Minutes of the 95th Meeting of the SPSC
Held on Tuesday and Wednesday January 19th and 20th 2010

OPEN SESSION:

1. AD2 - ATRAP  
   G. Gabrielse

2. AD3 - ASACUSA  
   R. Hayano

3. AD5 - ALPHA  
   J. Hangst

4. AD6 - AEGIS  
   M. Doser

5. AD4 – ACE  
   M. Holzscheiter

CLOSED SESSION

Present:

S. Bertolucci, P. Bloch, B. Bloch-Devaux, H. Breuker, M. Charlton, O. Cremonesi, 
A. Ereditato, E. Falk, L. Favart, L. Feld, E. Gallo, L. Gatignon, L. Garrido, P. Giubellino, 
M. Gonin, S. Katsanevas\(^2\), J. Knobloch, M. Mannelli (Secretary), S. Maury, P. Newman, 
E. Rondio, C. Touramanis, C. Vallée (Chairman), U. Wiedemann

Apologies: F. Close, P. Collier, A. Denig

1) Present on Tuesday only
2) Present on Wednesday only
1. MINUTES OF THE 94th MEETING OF THE SPSC, HELD ON NOVEMBER 24th and 25th 2009

The Minutes of SPSC 94 were approved.

2. REPORT FROM THE CHAIRMAN

The Chairman welcomed the new members of the Committee, and thanked the outgoing members for their dedication and contributions over the past years.

The Chairman reported on the Research Board (RB) meeting, RB190. The SPSC presentation to RB190 covered both SPSC meetings 93 and 94 since no RB was organised between these. The following points were presented and, where necessary, discussed:

2.1 The SPSC reported the good progress of the NA48, NA49 and NA60 experiments in the analysis of their complete data sets, and recommended continued support to these analysis efforts.

2.2 The SPSC presented the promising preliminary results of the NA61 Collaboration on hadron production in proton collisions, and expressed its recommendation that the preparation of the ion scan be performed, by setting up the methods to produce light and intermediate ions with secondary and primary beams.

2.3 The SPSC highlighted the improved measurement of the $R_K$ ratio by the NA62 Collaboration, and its good progress towards a TDR for the measurement of double neutrino K decays.

2.4 The SPSC reported the good progress of the CAST experiment towards completion of its pressure scan for the solar axion search, and discussed the plans of the OSQAR experiment on regeneration and birefringence studies.

2.5 The SPSC recommended that the proponents of the LOI related with the W mass at LHC present their arguments in the relevant forums and gather a significant experimental Collaboration before their case can be discussed in the SPSC.

2.6 The SPSC highlighted the promising results of the UA9 Collaboration for crystal collimation and their plans for the future.
2.7 The SPSC presented the request of OPERA for a formal extension of the CNGS beam until 2012, and expressed its support to OPERA's demand for nominal integrated beam intensity from 2010 onwards.

2.8 The SPSC reported on the updated plans of the PAX Collaboration and recommended that they first perform spin-filtering measurements at COSY before their plans at the AD be further reviewed by the SPSC.

2.9 The SPSC expressed its strong support to the ELENA proposal and its encouragement to proceed towards a detailed TDR and full funding of the project.

2.10 The SPSC recognised the need for the GIF++ facility and expressed its recommendation to further optimize the design and location of the facility.

The Research Board noted points 2.1, 2.3, 2.4, 2.6 and endorsed points 2.5, 2.8 and 2.10. Concerning point 2.2 the secondary beam test for Boron will be done, but further actions towards FT light ion running are pending manpower evaluations related to the LHC injectors upgrades.

Concerning point 2.7, CNGS beam extension was granted until 2012 but the delivered intensities will still need to be discussed within the overall POT arbitration process. Concerning point 2.9, the RB acknowledged the scientific motivation for ELENA but postponed its formal decision on the project to the June 2010 RB.

3. STATUS OF ACCELERATORS

S. Maury reported on the status of the Accelerators.

Since the last SPSC of the 24th and 25th November, when the end of the non-LHC physics run on November 23rd 2009 was reported, the injector complex kept running exclusively for filling the LHC until the 16th of December, with a few targeted exceptions such as the AD and the CLOUD prolongations until December 7th and the preparations for an AMS run in the North Area.

During this time, the LHC had a successful run with collisions at both the injection energy, and with beams of 1.18TeV/c, the highest ever reached by any accelerator in the world.

The Linac2 operated without any major problem both for non-LHC and for LHC physics. Minor interruptions included the power cut on the Meyrin site on December 2nd, which caused a stop of several hours, and a problem with the primary and ion vacuum pumps. The primary pumps have been replaced. During the short shutdown from December 17th
to January 29th, in addition to the normal maintenance work, the proton source and the ion pumps on the RFQ will be exchanged.

The Booster also operated with only minor problems, such as the intervention on the superheated water and door interlock. The power cut on the Meyrin site has also perturbed the operation and caused several hours of stop.

In addition to the normal maintenance, the 19kV power cable, which has been in operation for 30 years and is close to its thermal limits, will be reinforced.

Several problems disturbed the PS operation, such as the cooling pump of the injection septum, which was replaced, the interruption of the B-train distribution, and of course the site-wide power cut. A stop of about 12 hours on November 25th was caused by a vacuum leak on a wire scanner in straight section 54, which was finally removed from the ring. This missing wire scanner has slowed down the progress of the studies on the Multi-Turn Extraction (MTE).

For the MTE only about 17% of the intensity was trapped in the islands while about 30% was trapped in the core. This large difference of the population between the islands and the core caused losses during the acceleration in the SPS.

During the commissioning microwave instabilities were found to occur after the de-bunching, which caused a part of the beam to loose energy. Due to this effect, a part of the beam did not cross the separating resonance, and thus was not trapped in the islands. After keeping the beam bunched until a few ms before extraction and introducing a noise at fixed single frequency, the situation of the different population was then improved. With the introduction of a frequency swipe around the betatron frequency the situation was further improved, and finally 20% of the beam could be trapped inside each island as well as in the core.

It is planned to resume the beam tests as soon as the machines are back in operation and to confirm the good performance obtained in December, in order to then deliver the beam to SPS for additional studies. The intensity should then be increased towards SFTP1RO and CNGS nominal values. Data about losses on the septum 16 have been recorded and the conclusions of the analysis will be crucial to understand how to proceed with MTE this year.

The PS shutdown has started on January 4th and the restart of the complex will be on February 1st. In addition to the normal maintenance the broken wire scanner will be exchanged and all septum magnets (SMH16, SMH57, SEH23 and SEH31) will be replaced.

Apart from the 18kV power cut on the Meyrin site, which caused a 13 hours beam stop, the main problems encountered on the SPS were RF related. The beam was delivered for AMS setting-up on Thursday and Friday December 3rd and 4th. Unfortunately, due to problems internal to the AMS experiment, the January run was finally cancelled.

During the short shutdown, in addition to the normal maintenance about 7 magnets will be replaced, the UA9 experiment be upgraded, the RF amplifiers will be revised and TT41 (the CNGS transfer line) will be re-aligned mainly in the vertical plane.
A visual and audio inspection of all magnets of the LHC injector chain (from Linac2 to LHC) has been organized.

The approval of the 2 weeks extension prolonged the AD operation until the 7th of December. The physics was perturbed by a series of tests on the fire detection system, which caused the trip of electron cooling system. A 14 hours stop on November 21st was due to the exchange of the broken filament of the electron cooling and the time necessary for the reconditioning. The AD physics also suffered of the Meyrin site power cut when one day was necessary for the full recovery.

The shutdown started the 7th of December and the restart is planned for the 22nd of March. In addition to the normal maintenance, the repair of TT6 drainage and the renewal of the electronics of the electron cooling system, which is a part of the AD consolidation, are foreseen. AD physics will restart the 10th of May having a gain of 2 weeks compared to 2009.

In conclusion, the main problem, which affected the entire injector complex, was the Meyrin site-wide power cut.

The restart of the injectors in a mode dedicated to the LHC filling will be the February 1st. Once all the LHC beams will be ready, the MTE commissioning will be resumed in order to confirm the good results obtained last year. The non-LHC physics will start in April. The first heavy ion physics run in the LHC is scheduled for November. The NA61 fragmented beam test is scheduled in September or October during an MD period when LHC does not take the proton beam.

4. STATUS OF EXPERIMENTAL AREAS

Lau Gatignon reported on the status of the Experimental Areas.

The CLOUD experiment had been granted a two-week extension of their run in the T11 beam line in the East Area. The experiment profited from good and very stable beam with the exception of a 16-hour interruption due to a Meyrin-wide power cut, which by chance coincided with a beam-off run for CLOUD reference data.

In all the experimental areas regular maintenance will be done on the equipment and installations. In the North Area 13 magnets need repair, out of which 9 have to be taken to the workshop. In the East Area more cool-down time is required and most of the magnet patrols can, as usual, only be done later. Special attention will be given to a few magnets in the T7 beam (unused again in 2010), which suffered possibly from overheating during the last run and where a water leak has appeared. Repair will only be
considered if it is easy. A leaking corrector magnet F61N.DVT01 in the branch towards the production target for the T9, T10 and T11 beams will not be repaired, as it is very difficult to access in a zone which would require a stop of the whole of the PS and it is redundant anyway (in fact it was broken from the start of the 2009 run, without consequences for operation).

In the North Area the dismantling of the H10 beam and of the NA60 experiment has started, to make space available for the installation of the new K12 beam and NA62. Preparations are ongoing for the NA61 run in 2010, including improvements of rectifier control at low currents and the preparation of a degrader for the 2010 test with fragmented ion beams.

It is foreseen to upgrade the access control in the H2 and H4 beam lines and the motorization control of the TAX beam-dumps.
Soon the user schedule and user requirements will become available so that preparations for the 2010 fixed target program can start.

In the AD, the installation of the beam line for the AEGIS experiment has started. This includes 5 magnets, 3 wire chambers, vacuum equipment, cabling, and so forth. In addition 10 ejection line power supplies will be renewed. A number of installations in the AD hall will be consolidated, in particular with respect to safety aspects.

In CNGS the water evacuation from the primary proton beam line will be modified to avoid contact of the water with air from the target cavern. This shall avoid the possible contamination of this water with tritium.

5. PS, SPS AND AD SCHEDULES

H. Breuker gave the update of the user’s schedules for PS, SPS and the AD.

Work has started to assemble the schedules based on the running time for fixed target physics given by the 2010 Injector Accelerator Schedule (V 1.3 dated 5/1/2010).

East hall physics will start 29th of April, and the start of North Area physics follows on the 10th of May. The AD run starts 4 weeks earlier compared to 2009, on the 10th of May. The CNGS physics run is foreseen to start on the 13th of May with the pending proposal to start 2 weeks earlier. The nTOF experiments will start to take data on the 17th of May. The end of fixed target physics is foreseen for the 22nd November.

The amount of beam requests for 2010 has increased to 75 compared to 60 of 2009. We observe double and triple overlaps in the requested beam line and time, in particular in H4 and H6 at the SPS. The total amount of requested test beam time is 335 days at the PS with additional 160 days for the irradiation facility and 860 days at the SPS. The V 1.0 of the user’s schedules is expected for the Research Board on 3 rd of March.
6. DISCUSSION OF THE OPEN SESSION

6.1 AD2 - ATRAP

The SPSC notes continued progress towards the goal of cold anti-hydrogen production and trapping, in particular in terms of a further improved anti-proton capture rate and the production of cold electron and positron plasmas.

6.2 AD3 - ASACUSA

The SPSC is impressed with the level of precision achieved with the spectroscopy of anti-protonic Helium for the determination of fundamental constants, such as the electron to anti-proton mass ratio and the anti-proton magnetic moment, and by the ambition of the collaboration to further improve these.

In parallel with this, progress also continues to be made towards anti-hydrogen production.

6.3 AD5 - ALPHA

The SPSC notes with pleasure progress in techniques for low temperature preparation and mixing of positron and anti-proton plasmas, including the successful demonstration of evaporative cooling for anti-protons.

The ALPHA apparatus includes sophisticated detection devices, including a multi-layer silicon vertex detector, and the SPSC looks forward to the full exploitation of these in the study of anti-hydrogen production and trapping.

6.4 AD6 – AEGIS

The SPSC notes with pleasure the significant progress of the AEGIS collaboration towards finalizing the detailed design of all major components of the experiment, and looks forward to a Technical Design Report.

The SPSC appreciates in particular the progress made by the AEGIS collaboration towards establishing the feasibility of positronium production with suitable kinematical characteristics.

The SPSC notes that the AEGIS collaboration has by now secured a significant fraction of the resources needed for the construction of the experiment, and considers it important that the remaining resources required are secured in a timely fashion.
6.5 AD4 – ACE

The SPSC notes with pleasure the improvement in the understanding of the peripheral damage and the RBE (Relative Biological Effect) of antiprotons, and its comparison with that of carbon ions. The SPSC looks forward to a quantitative set of conclusions on the potential effect of antiprotons in cancer therapy.

7. FOLLOW UP ON EXPERIMENTS AND PROPOSALS

7.1 DIRAC

The SPSC supports an extension of the DIRAC data taking in 2010, compatible with the requirements of other users.

7.2 CLOUD

In the light of the progress achieved in 2009, the SPSC supports CLOUD data taking in 2010.

7.3 NA63 ADDENDUM

The SPSC notes receipt of an Addendum to the proposal by the NA63 Collaboration.

The SPSC supports the proposed data taking in 2010, for the extension of the LPM studies to low Z materials.

8. DOCUMENTS RECEIVED

1. Minutes of the 94th Meeting of the SPSC Held on Tuesday and Wednesday November 24th and 25th 2009, CERN/SPSC-2009-037 / SPSC-094.

2. Agenda for the 95th Meeting of the SPSC; CERN-SPSC-2010-002 / A-095.


4. AD-6 (AEGIS) Status Report; CERN-SPSC-2010-003 / SR-055.

5. AD-3 (ASACUSA) Status Report; CERN-SPSC-2010-005 / SR-056.

6. OSQAR Revised Program; CERN-SPSC-2010-004 / M-770.
