system, to the inertion / dry air system, and to the cooling system, but this cannot easily be brought forward due to a lack of material and personnel. CMS must improve procedures and reduce risks associated with opening and closing the detector and also complete the shimming configuration between the Rotating Shielding and the Collar Shielding in the forward region. The LHCC noted the issues and concerns regarding resources for the core technical team and for the procurement of spares and replacement equipment.

5. REPORT FROM THE TOTEM REFEREE
The LHCC heard a report from the TOTEM referee, concentrating on the status of the experiment, the plans for the shut-down and the outlook for early physics.

The LHCC heard a report on the status of the TOTEM detectors. Production of the T1 Telescope is advancing. Some of the Cathode Strip Chambers (CSCs) need to be produced again due to issues of planarity of the original chambers. Production of the full read-out electronics chain is well underway and the mechanical support needs to be modified due to the revised installation procedure. Fabrication of the Gas Electron Multiplier (GEM) chambers for the T2 Telescope is complete and production of the read-out electronics is well underway. The support of the T2 Telescope moved during the CMS magnet powering and a technical analysis of the event is in progress. All Roman Pot (RP) stations have been installed in the LHC tunnel at 147 m. and 220 m. from the interaction point. Two of the RP stations have been equipped with silicon detectors and need to be commissioned. The interlock and movement control of the RPs is in progress.

The Committee took note of the TOTEM plans for the shut-down period. The Collaboration plans to complete the installation of the T1 and T2 Telescopes. Moreover, all RP stations at 220 m. are expected to be equipped with detectors, while only some of
the RP stations at 147 m. will be so equipped in order to learn more about background and radiation.

The referee reported on the possibilities for early physics measurements of TOTEM with a $\beta^*$ = 90 m. Measurements of elastic and diffractive protons could be made with a few instrumented RP stations and the T1 Telescope.

6. REPORT FROM THE LHCf REFEREES
The LHCC heard a report from the LHCf referees, concentrating on the status of the experiment. Excellent progress has been made by the LHCf Collaboration in preparing the experiment for first data-taking with LHC beams and the LHCC congratulated the LHCf Collaboration. Installation of the LHCf calorimeters was completed in January 2008 and both Arm-1 and Arm-2 calorimeters are working well. In addition, two scintillator Front Counters were installed in front of both calorimeters and will be used to check the beam quality prior to moving in the calorimeters from their garage to beam positions. The interface of signals and timing information with the LHC machine is also complete. Synchronization of LHCf with ATLAS has been performed and it is now possible to correlate LHCf events with ATLAS events. First LHC beam events were observed. The measured beam-gas event rate was measured and was found to be consistent with the expectations based on the residual gas pressure. The referees also reported on the beam tests at the SPS. The energy resolution was measured to be < 3% even for the smallest tower. The Committee noted that LHCf is ready for data-taking at the LHC.

7. REPORT FROM THE MOEDAL REFEREE
The LHCC heard a report on the MoEDAL experiment, concentrating on the status of the experiment design and the preparation of the Technical Design Report. The MoEDAL experiment aims to search for highly-ionising particles at the LHC using plastic track-etch detectors. MoEDAL plans to start data-taking in 2009 in proton-proton mode with 20% of the detector deployed in order to ascertain the backgrounds. The MoEDAL array will be installed in the VELO cavern at Point 8. Full deployment of the MoEDAL configuration will be in place as from the 2010 LHC run. MoEDAL also proposes heavy-ion running for three periods, if possible. Agreement in principle has been reached with all parties concerned for the MoEDAL final design and integration at Point 8. Improvements of the etching procedure are under study. The MoEDAL Technical Design Report is under preparation and will be sent to the LHCC by the end of November 2008. The LHCC encourages the MoEDAL Collaboration to continue with the design of the experiment configuration leading up to the submission of the Technical Design Report.

8. REPORT FROM THE LCG REFEREES
The LHCC heard a report from the LCG referees, concentrating on the general status and issues from the experiments. The World-wide LHC Computing Grid (WLCG) is ready to receive data from the LHC experiments and to provide services in production mode. The middleware is in place and functional, although not all the required functionality is available. In particular, the lack of a proper quota system in the storage is problematic for the experiments that have not developed specific solutions. At present, the deployed resources of computing power and storage are not fully used, which might be attributed in part to the development of the LHC schedule and in part to residual inefficiencies in the system. The list of milestones is well defined and the milestones are being passed as
scheduled. Accounting of the stability and reliability for the Tier-1 centres is now available for each experiment and the referees urge that this is also done for the Tier-2 centres. The first report and recommendations to the Computing Resources Review Board by the Computing Resources Scrutiny Group will be made in November 2008. Deliberations are on-going on the sharing of WLCG resources at CERN amongst the experiments. The LHCC took note of the good progress made by the experiments in their use of the WLCG.

9. REPORT FROM THE RD51 REFEREES
The Committee heard a report on the R&D proposal on the development of advanced gas-avalanche Micro-Pattern Gas Detector (MPGD) technologies and associated read-out systems for applications in basic and applied research (LHCC 2008-011 / P-001). The proposal is to develop techniques for such detectors so they can be capable of coping with high-flux rates while also improving the needed space-point resolution and the radiation hardness of the detectors. The proposed research is organised in seven working groups, each being structured through a set of tasks.

The Committee considers that the proposed experimental programme is sound and that the results of the R&D would be important for future high luminosity colliders, including an upgraded LHC. The proposal also has the potential to improve the collaboration between several institutes towards a common goal. However, the Committee asks the Collaboration to present a clearer definition of the resources and responsibilities of each institute, which will lead to the eventual signing of the Memorandum of Understanding.

The LHCC, therefore, recommends that the Collaboration carries out its programme of work, and encourages the Collaboration to define the resources and responsibilities of each participating institute. A status report should be submitted to the LHCC in one year.

10. REPORT FROM THE LHC PROGRAMME CO-ORDINATOR
The LHCC heard a report from the LHC Programme Co-ordinator. The SPS-LHC injection and synchronization tests in August and September 2008 provided a very useful opportunity to test the kicker timings, the apertures, the magnet polarities and the optics. The tests also allowed ALICE and LHCb to perform synchronization tests and to observe horizontal tracks. The experiment interlocks were also activated. Following first beam on 10 September 2008, a series of successful studies and tests with the machine followed, including systematic optics tests, beam capture, aperture studies and the dumping of one beam while the counter-rotating beam was circulating. The studies were interrupted by electrical transformer problems at Point 8, which stopped the cryogenic plants for Sectors 7-8 and 8-1, and by a cold compressor stop for Sector 4-5 prior to the stop of operations caused by the incident in Sector 3-4 on 19 September 2008. A plan for the shut-down period, for the completion of the commissioning of the LHC accelerator in 2009 and for the physics runs in 2009 is being developed.

11. REPORT FROM THE ATLAS MINI-REVIEW
The LHCC heard a report from the ATLAS Mini-review, concentrating on the progress leading up to the first LHC beams, experience gained with LHC first beams and issues to be addressed prior to the LHC run in 2009.
The referees reported that the ATLAS Collaboration has made tremendous progress in preparation for first LHC beam on 10 September 2008 and the LHCC congratulated the ATLAS Collaboration. In particular, excellent progress was made since the previous LHCC session in July 2008 with the evaporative cooling system for the Inner Detector, with the performance of the power supplies for the Muon System and with the integrity in the magnetic field of the low voltage power supplies for the LAr End-cap Calorimeter. All ATLAS sub-detectors – Pixel Detector, Semiconductor Tracker (SCT), Transition Radiation Tracker (TRT), LAr and Tile Calorimeters, and the Muon System were installed, cabled and integrated into the DAQ. The Pixel Detector and LAr Forward Calorimeter (FCAL) had high voltage off, while the Muon System and SCT were operated at reduced high voltage during the period with first LHC beams. Most of the ATLAS systems had passed successfully through a series of combined data tests with cosmic rays. Commissioning of the Pixel Detector is on-going.

ATLAS commissioning with beam started with the first LHC beams and particularly so-called splash events on the LHC collimators around ATLAS were used for the further commissioning of the ATLAS experiment. The calibration and alignment procedures are in progress as they require more statistics, both with and without magnetic field, to reach the required accuracy in the alignment of the tracking devices. The ATLAS operational model works well.

The LHCC identified certain critical issues which remain outstanding, including the need to a) rectify the instability of the read-out modules for the Cathode Strip Chambers (CSCs), b) replace the failing TX timing transmitters common to the SCT and Pixel Detector and c) consolidate the cooling system in order to ensure efficient running of the SCT and Pixel Detector in 2009.

The ATLAS magnet system is operational. The long chain of necessary tests and trainings was completed to ensure a reliable operation of all the magnet parts, Solenoid, Barrel Toroid (BT), and End-Cap Toroids ECT-A and ECT-C, both in stand-alone and combined modes. The ECT-A required additional training steps to reach the full current, but since quenches were localized in different coils, this is not considered to be indicative of defects. Some remaining steps are required to complete the magnet commissioning and to reach the required current of 20.5kA in a combined BT, ECT-A, ECT-C mode.

The Beam Interlock and Injection Permit systems are fully operational and are integrated into the Detector Control System (DCS). The primary machine parameters are available and information from the Beam Condition Monitor (BCM) is available. The LHCC urges ATLAS to develop further their beam dump protocols.

The Trigger and DAQ are fully installed and many checks have been done with cosmic-ray runs and with the first LHC beams. The Trigger still needs some further tuning and timing during final commissioning with the LHC beam in 2009. Further installation of computing power will continue for ATLAS operation at higher rates. The performance of the Event Builder is being evaluated.

The on-line and off-line calibration procedures are well organized and have passed through various checks in the FDR-1 and FDR-2 Full Dress Rehearsals phases. Very good inventory is prepared for what remains to be done. The 24h loop for calibration procedures will be initially relaxed and should be carefully followed-up during LHC data-taking, as should the status of the condition database. The ability for reprocessing should be indicated on a more realistic scale.
Excellent progress was reported on the software, computing and strategies for physics commissioning. The ATLAS software has been intensively checked during FDR-1 and FDR-2 and is considered to be in a good state. The software has been validated and stress tested, but still requires more effort to reach optimal conditions. The ATLAS computing operations are in a good state and are ready for data taking. The computing system is ready for implementation when LHC data are available, requiring just some better regulation in the usage of the data storage systems. ATLAS may need to develop an internal disk quota system. The strategies for physics commissioning have been studied in detail with simulated data, and further progress was achieved during FDR-1 and FDR-2.

12. REPORT FROM THE LHCb MINI-REVIEW

The LHCC heard a report from the LHCb Mini-review, concentrating on the progress leading up to the first LHC beams, experience gained with the first LHC beams and issues to be addressed prior to the LHC run in 2009.

The LHCC heard a report on the status of the LHCb detector, together with its installation at Point 8, and the preparations leading up to LHC data-taking. The construction and commissioning of the LHCb experiment have been realized with impressive success and the LHCb Collaboration is congratulated for their efforts over many years. The LHCb sub-systems were in a good state for the first LHC beams. The chamber installation for the M1 Muon Station is scheduled for the 2008-2009 LHC shutdown period. The major outstanding issue is related to the Hybrid Photo Diode (HPD) read-out for the RICH-1 and RICH-2 Ring Image Cherenkov detectors. Because of a high-ion feedback rate, 20 HPDs have been exchanged and a further 10 have started showing similar characteristics and are being monitored.

The referees reported on the experience gained with first LHC beams. Event samples were recorded in LHCb during the LHC injection tests and with first circulating beam. This has enabled LHCb to carry out a series of timing synchronisation studies and to make first attempts at measuring the detector spatial resolution.

The LHCC heard a report on the status of the Outer Tracker. The issue of gain loss of the Outer Tracker has been approached with great vigour and the understanding of the cause has made much progress. The cause of the problem has been traced to the use of Araldite AY103 in the chamber fabrication and the test modules built with Tra-Bond glue show no negative effects. Solutions based on high-voltage training at high currents, flushing the detector with gas and the heating of the modules have been introduced and a significant reduction of the gain loss has been obtained. In situ irradiations are made to measure the gain loss. The Committee will continue monitoring the performance of the Outer Tracker, as the detector is an essential element of the LHCb trigger, particularly at higher luminosities.

The Committee took note of the initiative taken by LHCb for improving the detector, the trigger and the read-out systems in order to handle data taking at a luminosity of $2 \times 10^{33} \text{cm}^{-2}\text{s}^{-1}$. This effort will allow extending the physics reach of the experiment, in particular with the study of very rare B-meson decay channels and the search for new CP-violation signatures. As soon as the first results from LHC will become available, and if they uncover hints for new physics, a more detailed physics programme at high luminosity should be prepared. This upgrade scenario will require several years for the development and construction of new detector parts and the conceptual studies should
receive immediate attention so as to complete in due time the necessary upgrade solutions.

13. REPORT FROM THE LHC EXPERIMENT UPGRADE REVIEW
The LHCC heard a report on the LHC luminosity upgrades. Work is in progress to study upgrades to the particle detectors which are needed to follow the increase in LHC luminosity. The plans for the upgrades to LHCb were presented and are described in Section 12 above. The primary upgrade items for ALICE include a smaller inner radius for the Tracker, an upgrade to the DAQ input/output bus and the improvement of the particle identification capabilities of the ALICE detectors. For ATLAS, the Phase I upgrade options include the replacement of the present beryllium beam pipe with a beam pipe of smaller radius and a B-layer inside the existing ATLAS detector. ATLAS is also investigating possible strategies to mitigate the effect of high occupancies in the Transition Radiation Tracker (TRT). For Phase I, CMS plans to replace the entire Pixel Detector, improve the granularity of the inputs to the Level-1 trigger, complete the despaced muon chamber array, and replace the existing Hadron Calorimeter read-out by Silicon Photo-Multipliers as well as introducing some segmentation in depth for the read-out. New appointments to the LHCC membership have been made also with a view of strengthening the expertise in areas relevant for upgrades. An LHCC referee team is being established to review the LHC experiment upgrades.

14. REFEREES
The LHCC referee teams are as follows:
ALICE: M. Gonin (Co-ordinator), W. Kuehn, J.-F. Grivaz
ATLAS: J. Blazey (Co-ordinator), C. Cecchi, P. Mato, D. Pitzl
CMS: M. Martinez-Perez, S. Smith (Co-ordinator), R. Yoshida
LHCb: F. Bedeschi (Co-ordinator), C. Hawkes, A. Nomerotski
TOTEM, LHCf, MoEDAL: C. Cecchi, M. Mangano, P. Mato
LCG: J.-F. Grivaz, C. Hawkes, M. Martinez-Perez (Co-ordinator)
Experiment Upgrades:
  Co-ordinator: D. Pitzl
  RD39: D. Pitzl
  RD42: A. Nomerotski
  RD50: A. Nomerotski, R. Yoshida
  RD51: W. Kuehn

15. The LHCC received the following documents:

Minutes of the ninety-fourth meeting held on Wednesday and Thursday, 2-3 July 2008
LHCC-2008-010/LHCC-A-094
16. **DATES FOR LHCC MEETINGS**

Dates for **2008**:
19-20 November

Dates for **2009**:
18-19 February
6-7 May
8-9 July
23-24 September
18-19 November

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9. LHC Status Report: Lyn Evans
10. WLCG Status Report: Ian Bird
11. RD39 Status Report: Zheng Li
12. RD42 Status Report: Harris Kagan
13. RD50 Status Report: Mara Bruzzi

CLOSED SESSION:


*part-time

Apologies:  M. Mangano

1. PROCEDURE

The Chairman thanked the Chief Scientific Officer, Jos Engelen, for the magnificent job that he had done in wisely steering the LHC experiments through the construction, installation and commissioning period, leading up to LHC first beams. The Chairman welcomed Horst Breuker who has been appointed as SPS and PS Physics Co-ordinator as of 1 January 2009 and thanked the outgoing Co-ordinator, Emmanuelle Perez, for her contributions to the Committee. The minutes of the ninety-fifth LHCC meeting (LHCC 2008-016 / LHCC 95) were approved.

2. REPORT FROM THE CHIEF SCIENTIFIC OFFICER

The Chief Scientific Officer (CSO) reported on issues related to the LHC. Repair of LHC Sector 3-4 is well underway. The work required to be carried out is now known and detailed diagnostics are being developed as part of the inspection plan of the full machine. Details of the work will be presented to Council in December 2008 together with an update on the expected duration of the shut-down and the financial consequences that need to be taken into account. Access conditions to the underground areas need to be reviewed.
in order to mitigate the risk of an accident while allowing the experiments to carry out their work. The CSO also mentioned that the civil engineering work for LINAC4 has started.

3. REPORT FROM THE LHCb REFEREES
The LHCC heard a report from the LHCb referees, concentrating on the status of the experiment and the work scheduled for the LHC shut-down period.

The referees reported on the status of the experiment. All detector components took data during LHC first beam in September 2008. New issues which were identified and are being dealt with in order to achieve full functionality and reliability of the LHCb experiment are:

a) the replacement of Silicon Tracker modules that have broken bonds;

b) the modification of noisy Cockcroft-Walton bases of the Electromagnetic Calorimeter photomultiplier tubes. Installation and commissioning of the M1 Muon Station will be completed during the 2008/2009 shut-down. Moreover, improvements in the experiment control system, DAQ and monitoring system software are in progress. The CPU capacity of the DAQ system will be upgraded to the full nominal requirements. LHCb expects to complete the detector work by May 2009 and could take TED data resulting from interactions of injected beams on the beam stop in front of the LHCb detector whenever possible until LHC circulating beams are available.

4. REPORT FROM THE CMS MINI-REVIEW
The LHCC conducted the second Mini-review of CMS on 17 November 2008, consisting of a day of presentations and discussions with CMS management, and a visit to the Preshower construction site in Bldg. 186. The three foci of the review were:

- completion of the first-phase detector,
- progress of the Electromagnetic Calorimeter (ECAL) Preshower system,
- detector commissioning with the first beam and with cosmic rays.

Detector and Magnet Construction and Performance

In the past few months all phases of the experiment have come together in the CMS cavern. The low-luminosity detector (minus the Preshower) was completed and tested successfully with cosmic rays and first beam. The magnet system performed flawlessly, but stray fields and magnetic forces were much larger than experienced two years ago on the surface, and up to 5 times those predicted by modeling. Stresses on parts of the detector and magnetic effects on LHC equipment limited initially the magnet operation to below 3 T. Extensive efforts are underway to reduce the fields to acceptable values, and also to reconcile measurements with calculations. By removing the CASTOR calorimeter, the part most affected, CMS brought the magnet to full field, and carried out a 4-week cosmic-ray run at 3.8 T (CRAFT) as well as various tests of the magnet. The only interruptions were caused by occasional failures of the cooling system. These interruptions caused around 10% inefficiency during the cosmic-ray data-taking and are being fixed over the shut-down. The LHCC congratulates CMS on its heroic efforts in conclusively winning a difficult and complex “end-game” to be ready to take high-quality data.

On the downside, the CASTOR calorimeter requires a major re-design to withstand the unexpectedly large magnetic forces. A solution is not yet in hand, so it is unlikely it will be reinstalled under the current LHC schedule. Fortunately, this system is not required for physics in the 2009 run. Similar concerns about TOTEM T1 Telescope are being addressed by CMS and TOTEM.

The LHCC took note of additional TOTEM issues troubling CMS, including activation of the TOTEM T2 Telescope cooling fluid. A joint CMS-TOTEM session will be convened
at the February LHCC meeting to make sure that TOTEM’s systems and plans, including the above, are compatible with CMS.

Finally, the Committee took note of the continuing dependence of CMS on expert teams to carry out maintenance and repairs, especially during shut-downs, and their concern that these needed resources may become unavailable in the future.

Shut-down Plans
CMS presented a detailed, well-thought-out plan for the shut-down, which the Committee strongly endorses. The main interventions include repairing the cooling systems of the Tracker and Forward Pixel Detector, replacing the few Hybrid Pixel Detectors (HPDs), that are especially sensitive to magnetic fields, repairing Barrel muon chambers and endcap Cathode Strip Chambers (CSCs), and solving the problem of increased leakage current in some of the End-cap Resistive Plate Chambers (RPCs), and installing the ECAL Preshower detectors. CMS also described a comprehensive program to improve procedures for opening and closing the detector, and to access components near the beam line. Safety of the detector and ALARA are prime considerations. The referees look forward to receiving a progress report at its February meeting.

Preshower Construction and Schedule
The Preshower group has been strengthened considerably as the ECAL and Tracker manpower has become available over the last year. Currently about 40 people are involved at CERN on ECAL assembly, representing about 25 full-time equivalent (FTE) personnel, including skilled and experienced technical manpower.

The assembly is taking place in the former TIF facility of the Tracker. All components are on hand, and one complete Dee has been assembled and tested. Another is almost ready. The schedule to finish all assembly and testing in January looks realistic if the goal of reducing the testing time from 2 weeks to a few days, by using the latest improvements in readout and hardware, works as expected. The schedule has 1 month contingency with 5-day work weeks and appears to be relatively safe. Quality assurance practices taken from the Tracker experience appears to be paying off with very few problems found at the testing stage.

The installation into CMS has been tested using the Preshower windows previously in July. However, since the Preshower installation now has to take place with the beam pipe in place, new tooling has been designed and some changes in procedure are envisioned for the actual installation. The off-detector electronics are mostly on hand and the software integration are well advanced.

Commissioning with Beam and Cosmic Run at Full Field (CRAFT)
Very good progress has been reported on the commissioning of the CMS detector using cosmic-ray runs with the solenoid operational at 3.8 T (CRAFT). The experiment ran continuously during four weeks and collected 370M events. In about 200M of these events, all sub-detectors were functional and read out.

The DAQ system showed a good performance with a reasonable efficiency (~70%) and a modest time required to start new runs. The prompt reconstruction of the data at the Tier-0 centre at CERN and the transfers to Tier-1 centres were carried out as expected.

The Collaboration has used the data to perform a first alignment of the Tracker, Pixel Detector, and Muon Chambers and a detailed study of the efficiency and timing of the RPCs. The result of alignment of the Muon Chambers from cosmic-rays agrees with the results of the photogrammetry. The occupancy plots indicate a good performance and understanding of both the ECAL and Hadronic Calorimeter (HCAL).
Modulo some noise observed in the RPCs and in the HCAL HPDs, currently under investigation, the CMS detector has been demonstrated to be ready to take high-quality physics data.

**Overall Conclusion**
The LHCC considers that CMS has made excellent progress in the detector and DAQ commissioning achieved during three periods of cosmic-ray runs and with LHC first beams. The CMS plan for the shut-down period is reasonable and includes the installation of the end-cap Preshower detector. The Committee considers it realistic for CMS to be completely ready for the first colliding beams in 2009.

5. **REPORT FROM THE ATLAS REFEREES**
The LHCC heard a report from the ATLAS referees, concentrating on the status of the experiment, the plans for the shut-down and the status of the upgrade planning.

The Committee heard a report on the status of the ATLAS experiment. A number of repairs and improvements are planned for the shut-down period and the ATLAS Collaboration is making excellent use of the shut-down. The failure of the front-end transmitters for the LAr Calorimeter appears to be the most serious recent development with the greatest schedule risk. The new transmitters for the Semiconductor Tracker (SCT) and the Pixel Detector front-ends are arriving and will be installed upon reception as access to the ATLAS detector is made possible. ATLAS would be in a position to install the remaining Muon Chambers if time becomes available in May/June 2009. The LHCC requests further details on the plans for replacing the low voltage power supplies of the LAr Calorimeter and the repair plans for the SCT and Pixel Detector cooling system. Given the number of complicated tasks, the LHCC urges the ATLAS Collaboration to proceed with caution and the Committee will monitor progress of the repairs during the shut-down period.

The referees also reported on the cosmic-ray data taking, the status of the data preparation and on the status of the software and computing. The ATLAS cosmic-ray data collection ran extremely efficiently. The referees noted that the software strategy and approach has become more effective. The software release schedule and strategy is reasonable. Good progress was reported on the alignment and calibration. The referees would like to see more work on the inter-detector calibration and on the resolution of the muon barrel alignment variation.

The LHCC also heard a report on the ATLAS upgrade planning. The plan to submit in 2009 both the Technical Design Report for the ATLAS Inner Barrel Layer and a Letter of Intent for the ATLAS experiment upgrade is reasonable. The LHCC urges ATLAS to consult available external expertise, e.g. from DØ, with respect to the Inner Barrel Layer.

6. **REPORT FROM THE TOTEM REFEREES**
The LHCC heard a report from the TOTEM referees, concentrating on the status of the detector and of the software and computing.

The referees reported on the status of the detector. Production of the Cathode Strip Chambers (CSCs) of the T1 Telescope is complete and assembly of one-quarter of the telescope is finished. Installation of the full T1 Telescope in CMS is scheduled for when CMS is closed in April 2009. Production of the Gas Electron Multiplier (GEM) modules is complete and production of the read-out and trigger components is approaching completion. Assembly of the full T2 Telescope is in progress and is expected to be installed in CMS between January and March 2009. All Roman Pots have been installed at the LHC with two fully-equipped Roman Pots installed on either side at 220 m. from the
interaction point. TOTEM plans to equip all Roman Pot stations at this location by mid-March 2009. The availability of the read-out electronics remains a concern as the schedule is very tight. The Committee noted the aggressive planning needed to complete the assembly and installation of the T1 Telescope, the T2 Telescope and the Roman Pot Stations at 220 m. from the interaction point. Integration of the T1 and T2 Telescopes in CMS needs to be revisited in some detail. The LHCC requests that TOTEM submits a resource-loaded schedule for the completion of the TOTEM experiment together with a plan for the requested physics run. Work on the offline software is starting and there is much to do while simulations are being prepared and Monte Carlo productions are scheduled.

7. REPORT FROM THE LHCf REFEREES

The LHCC heard a report on the LHCf experiment, concentrating on the status of the experiment and its running scenario. Installation of the LHCf Arm-1 and Arm-2 calorimeters was completed in January 2008 and since then no major issues have been identified. Both the Arm-1 and Arm-2 calorimeters are functioning well. Moreover, fixed Front Counters were installed in front of Arm-1 and Arm-2 and have proven to be very useful to check the beam quality. The referees also reported that the LHCf computing and DAQ are well developed and work well and that the communication with ATLAS and the LHC machine is fully operational. The LHCf shut-down activities are well organized and include the installation of the remote-handling system, improvements to the offline software and DAQ and a cross-check of the Monte Carlo simulations with various codes. The LHCC took note of the memorandum submitted by LHCf concerning running at 14 TeV centre-of-mass energy. The LHCf physics measurement, as approved by the LHCC, is fulfilled at 14 TeV centre-of-mass energy. Should the 2009 LHC run at 10 TeV centre-of-mass energy exceed an instantaneous luminosity of \(10^{31}\) cm\(^{-2}\) s\(^{-1}\), LHCf would be obliged to remove their detectors due to the risk of radiation damage. In such a case, LHCf requests that their detectors are re-installed during the 2009/2010 shut-down period in order to complete their data-taking at the nominal 14 TeV centre-of-mass energy. The LHCC will discuss this issue again when further details on the LHC schedule for the coming years is available.

8. REPORT FROM THE WLCG REFEREES

The LHCC heard a report from the WLCG referees, concentrating on the general status and issues of the project and the experiments. The LHCC took note of the Tier-1 and Tier-2 resources for 2009. Given the present understanding of the LHC schedule for 2009, the experiments consider that their estimates for their 2009 computing needs remain valid. Neither the experiments nor the WLCG Management could support any delay in the delivery of the pledged resources for 2009. Moreover, the Computing Scrutiny Group of the Resources Review Board (RSG) has reviewed the Computing Technical Design Reports and modifications since then and agree with the requests by the experiments for 2009. The ATLAS computing needs differ substantially from those originally envisaged in the Technical Design Report, particularly in the heavier demands on CERN resources, the large event sizes and the proliferation of data formats. The RSG believes that the ATLAS request for CERN resources (which is roughly a factor of two larger than originally requested in terms of both CPU and storage capacity) are largely justified but is concerned about the move away from other Tier-1 centres and urges ATLAS to re-examine the
parameters of their computing model. Moreover, any increase in the allocation of CERN-based computing resources to ATLAS would have to come at the expense of the other experiments, since the total available resources are fixed. In addition, the RSG recommends that ALICE undertake a full assessment of how their physics reach might be affected should the requested computing resources not materialize fully. Finally, the CMS effort to improve the performance and to reduce the event size should be followed by all the experiments as they have a direct impact on the overall computing requirements. The LHCC recommends that the experiments keep their computing models updated as certain of the underlying assumptions might vary. The LHCC also took note of the WLCG software upgrades brought forward due to the earlier-than-expected LHC shut-down period. A mini-review of the WLCG will be conducted during February 2009 session of the LHCC and will be an excellent opportunity to examine these issues in detail.

9. REPORT FROM THE EXPERIMENT UPGRADE REVIEW
The LHCC heard a report on the LHC experiment upgrades. This session focused on the machine-experiment interface, and in particular on the collimation system and on the experimental beam pipes. The session brought very useful interchanges between the machine and experiment groups.

The referees reported on the status of plans for the experiment upgrades. The ATLAS Collaboration has decided that the only feasible option to upgrade its Pixel Detector for LHC Phase I running from 2012-2013 is to install a new, smaller radius beam pipe with an additional pixel layer inside the current B-layer. The ALICE Collaboration has also expressed an interest in a smaller radius beam pipe and Pixel Detector. Over the coming months an assessment will be made by the machine group to determine the minimum beam pipe radius that is realistically achievable with the machine optics and collimation scheme to be envisaged in LHC Phase I running. This is an essential step in establishing the feasibility of the ATLAS and ALICE Phase I pixel upgrade plans.

The referees also reported on various machine issues having a direct bearing on the experiments. The Committee took note of the ATLAS request to realise a spare beam pipe for ATLAS to be used in case of an accident that would spoil the LHC vacuum. This beam pipe would be inserted without removing the Pixel Detector. Moreover, the LHCC took note that additional R&D effort on machine elements such as crab cavities and dipole magnets would be required before proceeding to the Phase-II upgrade of the machine. The Committee noted a request from the machine group that the maximum $\beta^*$ required for LHC physics running after Phase I machine upgrades be specified as soon as possible. The LHCC considers that a forum to discuss regularly upgrade issues between the machine and experiment is now needed. A mini-review of the LHC experiment upgrades is schedule for the LHCC’s next session in February 2009.

10. REPORT FROM THE ALICE MINI-REVIEW
The Committee heard a report from the second ALICE Mini-review concerning the current and foreseen shut-down activities and the general detector performance. Three cosmic-ray runs have been held during the last twelve months and during that period the experiment continued to make very good progress in the detector and DAQ commissioning and in solving the long-standing noise problems.
Forward Detectors
The neutron-proton and electromagnetic Zero Degree Calorimeters (ZDCs) are commissioned and ready for data taking. The T0 detectors were operational for the injection tests and saw the first LHC beams. A time resolution for the T0 detectors of 35 ps was measured, which is within specifications.
Firmware adjustments were needed to synchronize the V0 detector with the LHC clock, and modifications to the electronics have been identified. Noise issues on the A-side will also be addressed during the shut-down. After-pulses in the V0 photomultiplier tubes inducing fake triggers implies lower operating voltages and possibly a multiplicity requirement of at least two hits, rather than one, on each V0 side. The trigger efficiency reduction would then be at the level of 5%. The V0 is an essential component of the ALICE trigger system, and it is therefore very important that it becomes fully operational for first beam in 2009.
Only 25% of the Photon Multiplicity Detector (PMD) was installed and operated satisfactorily. The main reason is that a spark protection system was found to be necessary for its safe operation. All of the PMD modules are expected to be ready for installation before end of March 2009.
The entire Forward Multiplicity Detector (FMD) has been operational with beam. Clean MIP signals were observed at low intensity, and hit densities were derived from the total charge collected up to ~ 150 charged particles/cm². Zero suppression was implemented in the front-end electronics, allowing an accepted trigger rate of 2.7 kHz at 40 MHz.

Inner Tracking System, Time Projection Chamber, and Muon System
Good progress on the Inner Tracking System (ITS) was reported. On average, more than 90% of the ITS channels are working and exhibit a very good performance. The remaining bad connections or dead channels will be fixed during the shut-down. The cooling problems for the Silicon Drift Detector (SDD) and Silicon Strip Detector (SSD) have been solved with the modification and repair of their common cooling plant. New problems regarding the Silicon Pixel Detector (SPD) cooling system were discussed and a solution seems to have been found. Upgrades concerning modifications of the pressure for the SPD cooling system will be carried out during the shut-down.
Very stable operation was reported for the Time Projection Chamber (TPC) over a five-month running period and very good progress in the calibration was achieved. The high-voltage sparks that occurred in the chambers have been identified to be due to impurity in the resistor rods. Modifications to the low voltage power supplies are complete but a new source of noise has arisen and is still under investigation. Repair interventions on the A-side front-end electronics and for the cooling system are scheduled for the next two months.
The main issue regarding the Muon Spectrometer remains the noise measured in the tracking chambers of the Stations 3, 4 and 5. The low frequency noise, roughly 300 Hz, was significantly reduced with the modification of the low voltage power supplies. The origin of the high frequency noise, roughly one MHz, is still unclear. Some fraction of the noise seems to be due to interferences with the Geometry Monitoring System (GMS) located in the same support panel as the tracking chambers. This GMS system is planned to be isolated from the tracking chambers during the shut-down. A repair of the low voltage bus bars on the MANU readout board is underway and expected to be complete in two months. These upcoming failures seem to be due to soldering problems not detectable
before the transportation and the installation of the tracking chambers in the ALICE
cavern.

Remaining Central Region Detectors
One Photon Spectrometer (PHOS) module was installed and operated with reduced
performance at 18°C due to a serious humidity problem. The solution is to equip each
module with an air-tight enclosure flushed with dry nitrogen. The schedule for the timely
repair and completion of the five modules is very aggressive. In addition, noise problems
were observed during the operation of the first module, which also need to be addressed.
The Time of Flight (TOF) detector is mechanically complete, and 17 out of the 18
supermodules (SMs) are flushed with gas. First observations with cosmic data show a very
good efficiency, and triggers were provided by the TOF for the TPC, as well as pre-
triggers for the Transition Radiation Detector (TRD). The time resolution achieved up to
now is 160 ps, but a number of analysis improvements should allow the 100 ps goal to be
achieved. A fix to the problem of DC-DC converters damaged in the magnetic field is
underway.

Four SMs of the TRD have been operational in ALICE with good performance. Two
modules developed gas leaks at an unacceptable level and will be repaired during the shut-
down. The production of all the chambers is close to completion, but there is a new
bottleneck at the level of the Read-Out Boards (ROBs). Some stress between the Multi-
Chip Modules (MCMs) and the ROBs on which they are mounted developed during the
cool-down phase. This problem is apparently due to unwanted changes made by the
subcontractor, as the initial MCM batches did not show any such defect. Negotiations are
underway, and it is clear how to proceed. Given the potentially large delays involved, a
detailed progress report at the LHCC session in February 2009 is expected. With the
available parts, it is foreseen that four SMs could be installed during the shut-down,
leading to a total of eight once the first two are repaired.

DAQ and Trigger Commissioning
The ALICE data acquisition has been assembled to a level of 40% design capacity. Most
detectors were successfully integrated and algorithms have been developed for most sub-
systems and stable operation was achieved with most sub-systems. The system is able to
perform at 400 MB/s sustained recording rate, which should be sufficient for the first
proton-proton run. 3 PB of data was read out in total and 350 TB were transferred to mass
storage. Open issues include problems with the recording speed, which should be
improved with a new version of ROOT. As expected from the commissioning of such a
complex system, there are still occasional crashes due to corrupted data or sub-systems
running out of synchronization. Furthermore, the feedback on data quality monitoring in
the control room needs improvement.

The Central Trigger Processor (CTP) worked well during the cosmic-ray runs. A new
switch was introduced which increases the number of inputs to the CTP. A SPD Level- 0
trigger was introduced. Run-by-run information is now available via a new MySQL
relational database, which also includes scaler settings and further monitoring parameters.

Shut-down Activities
The ALICE schedule was presented for the coming shutdown activities. The main goals
are the modification of the Miniframe services, general repairs for all sub-detectors,
installation of four to six new TRD modules and 2 new PHOS modules. The first EMCAL
module should be ready for installation beginning of 2009. The work on the Miniframe
services will continue until February 2009 on the surface. The purpose of the work on the
Miniframe is to provide an easy access of the TPC A-side without taking out the Miniframe. The modification does not concern the structure of the Miniframe but just the location of some of the ITS patch panels. The Miniframe reinstallation is scheduled for mid-February 2009 and the reconnection of all detectors should be finished by end of March 2009. The modified Miniframe will require new installation procedures for the installation, which will remain a complex operation.

Very recent progress on noise studies shows that the ALICE ventilation unit, used for the ITS and Muon Spectrometer, might have significant noise contributions at high frequencies. The measurement of this noise effect in each detector is underway.

**Overall Conclusion**

The LHCC considers that ALICE has made very good progress in the detector and DAQ commissioning achieved during three periods of cosmic-ray runs. The Committee notes some risk for the timely commissioning of the V0 detector and expresses its concern regarding the readiness of the TRD and PHOS detectors for the 2009 LHC run. It is nevertheless realistic to expect ALICE to be completely ready for the first colliding beams in 2009.

**11. REPORT FROM THE RD39 REFEEE**

The LHCC heard a report from the RD39 referee on the collaboration’s programme concerning the operation of solid-state detectors at low temperatures and in a high radiation environment. The referee summarised the experimental results that RD39 has achieved on the development of such detectors and also described the proposed programme for future work.

The Committee took note of the good progress during 2008 in the study of such cryogenic devices for applications in future high energy physics experiments. RD39 has made considerable progress in characterizing and modeling the new Charge Injection Device (CID) operation mode for heavily-irradiated silicon detectors. The first test beam results with strip detectors operated in CID mode are encouraging and the operation temperatures for these devices is approaching feasible levels for applications in LHC detectors.

The LHCC considers the proposed research programme for 2009, concentrating on test beams on heavily-irradiated CID strip detectors, new micro-strip sensor processing following ATLAS and CMS specifications, and the study of CID suitability for higher temperature operation, to be reasonable.

In order to continue their research programme, the RD39 Collaboration requests support from CERN and from the external funding agencies together with the use of CERN facilities, such as space and access to test beam set-ups. The Committee considers that solid-state detectors developed by RD39 are one of the options for the LHC experiment upgrades and their further development should be taken up by the experiments interested in such a technology. In order to share experiences and infrastructure, the LHCC encourages the RD39 Collaboration to work closely with other R&D projects. In view of the above, the CERN Physics Department agrees to continue providing support in terms of access to common CERN facilities such as laboratories and test beams.

Under the above terms, the LHCC recommends that the RD39 project be continued in 2009. A status report is expected to be submitted to the LHCC in one year’s time.
12. REPORT FROM THE RD42 REFEREE
The LHCC heard a report from the RD42 referee on the Collaboration’s programme concerning the development of intrinsically radiation-hard Chemical Vapour Deposition (CVD) diamond devices. Good progress was reported for the past year. Large dimensions and large quantities of diamond-based detectors are now available. The collection distance is no longer an issue for polycrystalline (pCVD) material and large-area single-crystal (scCVD) has become a reality. Moreover, the understanding of radiation damage is improving. Diamond pixel modules have been prepared and tested for ATLAS. Such modules exhibit low noise, good performance and operate at room temperature and are being considered for use in the ATLAS upgrade plans. Finally, diamond-based beam monitors recorded successfully first beams at the LHC in September 2008.

The LHCC considers the proposed research programme for 2009, concentrating on studies of radiation hardness of diamond trackers and pixel detectors, production of pixel detector modules, beam tests with diamond trackers and pixel detectors and the further characterization of diamond, to be reasonable.

In order to continue their research programme, the RD42 Collaboration requests financial support from CERN and from the external funding agencies together with the use of CERN facilities, such as space and access to test beam set-ups. The Committee considers that diamond-based detectors are one of the options for the LHC experiment upgrades and their further development should be taken up by the experiments interested in such a technology. In order to share experiences and infrastructure, the LHCC encourages the RD42 Collaboration to work closely with other R&D projects. In view of the above, the CERN Physics Department is not in a position to cover the request for funding for 2009, but it agrees to continue providing support in terms of access to common CERN facilities such as laboratories and test beams.

Under the above terms, the LHCC recommends that the RD42 project be continued in 2009. A status report is expected to be submitted to the LHCC in one year’s time.

13. REPORT FROM THE RD50 REFEREE
The LHCC heard a report from the RD50 referee on the collaboration’s programme concerning the development of radiation-hard semiconductor devices for very high luminosity colliders. The referee summarised the experimental results that RD50 has achieved on the development of such detectors and also described the proposed programme for future work.

Good progress was reported for the past year. The Collaboration carried out work which provides confirmation of a planar detector’s suitability for a pixel detector at a future LHC experiment upgrade. Microscopic studies are beginning to provide results, but there is some way to go in gaining a full understanding of defect engineering. The compensating effects of various defects point towards certain technologies to be used for pixel detectors. The LHCC considers the proposed research programme for 2009, concentrating on characterization of irradiation silicon, studies on high-quality double-column 3D devices, further exploration of irradiation effects at higher fluences and the production of epitaxial silicon on FZ substrate, to be reasonable.

In order to continue their research programme, the RD50 Collaboration requests support from CERN and from the external funding agencies together with the use of CERN facilities, such as space and access to test beam set-ups. The Committee considers that
solid-state detectors developed by RD50 are one of the options for the LHC experiment upgrades and their further development should be taken up by the experiments interested in such a technology. In order to share experiences and infrastructure, the LHCC encourages the RD50 Collaboration to work closely with other R&D projects. In view of the above, the CERN Physics Department agrees to continue providing support in terms of access to common CERN facilities such as laboratories and test beams.

Under the above terms, the LHCC **recommends** that the RD50 project be continued in 2009. A status report is expected to be submitted to the LHCC in one year’s time.

14. TEST BEAMS

The LHCC heard a report from the SPS and PS Physics Co-ordinator. Due to the incident at the LHC on 19 September, it was decided to stop the North Area physics programme on 6 October rather than on the scheduled date of 12 November in order to bring forward the start of the LHC in 2009. The long intervention planned for the 2008/2009 shut-down concerns the replacement of cables in LSS2 needed for the extraction from the SPS to the North Area. In general, the LHC test beams worked fine and most groups achieved their goals although they were affected by the shorter running period. The draft SPS and PS accelerator schedule for 2009 has the physics programme at the East Hall starting on 23 April and that at the North Hall on 4 May, with both programmes terminating on 16 November. This is about four more weeks than in 2008. The deadline for submission of beam time requests was end of October 2008 and the 2009 physics programme is being drawn up. The users acknowledge the dedication and assistance of the SPS and PS accelerator, beam and experimental area teams.

15. REPORT FROM THE LHC PROGRAMME CO-ORDINATOR

The LHCC heard a report from the LHC Programme Co-ordinator. He recapitulated the incident of 19 September in LHC Sector 3-4 and summarized the primary repair work, which includes particularly the replacement and repair of dipole and quadrupole magnets as well as interventions on the beam vacuum system (cleaning of the beam pipes, control and repair of the plug-in-modules) and a systematic inspection of interconnects elsewhere in the machine. Issues of safety and access to the LHC experiment caverns are being reviewed in depth as are the running scenarios for 2009 and 2010.

16. REFEREES

The LHCC referee teams are as follows:
ALICE: M. Gonin (Co-ordinator), W. Kuehn, J.-F. Grivaz
ATLAS: J. Blazey (Co-ordinator), C. Cecchi, P. Mato, D. Pitzl
CMS: M. Martinez-Perez, S. Smith (Co-ordinator), R. Yoshida
LHCb: F. Bedeschi (Co-ordinator), C. Hawkes, A. Nomerotski
TOTEM, LHCf, MoEDAL: C. Cecchi, M. Mangano, P. Mato
LCG: J.-F. Grivaz, C. Hawkes, M. Martinez-Perez (Co-ordinator)

Experiment Upgrades:
Co-ordinator: D. Pitzl
RD39: D. Pitzl
17. The LHCC received the following documents:

Minutes of the 95th Meeting of the LHCC, held on 24 and 25 September 2008
LHCC-2008-016; LHCC-095

RD39 Status Report 2008
LHCC-2008-019; LHCC-SR-001

Memorandum to LHC 27 October 2008 from LHCf Spokesperson
LHCC-2008-020 – G-143

18. DATES FOR LHCC MEETINGS

Dates for 2009:
18-19 February
6-7 May
8-9 July
23-24 September
11-12 November (Note change of date made January 2009)
Minutes of the 88th Meeting of the SPSC
Held on Thursday and Friday 4th and 5th September 2008

OPEN SESSION:

1. NA49  
   H. Stroebele

2. NA61  
   M. Gazdzicki

   H. Vincke

CLOSED SESSION

Present:


1. MINUTES OF THE 87th MEETING OF THE SPSC, HELD ON July 15th and 16th, 2008

Approval of the Minutes was postponed to the next meeting of the SPSC.

2. REPORT FROM THE CHAIRMAN

The Chairman reported on the Research Board meeting, RB185.

The following points were presented and, where necessary, discussed:

   1. the appreciation by the SPSC of the establishment of good beam delivery for all data-taking, fixed-target, experiments in 2008;
2. the substantial progress in deep-inelastic $\mu$ spin physics by the COMPASS experiment, in particular towards the publication of the measurements of the polarisation asymmetry in the accessible kinematic domain;

3. the interesting new results concerning the spin-parity analysis of forward diffractive meson production on a heavy nucleus using hadron beam data by the COMPASS experiment, and their indication of good prospects for similar analysis in central production;

4. the appreciation by the SPSC of the huge and successful efforts by both the CNGS crew and the OPERA experiment to establish data-taking in 2008 with an almost complete target mass; henceforth the SPSC considers it to be of top priority to now pursue the maximum delivery of neutrinos to LNGS in the foreseeable future;

5. the impressive progress to establish the T600 LAr module in LNGS and the importance now of securing the remaining infrastructure from industry and LNGS in a timely fashion; and

6. the recommendation for approval by the SPSC of the crystal collimation proposal P335.

The Research Board noted points 1 through 5 above and confirmed the recommendation in point 6 for approval subject to the availability of resources.

The following issues concerned with the CERN fixed-target programme were discussed, agreed and/or noted at RB185:

- CERN funding for the P326 Gigatracker was confirmed for 2008/9.
- A draft of a report on infrastructure required to operate the AD to 2012 was presented.
- In the light of unforeseeable difficulties with beam delivery at the AD this year 2008, it was agreed to run the AD on beyond the foreseen end-date into December 2008.

3. STATUS OF ACCELERATORS

The Status of the Accelerators was presented by presented by L. Gatignon, on behalf of S. Baird who had sent his excuses.

Highlights are since the last SPSC on the 15th of July are:

The successful LHC synchronization tests for beams 1 and 2, and the CNGS intensity, which has now reached 4.2e13 per cycle (2.1 e13 per shot). However, the overall integrated intensity (5.7e18) sent to CNGS so far is still below the initial estimates.

For the LHC synchronisation tests it should be noted that the first test on 8th, 9th & 10th August was done with no physics beams present in the SPS due to a PS septum problem. The second test on 23rd, 24th and 25th August, however, was completed in parallel with both North area and CNGS physics, with minimal interference.

Other issues are:
After the change of Main Magnet Unit 25 in the PS, due to a failed connection of the “figure of 8” loop (as mentioned at the last SPSC), the ion injection from LEIR to PS was not re-installed. This will be done during the coming shutdown.

In July and August the series of PS problems has continued... On the 27th of July there was a fire alarm in the PS Main Power Supply building. This was caused by a spark-gap detector failure (it had exploded). The gap is in place to protect the PS main magnets against a possible power supply over-voltage. After the clean up, it was decided to replace the failed gap with an analog voltage protection system, which was successfully implemented. On the 8th August, just hours before the first LHC injection test, a second fire alarm occurred in the PS tunnel itself. A failed bearing on a large ventilation fan caused this. The bearing could not be replaced and this part of the ventilation system has been left off. It will be replaced during the next Technical Stop in November. This has resulted in an increase in temperature of about 4 degrees over one quarter of the PS tunnel, which is not ideal but is acceptable. The LHC beam start was not delayed but, during the re-start that evening, increased beam losses were seen around the electrostatic extraction septum (SEH31). This is used to supply the CNGS and North area beams to the SPS, but NOT the LHC beam. The leakage current on the device and the vacuum levels had also increased significantly. After further investigation, it was agreed that the septum would have to be changed, which was done the following Monday, after the LHC synchronisation test.

Towards the end of July, at the SPS, there were an alarming number of faults on the SPS 18kV loop and the 18kV supply to TI8 and CNGS. These faults were traced to a faulty cable splicing technique that had been used by the contractor during a recent replacement of the cable. This was found to concern 39 splices. Thanks to a very big effort from TS/EL these suspect splices have now all been replaced. It should also be noted that the high intensity CNGS beam causes repeated trips of the SPS RF system due to the high beam loading. This will need further investigation during the shutdown.

Early in August the AD beam developed some unusual losses (30-40%) at the low energy part of the cycle. This was eventually traced to a vacuum leak on a beam scraper. In order to minimize the repair time, a secondary vacuum has been established around the leak and it will be repaired during the shutdown. It should be noted that although the AD is running well, current performance is around 10-20% below the best levels from 2007. This seems to be due to reduced antiproton intensity at injection.

The PS MTE extraction hardware has all been successfully commissioned with beam, but repeated problems with several PS beam diagnostic and measurement systems (for trajectory, tune and profile measurement) have meant that the MTE cannot be put into physics operation. It is still hoped to use the MTE system for at least a few weeks at the end of September for the SPS North area beam.

At the next SPSC, at the beginning of November, S. Baird will present the main shutdown activities for the accelerators.
4. STATUS OF EXPERIMENTAL AREAS

L. Gatignon reported on the status of the Experimental Areas.

Apart from the machine interruptions mentioned above, the East and North Areas have been running smoothly. In the East Area DIRAC has been taking data regularly since early August with quite a large number of spills available for them. The proton rate per spill was lower than in 2007, about 1e11 ppp, but with the new target the event rate was essentially similar. Over the weekend of September 15th about a day was lost due to ventilation problems in their barrack. The North branch has served quite some users successfully, before it stopped as planned on the 4th of August to leave a maximum amount of cycles available for DIRAC and the T7 Irradiation facility. It resumed operation on the 3rd of September. Just before the stop, the increased beam spot for CLOUD in the T11 beam could be measured, after having increased the gap of the last vertical dipole magnet.

In the North Area COMPASS took data smoothly and the recurrent problem with the access control was finally resolved by mid August. Preparations for the start of the NA62/P326 run, scheduled for the 11th of September, are well under way. Otherwise a large amount of user groups were served with good efficiency of the secondary beams.

Since its physics start on the 1st of July, the AD has been running smoothly until a cryo-pump compressor stopped in early August. After this was repaired, a leak was found on one of the bellows of a scraper. A temporary fix was made, but all four bellows must be replaced over the shutdown. The AD intensity is still a bit lower than the best values reached in 2007: the reason for this is still under investigation.

CNGS runs routinely at more than 4*10^{13} protons per CNGS spill. The integrated proton flux is still low, mainly limited by machine efficiency. Just a few days before the meeting, the filter of the horn water-cooling system had to be swapped to the spare one and the hadron stop sump emptied. This took about two days. The integrated proton flux on the CNGS target at the time of the meeting was about 5.7e18.

5. PS, SPS AND AD SCHEDULES

E. Perez summarised the schedule issues for the PS, SPS and AD.

A series of unlucky events affected the accelerator complex and the users since the last SPSC meeting. Following a magnet incident at the PS mid-July, one week was lost for all users. Early August, a problem with a PS septum prevented the CT extraction, and several days were lost for fixed target physics at the SPS and for CNGS. CNGS suffered from additional down time due to faulty 18kV cables. The users acknowledge the fact that the AB, AT and TS teams did their very best when facing these problems, and that the recoveries were reasonably fast. Re-arrangements and reshuffling of the users schedules for the test beams had to be done. The various groups helped each other such that this reshuffling worked fine.

All in all, most groups were nevertheless able to carry out the most of their foreseen programme.
Updated versions of the PS and SPS schedules are provided regularly, taking into account cancellations and requests for more beam time.

At the PS, the DIRAC experiment started their data taking at full speed on August 5. Beam spot measurements were done at T11 for the CLOUD experiment, which will run next year.

At the SPS, NA61 is completing the installation of their new electronics and testing their PSD. COMPASS completed their calibration and the commissioning of their trigger in early August, and is now in regular data taking mode at essentially nominal intensity with stable and fully optimized conditions.

CNGS runs with nominal intensity, more than 4e13 protons per CNGS cycle. About 0.6e19 protons on target have been collected so far.

AD made a request at the last Research Board (September 3rd) for an extension of their 2008 run, because of a rather inefficient start-up this year (the start-up was delayed because of a magnet problem; AD beam intensities were low at the beginning; and AD suffered as other users from the PS incidents). An extension was granted as long as the PS continues operation for LHC injection.

6. DISCUSSION OF THE OPEN SESSION

6.1 STATUS REPORT OF THE WORKING GROUP ON FUTURE IRRADIATION FACILITIES AT CERN

CERN’s high energy and high intensity beams are fundamental to carry out a broad range of essential radiation related studies.

The SPSC notes the progress of the Working Group, towards a detailed proposal for the implementation of a set of irradiation facilities, well matched to the requirements of the user community.

6.2 NA49

The SPSC notes with pleasure that, since its last Annual Review NA49 has maintained a vigorous analysis program, to fully exploit the physics content of their data set. A number of new results have been published, which contribute significantly to field, and several more analyses are ongoing.

In the light of this, the SPSC encourages NA49 to continue with their plans for publication of \( p+p \), \( p+A \) and \( A+A \) results.

The SPSC recommends continued support for the NA49 data analysis.

6.3 NA61
The SPSC notes with pleasure that the NA61 Collaboration has had a successful pilot run in 2007, and are progressing well with the analysis. The SPSC looks forward to the first physics results from that run.

The SPSC notes the efforts of NA61 to install and commission the necessary upgrades in time for the 2008 run.

7. FOLLOW UP ON EXPERIMENTS AND PROPOSALS

CNGS1 / OPERA

The SPSC congratulates the CNGS team for the successful delivery of high intensity neutrino beam to the LNGS.

The SPSC notes with pleasure the efforts of OPERA to take full advantage of the beam and process their data promptly.

8. ANY OTHER BUSINESS

SPSC Dates for 2009:

The dates for SPSC 90, the first meeting in 2009 are Tuesday and Wednesday 27 and 28 January 2009.

The dates for the other meetings of the SPSC in 2009 will be set at the next meeting, SPSC 89.
9. DOCUMENTS RECEIVED

1. Minutes of the 87th Meeting of the SPSC Held on Tuesday 15 and Wednesday 16 July, 2008; CERN-SPSC-2008-021/SPSC-087.


4. Status report 2008 of the NA49 Collaboration: Status and further analysis plans of the NA49 Collaboration; CERN-SPSC-2008-024/M-764 (arrived late)

OPEN SESSION:

4. NA62/P326: Measurement of $R_K$ E. Goudzovski
5. NA62/P326: Status of the R&D A. Ceccucci
6. NA60 G. Usai
7. OSQAR L. Duvillaret
8. HARP: Results from the HARP CDP Group I. Nefedov

CLOSED SESSION

Present:

H. Abramowicz, S. Baird\(^1\), J. J. Blaising, B. Bloch-Devaux, H. Breuker, T. Carli, J. B. Dainton (Chair), M. Doser, J. Engelen, M. Erdmann\(^1\), A. Ereditato, L. Gatignon, L. Garrido, P. Giubellino, S. Katsanev\(\)\(^a\), J. Knobloch, P. Kooijman, M. Mannelli (Secretary), P. Marage, P. Newman, E. Perez, G. Ridolfi, P. Schleper, U. Wiedemann\(^1\)

Apologies: S. Baird\(^1\), F. Close, M. Erdmann\(^1\), S. Katsanev\(\)\(^a\), U. Wiedemann\(^1\)

\(^1\) Present on Wednesday only; \(^2\) Present on Thursday only

3. MINUTES OF THE 87\(^{th}\) and 88\(^{th}\) MEETING OF THE SPSC, HELD ON July 15\(^{th}\) and 16\(^{th}\), and September 4\(^{th}\) and 5\(^{th}\).

The Minutes of SPSC 87 and SPSC 88 were approved.
4. REPORT FROM THE CHAIRMAN

The Chairman reported on the Research Board (RB) meeting, RB184. The following points were presented to the RB and, where necessary, discussed:

1. SPSC notes again the benefits of refurbishment manifest in the relatively trouble-free start-up to data-taking in 2008, and here records its appreciation of the substantial effort to make this so.

2. In its annual review of the COMPASS experiment, the SPSC
   i) notes the substantial progress in its muon physics programme and looks forward to the publication of the final measurements of the spin asymmetry,
   ii) notes with interest the first results on diffractive meson spin-parity analysis, and
   iii) anticipates first measurements of central meson production including spin-parity analysis with 2008 data.

3. In its annual review of the OPERA experiment, the SPSC here records its appreciation of the achievements by CNGS to be ready to deliver beam reliably in 2008 to LNGS, and of the achievements by OPERA to be ready with almost full target mass to take bulk data in 2008. The SPSC reaffirms its view that the highest priority should continue to be given to achieving good beam delivery and data-taking in 2008 in the CNGS physics programme.

4. In its annual review of the ICARUS experiment, the SPSC notes impressive progress in the preparation of the T600 underground in LNGS. The SPSC shares the concerns expressed by the collaboration that the first data-taking by ICARUS could be dependent on now the completion of infrastructure at LNGS and on the delivery by industry of remaining outstanding components.

5. Following its usual procedures for the scrutiny of proposals, the SPSC recommends approval of the crystal-collimation proposal P335.

The Research Board noted points in 1 through 4 above. The recommendation by the SPSC in 5 above was accepted and confirmed by the Research Board subject to the availability of resources.

3. STATUS OF ACCELERATORS

S. Baird reported on the status of the accelerators.

After the incident in LHC Sectors 3-4, it was decided to advance the shutdown of all LHC injectors by one month to ensure that beam would be available for the LHC as early as possible in 2009. This also means that all fixed target physics programs are now scheduled to start one month earlier than previously planned in 2009.

The shutdown dates are 24th November to 20th February for the PS, and 24th November to 13th March for the SPS.

The MTE equipment in the PS is now fully hardware-commissioned. However, there were long delays with the beam commissioning, due mainly to problems with various PS beam measurements systems. The first MTE beam was extracted in August, but the full two-batch transfer to SPS and CNGS was only tested on the last weekend of the run, and then at reduced...
intensity. It is planned to complete the MTE beam commissioning as quickly as possible in 2009. The existing CT PS extraction scheme will be fully maintained during the shutdown and will be available for CNGS operation in 2009 if needed.

The main activities for the coming shutdown are:

- Finishing the last 9 magnets in the PS main magnet renovation program. As a result, 51 magnets plus 4 spares will have been renovated out of 100 in total.

- Completing the SPS main dipole manifold repairs. The last 90 units out of a total of 235 will be repaired.

- Replacing the irradiated cables in the LSS2 (North area extraction area) of the SPS. This is a major job, as the complete extraction channel has to be removed before the work can start and it is one of the most radioactive areas in the SPS tunnel.

4. STATUS OF EXPERIMENTAL AREAS

L. Gatignon reported on the status of the experimental areas.

The North Area operated well until the morning of the 6th of October, when its operation was stopped to allow for an earlier start-up in 2009.

The user program had been adjusted accordingly and in particular the big experiments had to reschedule a number of runs with special beam conditions. The only breakdown worth mentioning was a short circuit in a main dipole in the H4 beam line that occurred on the first day of the already very short NA63 run. Fortunately an acceptable setting of the beam line could rapidly be prepared without that magnet and NA63 could take advantage of most of its running time.

The East Area operated smoothly since the previous SPSC meeting, with the number of cycles for DIRAC being reduced from up to 7 to 4 or 5 per super-cycle once the North Area had been stopped and the number of CNGS cycles increased. Also the number of cycles for the IRRAD facility was reduced. The test beams have been operating well, serving many users, with some occasional cooling problems for dipole F61N.BVT01, which will be investigated during the shutdown.

The CNGS beam has been operated without major problems. The only interruption was for the exchange of a horn cooling cartridge on October 18th and 19th.

Once the North Area was stopped on October 6th, the SPS was operated almost exclusively for CNGS with one LHC cycle kept in the super-cycle. The duty cycle for CNGS was gradually increased from 37% before October 6th up to a maximum of 83% for the last day of the run. A proton delivery to the CNGS target of about $2 \times 10^{13}$/spill was achieved, which is close to maximum achievable and limited by the RF available. At the end of the CNGS run on
November 3rd the integrated number of protons on the CNGS target was $1.78 \times 10^{19}$, close to the maximum intensity nominally achievable.

The AD has been running well, mostly for the ALPHA, ATRAP and ASACUSA experiments. The beam optics for ALPHA and ASACUSA has been further improved, allowing for better efficiencies at the experiments. The intensity has remained the same since the last SPSC meeting. There is some hope that the replacement and subsequent alignment of the AD target and horn during the shutdown may lead to a slight increase of intensity. The AD4 run took place in week 44 with 500 MeV/c ejected beam. Several AD4 sub-groups were served with good beam conditions and efficiency.

5. PS, SPS AND AD SCHEDULES

E. Perez reported on the schedule of the accelerators for Fixed Target.

The consequences - from the PS and SPS users’ side - of the early stop of the North Area following the LHC incident of September 19th, were reviewed:

The AD run, which was granted (last RB) an extension for 2008 as long as the PS would inject beam into the LHC, finally stops on November 12, as initially scheduled.

The stop of the NA on the morning of October 6, instead of November 12, was a severe cut in the physics programme of NA61, NA62, COMPASS and NA63:

- NA61 had just completed the installation of their new TPC electronics when the incident occurred. Only a few days of data could be taken with the commissioned upgraded system. This allowed establishing that the upgrade is a success (allowing a ten-fold increase of the event rate). The physics data taking is however postponed to next year, and NA61 will need additional beam time in 2009 to compensate for the time lost in 2008.

- NA62 started their 2008 run on September 11. The first two weeks were devoted to taking data for improving the background subtraction of the Ke2/Kμ2 analysis. The second period started on October 2nd, and only a fraction of the tests foreseen (Straw Tracker and Large Angle Veto prototypes) could be done. For the test of the RICH prototype, which was foreseen in November, NA62 will require two weeks of beam time as early as possible in 2009.

- COMPASS was just finishing their π- data taking when the stop was announced. A minimum amount of data (1 week) could be recorded with a positive hadron beam (both polarities being needed for their central production programme). Other tests, necessary for the collaboration to prepare the future steps, could also be done in a considerably reduced version (Drell-Yan, DVCS). The collaboration acknowledges the big efforts made by Experimental Areas team, allowing them to quickly switch the beam conditions several times within a few days.
• NA63 had 5 days out of the 11 days initially scheduled. They were able to observe qualitatively the effect they were looking for, but will need one week in 2009 for systematic studies - in addition to their 3-weeks request.

Other users were affected as well. In particular the CREAM group (Cosmic Ray Energetics and Mass) had their test completely cancelled. The goal was to calibrate a calorimeter before launching it in a NASA's balloon. Since the calibration could not be done, the flight had to be postponed to mid-09. CREAM will need two weeks in 2009, with one test early in the year.

The MonoPix group could at least complete the data taking necessary for defining the architecture of the chip for EuDet, but had to drop other studies (for the vertex detector of STAR, and some resolution studies).

For the SiLC group, an arrangement was found with the ALICE groups, and SiLC could take about one week of data at the T10 beam line in the East Area.

Test-beams were also cancelled for the ATLAS, CMS and TOTEM experiments. Most of them concern tests for SLHC upgrades and can be done in 2009. The test that TOTEM planned with their Roman Pots and their T1 telescope will be done with cosmic muons, which requires some additional work to rotate the whole setup, and which will of course take more time than with the beam.

Some statistics for 2008 were given. The overall SPS efficiency for Fixed Target experiments was about 70% (and about 60% for the CNGS beam). This is lower than in 2007, and largely due to the series of unlucky events, which occurred during the summer. The CNGS run in 2008, which ended on November 3rd, is however a success, with total of $1.78 \times 10^{19}$ protons on target delivered. Approximately 40% of these were integrated during the last month, after the stop of the NA beam, when the number of protons per spill on the CNGS target routinely approached the maximum nominally achievable.

**The SPSC congratulates** the CNGS team for the successful run in 2008.

The draft of the accelerator schedule for 2009 was presented. The start-up of physics at the East Area should happen on April 23rd. Physics at the North Area and the CNGS facility should resume on May 4th. This corresponds to about 4 more weeks compared to 2008.

The deadline to send beam requests for 2009 was on October 31st. So far the number of requests received is similar to that of 2008.

As of January 1st, Horst Breuker will take over from E. Perez as the PS and SPS coordinator.

**The SPSC joined in warmly thanking E. Perez** for her excellent work on behalf of the accelerator user community.

6. **DISCUSSION OF THE OPEN SESSION**

   a. NA62/P326
The SPSC notes with pleasure the rapid progress and high quality of the preliminary results presented for the analysis of the $R_K$ measurement.

The SPSC also congratulates NA62/P326 for the continued progress achieved so far on the R&D and design issues critical for the success of the experiment. The remaining outstanding issue concerns the time resolution of the Giga-Tracker. Two variants of the design have been developed, and subjected to a detailed and successful design review. As a result, the Giga-Tracker is well on track to be tested in the SPS beam with realistic prototypes next year.

Good progress is also being made in further strengthening the Collaboration, and a draft MoU is under discussion, to ensure resources adequate for the needs of the experiment.

In the light of this, the SPSC recommends approval of the P326 proposal, in the expectation of the satisfactory performance of the Giga-Tracker, and anticipating adequate resourcing of the Collaboration.

b. NA60

The collaboration continues to publish interesting new physics results.

The SPSC reaffirms its recommendation for continued support of the NA60 analysis program.

Preliminary ideas for a possible next generation experiment were also presented.

6.3 OSQAR

The SPSC congratulates OSQAR on the results of their axion regeneration experiment, which have now been accepted for publication (to be checked).

The SPSC notes that circumstances beyond the control of the OSQAR collaboration have limited the progress that could be achieved in 2008.

The SPSC also notes that a substantially revised configuration for the VMB measurement has been presented.

6.4 HARP

The SPSC notes the refusal of the HARP collaboration to participate fully in the Open Session as requested as part of their Annual Review. The SPSC asks its Chair to communicate its displeasure to the collaboration.

The SPSC is critical of the publication of several results based on one of the two analyses of the HARP large angle data, given that significant discrepancies remain with the second analysis of those data.
It is now manifest that unfortunately the parties involved have failed to resolve these issues internally to HARP, as would normally be expected of a functional collaboration, and that the results of these two analyses will be published independently of each other.

Comparisons of the $\pi^+$/\$pi^-$ production cross-sections from the two analyses have been reported to the SPSC. A substantial $\pi^+$/\$pi^-$ production asymmetry is observed in the published analysis, which is not present in the second analysis. The authors of the second analysis point out that, such an asymmetry could at least in part be attributed to the Pt bias found by the Review Committee called by the main Funding Agencies, CERN and INFN. This effect alone, however, most likely cannot fully account for the discrepancies in the two sets of results, and to do so a more detailed and common evaluation by the collaboration would be required.

The SPSC considers its review process for the HARP experiment to be concluded.

7. FOLLOW UP ON EXPERIMENTS AND PROPOSALS

7.1 CNGS1-OPERA

The SPSC congratulates the CNGS team for the very successful delivery of high intensity beam in 2008.

OPERA is fully operational, and the physics analysis chain is operating efficiently.

7.2 CNGS2-ICARUS

The SPSC notes the substantial advances made towards the completion of the ICARUS detector.

The SPSC notes that inadequate design of the liquefier plant by the industrial partner responsible for it will result in a delay of approximately four months. ICARUS now plans to be ready for data taking by May of 2009.

8. A.O.B.

SPSC Dates in 2009:

- Tuesday and Wednesday January 27 and 28
- Thursday and Friday April 16 and 17
- Tuesday and Wednesday June 30 and July 1
- Tuesday and Wednesday September 29 and 30
- Tuesday and Wednesday November 24 and 25
9. DOCUMENTS RECEIVED

1. Minutes of the 88th Meeting of the SPSC held on 4-5 September 2008; CERN-SPSC-2008-029 / SPSC-088.


3. NA60 Status Report; CERN-SPSC-2008-032 / M-767.

4. Status of the Ke2/Kmu2 measurement at the NA62 experiment; CERN-SPSC-2008-031 / M-766.


9. Proposal to perform a testbeam run at CERN to characterise the T2K ECAL. CERN-SPSC-2008-025/ P-336.
OPEN SESSION
Monday 3 November 2008 at 13:30 h, Council Chamber

The Chairman of the INTC, Mark Huyse, opened the meeting and introduced the new members of the Committee, Patricia Roussel Chomaz and Nigel Orr, and thanked the previous members Yorick Blumenfeld and Philippe Chomaz. He congratulated everybody involved in the Physics program at ISOLDE for the so far successful running period with still a few more experiments to take place. He then announced the agenda of the open session.

ISOLDE Technical Report
The AB-ISOLDE representative for the INTC, Mats Lindroos, summarized the technical activities during the running period 2008. One of the main problems in 2007 was the increase in activated air being released through the stack of ISOLDE, which led to a decrease of the proton beam current to 1 μA in order to stay below the allowed limit of activated air. Several tests had been done in the shutdown and in the beginning of the 2008 running period in order to solve this problem. After the change of the ventilation direction in the target zone and additional measurements, the observed amount of activated air was finally comparable to previous data and a new limit of activated-air release of 650 kBq/m³ was put in place to have again a maximum of 2 μA of proton beam current on both target stations.

A new tape station system was installed at the LA2 beam line (in collaboration with IPHC Strasbourg), which will be tested in parallel to the present ISOLDE tape station for commissioning and calibration. The Committee was also informed on the successful operation of the new ISCOOL cooler and buncher, which has a transmission efficiency of more than 80% for nuclide masses above A=40. The device has been fully integrated into the existing control system, with the vacuum controls still to be added. In the shutdown a new rf amplifier will be installed for better performance in case of the very heavy nuclides. Also the bunch-mode operation was very successful this year and further tests are planned in the future.

The REX-ISOLDE campaign 2008 had seven runs with some new milestones, i.e. the first carbon beam, ⁶¹Fe isotopes produced by in-trap decay of ⁶¹Mn in the EBIS and post-accelerated for MINIBALL, ²⁰²,²⁰⁴Rn as heaviest radioactive isotope so far, and a 10-day long
$^{30}$Mg run for two-neutron transfer with a tritium target at MINIBALL. The total efficiency for the low-energy part of REX-ISOLDE was partly above 10%, for the heavy masses about 5%. The Committee was also informed that in the shutdown some elements of the REX-ISOLDE beam line will be modified in order to improve the beam transport. Furthermore, the rf-room cooling will be improved and the REX-TRAP consolidation is ongoing. Also the pulsed injection from the ISCOOL RFQ into REX-TRAP was tested which also allowed one to further test the mass resolution in REX-TRAP. For the HIE-ISOLDE project a short report on the HIE-LINAC design was then given. It is planned to have a staged construction to avoid interruption of the beam delivery and the first results on the cavity development are expected in February 2009.

Finally, an overview on the target and ion-source development was presented. A new FEBIAD ion source showed an up to 10 times higher ionization efficiency for noble gases and new nano-grained target materials like Y$_2$O$_3$ led to higher production yields for $^{72}$Kr and $^9$C. Also the new solid state lasers gave higher ionization efficiencies and showed a reliable operation throughout the year. New schemes have been tested and others improved. About 60% of the RILIS operation in 2008 was covered by the new solid state lasers. The Committee was informed that end of the year a large number of AB/ATB-IF group members will leave (end of PhD or retirement) and only a few new group members could be welcomed. Without further manpower the target and ion-source development might be hampered next year.

**ISOLDE Physics Report**

The ISOLDE Physics Coordinator, Alexander Herlert, gave an overview of the schedule and the running period 2008. The CERN accelerator schedule of 2008 allowed one to have 27 weeks of on-line physics runs at ISOLDE with protons from the PS Booster from May 5 until November 12. The stop of the ISOLDE facility is planned for December 5 in order to include some off-line tests and runs before the Christmas shutdown.

For the 2008 on-line schedule, 470 approved RIB shifts were left after the 2007 running period and in the February meeting another 231 RIB shifts were approved giving in total 701 RIB shifts which could be requested. The additional 120 RIB shifts from the May INTC meeting were not taken into account for scheduling. In total 551 RIB shifts were requested by 46 ISOLDE experiments from which 358 RIB shifts could be scheduled for 31 experiments (some with different beams). Additional shifts were reserved for target and ion-source development and machine development for REX-ISOLDE and the new ISCOOL RFQ cooler and buncher. Especially for the ISCOOL buncher an additional day for the setup of each target was added to the HRS schedule.

After a difficult start of the running period (as presented at the last meeting) most of the experiments in 2008 were successful and some used for the first time the bunched beam from the ISCOOL device. In 15 runs the RILIS was used with in total more than 2000 hours of RILIS operation for the year 2008. It was pointed out that the new solid state lasers were operational and showed a higher ionization efficiency. For REX-ISOLDE seven runs were scheduled and five of those were very successful, mainly Coulomb excitation experiments and for the first time the application of two-neutron transfer. Besides the busy on-line runs, several on- and off-line tests had been pursued including in-trap decay and mass-resolving tests in REX-TRAP. In general, the performance of the targets was very good. However, some
technical problems and broken target units led to the loss of beam time. The final numbers for the 2008 campaign will be given at the next meeting.

The Committee was then informed on new and closed ISOLDE experiments. The following experiments were closed by the users: IS360, IS386, IS412, IS421, IS428, IS436. The experiment IS406 was closed by the INTC after evaluation of the submitted status report. In 2008, 12 new experiments have been approved by the Research Board so far: IS465-IS476. In addition new experimental setups will be installed at ISOLDE during the upcoming shutdown period: the CRIS beam line for laser spectroscopy and a beta-NMR setup for the investigation of polarized beams.

The Physics Coordinator concluded with an overview of the RIB shift evolution over the last years. There seems to be an upwards trend for proposed and approved INTC RIB shifts over the last years. While the total number of remaining approved shifts has declined in the last years down to 700 shifts in the beginning of 2008, the number of requested RIB shifts increased significantly in 2008 as compared to the last three years. The number of delivered shifts is stable at around 300 shifts whereas the number of scheduled shifts declined slightly in the last two years, mainly due to the installation and machine development for the ISCOOL buncher. The draft schedule for the CERN accelerator complex for 2009 foresees a running period of about 31.5 weeks for ISOLDE, starting on April 6, 2009. Thus it might be possible to schedule more experiments as compared to 2008 (if resources are available) and to avoid a possible backlog of shifts.

n_TOF Status Report

The n_TOF representative, Paolo Cennini, gave a status report on the new n_TOF target and the planned startup. He presented a list of milestones towards the restart of the facility which is planned in 2008. This included the removal of the old target unit and a detailed investigation. The main problems seemed to be pitting corrosion at the region of the proton impact, mechanical instability of the separate lead blocks due to the modular assembly, and insufficient cooling due to hindered water flow caused by the target shape.

The pitting corrosion problem was studied in detail, especially the water chemistry at high temperatures which leads to a change of the oxidation state of Pb and therefore to the formation of hydroxides. All data obtained with the previous target helped in the understanding of the target degradation and to have a better design of the new target, especially with respect to the improvement of the target cooling.

The conceptual design, which was subject to an external panel review, foresees a new pressurized vessel which is lowered into the existing pool. The cooling water is provided from the top and should circulate with a much better flow to allow for a better cooling. In addition, an additional moderator is planned at the exit side of the target. The new target design was then studied in different simulations, also with respect to activation by the proton beam.

The Committee was informed on the present status of the installation of the new target at the PS complex. For the first tests the target area ventilation will not be implemented in agreement with CERN Radioprotection. It is foreseen to have the full ventilation system running after the shutdown 2008/2009. In conclusion, the facility is ready to take the first test beam in 2008.
The following proposals, addenda and status reports were then presented:

1. CERN-INTC-2008-035 and INTC-P-249, *n_TOF: New target commissioning and beam characterization*, José Luis Tain

2. CERN-INTC-2008-037 and INTC-P-250, *Charge radii of magnesium isotopes by laser spectroscopy: a structural study over the sd shell*, Deyan Yordanov

3. CERN-INTC-2008-038 and INTC-P-251, *The role of In in III-nitride ternary semiconductors*, Katharina Lorenz

4. CERN-INTC-2008-039 and INTC-P-252, *Coulomb excitation of neutron-rich $^{28,29,30}$Na nuclei with MINIBALL at REX-ISOLDE: Mapping the borders of the island of inversion*, Peter Reiter

5. CERN-INTC-2008-041 and INTC-P-253, *Measurement of the magnetic moment of the 2$^+$ state in neutron-rich radioactive $^{72,74}$Zn using the transient field technique in inverse kinematics*, Andrea Jungclaus


CLOSED SESSION

Tuesday 4 November 2008 at 8:30 h, room 60-6-002


Apologies: J. Billowes, Ch. Scheidenberger, N. Orr

1. INTRODUCTORY REMARKS

The Chairman opened the meeting and welcomed the new Committee members Patricia Roussel Chomaz and Nigel Orr, who replace Philippe Chomaz and Yorick Blumenfeld. He continued with a report from the Research Board meeting which took place on May 28, 2008. All experiments and RIB shifts recommended in the last INTC meeting have been approved. The Committee was also informed on the discussion of the status of the waste disposal of old target units and that 60 more free places are available at the ISR area, which will be sufficient for at least two more years of ISOLDE operation. As there is no means of dismantling the old target units, a plan for the longer term waste management should be put into place, e.g. the installation of a hot cell. It was also pointed out that CERN management requested a written report on the status of HIE-ISOLDE, as 50% of the required external funds have been collected. Mats Lindroos was asked by the ISOLDE Collaboration to coordinate the writing and the report should be submitted for the next Research Board meeting in December 2008.

The provisional dates for the upcoming INTC meetings were then fixed:

- 16 - 17 February 2009
- 18 - 19 May 2009
- 16 - 17 November 2009

The Chairman introduced the procedure to the new members and reiterated that solely a unique and well founded physics case should be taken as a criterion to recommend RIB shifts. The number of RIB shifts might be reduced and discussed, taking into account recent yield information and radioprotection or other safety issues. The priority or ordering of experiments is not to be discussed at the INTC.

It was pointed out by the Committee that downloading of INTC documents was rather difficult, especially after changing the login procedure of the CDS system. The INTC Secretary will look into this problem until the next meeting.

2. MINUTES OF THE LAST INTC MEETING

The minutes of the 31st INTC meeting held on 19 and 20 May 2008 were approved without amendments.

3. REPORT ON COMPLETED AND INACTIVE EXPERIMENTS

The status of inactive experiments was discussed including the status of the MISTRAL experiment (IS436). The Committee was informed and took note that the Spokesperson of MISTRAL, David Lunney, had submitted a status report (CERN-INTC-2008-033/INTC-SR-011) with which he closed the experiment. In addition, the experiment IS421 was closed by
the Spokesperson Ari Jokinen before the November INTC meeting. The ISOLDE Physics Coordinator then gave an overview of further inactive experiments and the INTC decided to close the following experiments:

IS419 (P171: Measurement of Gas and Volatile Elements Production Cross Section in a Molten Lead-Bismuth Target)

IS423 (P172: Coulomb excitation of a neutron-rich $^{88}$Kr beam-search for mixed symmetry states)

4. STATUS OF ISOLDE

The Committee took note on the successful physics program at ISOLDE. The ISOLDE physics coordinator reviewed the RIB shift evolution in the last years and the Committee expressed some concern of a possible backlog of shifts in the future. The Committee was informed that in 2009 the running period will be longer and more experiments can be scheduled. The situation will be again discussed in the next meeting as beam time requests will be available and a more accurate assessment can be done. It was decided that the Committee will still judge submitted proposals solely on the physics case and feasibility. The ISOLDE Physics Coordinator shall report on the shift evolution and the shift backlog in the following meetings and further action by the Committee will be discussed upon the results.

5. STATUS OF N_TOF

The Committee took note on the status report and is looking forward to the first tests with the new target. It was pointed out that the performance of the facility, after the long stop and the installation of the new target unit with all its changes, has to be tested before new physics experiments can be performed. The Committee was further informed that the present cooling circuit is not the final version and that for the first test this year a reduced proton beam intensity is foreseen in accordance to an agreement with the Radioprotection group. During the following shutdown the full ventilation system will be installed to allow n_TOF the operation at full intensity. The Committee showed concern on the availability of proton pulses for the envisaged tests and already approved n_TOF experiments and whether running n_TOF will have an impact on the number of protons delivered to ISOLDE.

6. DISCUSSION ON THE OPEN SESSION AND ON LETTERS OF INTENT

The proposals presented during the open session as well as submitted letters of intent were then discussed:

CERN-INTC-2008-035/P-249, n_TOF: New target commissioning and beam characterization

The proposal aims at the test and the characterization of the new target which was recently installed at the n_TOF facility. The new target is ready for initial tests in 2008 and for full operation next year. All experiments which will be carried out at n_TOF in the future require a full characterization of the target, i.e., a measurement of the neutron yield, fluence, beam profile, etc. The Committee thus pointed out the importance of these first calibration measurements and that only the physics aspects would be taken into account - any safety aspect should be discussed separately. The proposed tests are similar to the ones done for the previous target unit and it is planned to compare the results with simulations. Especially the
test of a new extra moderator and to find the best material requires additional beam time. The Committee recommend for approval by the Research Board a total number of $2.45 \times 10^{18}$ protons for the planned tests as indicated in the proposal. In addition, the Committee encouraged to perform simulations as vigorous as possible to fully understand the target behavior and a status report is requested once the target tests are complete.

CERN-INTC-2008-037/P-250, Charge radii of magnesium isotopes by laser spectroscopy: a structural study over the sd shell

The experiment proposes to measure the charge radii of Mg isotopes. The Committee found the physics case of high interest and the experimental method well founded. It is planned to apply two complementary techniques, fluorescence and beta-NMR detection, for which the COLLAPS group has a strong experience. The Committee decided to recommend for approval by the Research Board 10 shifts for the neutron deficient Mg isotopes and 2 additional shifts for the neutron-rich Mg isotopes, which will be added to the already approved 12 shifts of IS427. The Committee strongly suggested to analyze the data with respect to the shell model aspect and encouraged in general to ask for further theoretical support to obtain a broader view on the results.

CERN-INTC-2008-038/P-251, The role of In in III-nitride ternary semiconductors

The proposal is directed towards the investigation of the role of In in the efficiency of luminescent devices based on group III-nitride ternary semiconductors. The Committee found the physics case interesting and well founded, especially with respect to the unusual temperature behavior in the PAC measurements. However, it was pointed out that for these systems some work was already done in the past. Nevertheless, novel results are expected as previous experiments concentrated on only one case. The envisaged experiments could shed a light on the question whether In is indeed the cause of the luminescence mechanism. It is also of importance to investigate the after-effects of electron capture and to test if it is more an artefact of the measurements technique. The Committee recommended for the approval by the Research Board 20 shifts and requested a status report after the successful data taking in order to request additional 8 shifts for the $^{111m}$Cd beam if required. The Committee strongly suggested to check for the possibility of efficient beam sharing with other experiments.

CERN-INTC-2008-039/P-252, Coulomb excitation of neutron-rich $^{28,29,30}$Na nuclei with MINIBALL at REX-ISOLDE: Mapping the borders of the island of inversion

The aim of the proposed experiment is to study the properties of neutron-rich sodium nuclei related to the island of inversion using Coulomb excitation at REX-ISOLDE. The Committee found the physics case well founded and the expected results on the single particle structure are needed as present calculations are not satisfactory. The proposed Na isotopes are the best candidates to provide the required information. The Committee pointed out that in the case of $^{28}$Na a measurement of a 55-keV gamma-ray transition is needed, which might require additional detectors. However, as shown before, the measurement at these low energies should be possible with the presently installed Ge detectors of MINIBALL, especially due to the low background at REX-ISOLDE. The Committee recommended for approval by the Research Board 24 shifts.
The proposal intends to determine the sign and the magnitude of the g-factors of the first $2^+$ states in $^{72,74}$Zn for which Coulomb excitation and the transient field technique will be applied. The envisaged method is the same as used in the experiment IS415, which asked for an addendum at the present meeting. The Committee found the physics case for Zn as very important since various model predictions are not conclusive. The experimental method should be sensitive enough to obtain information on the single particle structure and to constrain the model space and to disentangle different theories. Compared to the other proposed experiment on Xe isotopes, the energy range just below the Coulomb barrier is advantageous. The Committee found the measurement technique very interesting and of importance for future experiments at REX-ISOLDE. If was also stressed that this technique is complementary to a recent experiment on $^{72}$Zn at GANIL as the energy ranges are different. The yield for the proposed Zn isotopes and the REX-ISOLDE efficiencies were considered to be too conservative and the number of shifts was reduced to accommodate recently obtained values. The Committee decided to recommend for approval by the Research Board 21 shifts.

CERN-INTC-2008-040/P-166-ADD-1, Magnetic moments of Coulomb excited $2^+_1$ states for radioactive beams of $^{132,134,136}$Te and $^{138}$Xe isotopes at REX-ISOLDE

The aim of the proposed experiment is to continue the measurement of g-factors of the first excited $2^+$ states of Te and Xe isotopes using the Transient Field method. This proposal is similar to the one presented for Zn isotopes (P253) and the Committee found the physics case well motivated, especially since theoretical predictions deviate quite a lot. The experimental method using MINIBALL detectors in order to be sensitive to the angular distribution is very nice, however, it would be better to have Compton suppression. The Committee expressed some doubts on the experimental setup, especially on the sensitivity to the choice of the material thicknesses but it was concluded that it is very important to test the experimental technique in addition to previous measurements with stable beam. The Committee recommended for approval by the Research Board 6 shifts in addition to the 6 remaining shifts in order to finish the measurements program for $^{138}$Xe and strongly suggested to submit a new proposal for the Te isotopes, especially for the case of $^{132}$Te, in which the physics results for the Xe isotopes should be presented as well as results on yield checks for Te isotopes.

CERN-INTC-2008-044/P-235-ADD-1, Addendum to the ISOLDE Proposal IS466: Identification and systematical studies of the Electron-Capture Delayed Fission (ECDF) in the lead region, Part II: ECDF of $^{178,182}$Tl

This addendum to the proposal P-235 asks for a continuation of the investigation of electron-capture delayed fission (ECDF) in the mass region of neutron-deficient Pb isotopes. ECDF is a very appealing method to determine fission parameters for the envisaged mass region: the mean kinetic energy mass distributions and the fission barrier heights. The Committee pointed out that in the original proposal it was foreseen to measure $^{178,180,182}$Tl, but during the scheduled run $^{180}$Tl was investigated only, as asymmetric fission was observed being considered as a new phenomenon. The Committee took note on the obtained results, however,
pointed out that it is not unexpected to observe asymmetric fission since high spin states are populated. The Committee further stressed, that it was not clear from the presented results, if the yield for $^{178}$Tl will be large enough to get sufficient statistics and if the observed asymmetric fission can also be clearly identified for low statistics. Nevertheless, the physics case is very interesting and with the planned measurement of the hyperfine structure the spin can be determined which is important to conclude on the obtained results. The Committee decided to **recommend** for approval by the Research Board **16 shifts** and suggested to concentrate on the case of $^{182}$Tl rather than $^{178}$Tl.

**CERN-INTC-2008-034/I-079, g-factor measurements at REX-ISOLDE**

The presented letter of intent aims at the installation of a new experimental setup to perform measurements of g-factors of isomeric states in exotic nuclei. The Committee found the envisaged experimental program of high interest, although no real example for a future measurement was given in the letter. The Committee **endorsed** the letter of intent and supported the installation of a test setup. The ISOLDE Physics Coordinator was asked to check the allocation of space behind the REX-LINAC in the upcoming shutdown and the next running period as the new setup should not hamper other approved REX-ISOLDE experiments.

**7. DISCUSSION ON LETTERS OF CLARIFICATION**

In addition to proposals, status reports and letters of intent, letters of clarification were submitted in order to address questions raised by the Committee in previous meetings on already submitted proposals.

**CERN-INTC-2008-036/CLL-003, Approaching the r-process "waiting point" nuclei below $^{132}$Sn: quadrupole collectivity in $^{128}$Cd - Letter of Clarification**

The original proposal P226 asked for $^{128}$Cd beam in order to study the quadrupole collectivity with the MINIBALL detector array using safe Coulomb excitation and to measure the transition strength B(E2) between the ground state and the first excited 2$^+$ state. The physics case was endorsed in the May meeting of the INTC, however, the Committee had asked for a yield check for $^{128}$Cd before shifts could be recommended. The yield measurements were performed in May 2008 for a UC$_x$ target equipped with a quartz transfer line for alkali metal suppression. From these data it was concluded that the initial yield estimate was realistic and sufficient to do the experiment at REX-ISOLDE. The Committee thus decided to **recommend** for approval by the Research Board **24 shifts**.

**CERN-INTC-2008-042/CLL-004, $^{72}$Kr beam development for Shape determination in Coulomb excitation of $^{72}$Kr**

In the proposal P228 a $^{72}$Kr beam was requested to perform measurements at MINIBALL related to the determination of the shape of low- and high-lying states. In the INTC meeting of May 2007, the Committee had decided to endorse the physics case and supported the development of a sufficiently intense $^{72}$Kr beam at ISOLDE. Several off-line and on-line tests in 2008 were performed, including also the new target material Y$_2$O$_3$ and an improved MiniMono ECR ion source. With the measured yields the experiment seems to be feasible and the Committee decided to **recommend** for approval by the Research Board **30 shifts**.
CERN-INTC-2008-043/SR-012, Status report: Shape coexistence measurements in even-even neutron-deficient Polonium isotopes by Coulomb excitation using REX-ISOLDE and the Ge MINIBALL array

This status report, which is rather a letter of clarification, summarizes the tests that were performed in 2008 to study the release and yield characteristics of Tl in order to obtain a pure Po beam for the envisaged proposal P247. This proposal is directed towards the investigation of shape-coexistence in $^{198,200,202}$Po using MINIBALL and safe Coulomb excitation. In the INTC meeting in May 2008 the Committee had endorsed the physics case but requested a test of Po and Tl yields as well as their release properties. The obtained data confirm the feasibility of the proposed experiment and the Committee thus decided to recommend for approval by the Research Board 27 shifts.

Out of the 203 radioactive beam shifts requested to the INTC a total of 180 have been recommended for approval by the Research Board.

8. DATES OF NEXT MEETING

The next INTC meeting will take place on Monday 16 and Tuesday 17 February 2009. The deadline for submission of proposals is Monday 19 January 2009.

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