MINUTES on the 104th Meeting of the SPSC
Held on Tuesday 17 January and Wednesday 18 January 2012

OPEN SESSION

1. Status and plans of the ALPHA experiment  Jeffrey Hangst
2. Status and plans of the ATRAP experiment  Gerald Gabrielse
3. Status and plans of the ASACUSA experiment  Ryugo Hayano
4. Status and plans of the AEGIS experiment  Michael Doser
5. Status and plans of the ACE experiment  Michael Holzscheiter

CLOSED SESSION

Present:

1) Present on Tuesday only

Apologies:
P. Bloch, P. Collier, E. Falk, L. Favart
1. MINUTES OF THE 103rd MEETING OF THE SPSC HELD ON 25 OCTOBER AND 26 OCTOBER 2011

The minutes of SPSC103 were approved (CERN-SPSC-2011-041, SPSC-103).

2. CHAIRMAN’S REPORT FROM RB198

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, RB198. The following points were presented and, where necessary, discussed:

1) The SPSC reported about the progress of the NA61 experiment in preparing the ion scan. The Committee recommended that enough Pb beam to be delivered in 2012 to complete the secondary Be scan, and that all efforts should be made to provide Ar beam in 2014.

2) The SPSC summarised the progress and plans of the UA9 and NA63 Collaborations, as well as its recommendation for NA63 to concentrate on their crystal positron production programme.

3) The status of the CAST and OSQAR axion searches was presented and it was reported that the CAST experiment finished the $^3$He scan. For 2012, a positive recommendation was given for a short CAST $^4$He run and further OSQAR data taking.

4) The SPSC summarised its review of the Letter of Intend to study proton-driven plasma wakefield acceleration (SPSC-I-240) and expressed its recommendation to proceed towards a TDR.

5) The updated proposal SPSC-P-343 (ICARUS@PS) as well as the new proposal SPSC-P-345 (NESSI) were presented, and the Committee expressed its recommendation that the two proposals should merge.

6) The SPSC presented the motivations of the proposal to measure the gravitational behaviour of antihydrogen at rest (SPSC-P-342) and outlined the main points to be followed in the ongoing review.
The Research Board noted points 1) and 6) and endorsed points 3), 4) and 5).
Regarding point 2) it was noted that for safety reasons a primary lead ion run from NA63 would anyway not be possible in 2012. As regards point 5), the RB requested that the physics case of the common proposal be reassessed, and that a possible location in the North Area be investigated.

3. STATUS OF ACCELERATORS

S. Maury gave an overview on the performance of the injector accelerators in 2011 and presented the major activities planned for the shutdown 2011/2012.
During the 2011 run the injectors were performing very well and delivered protons and ions at high efficiency. LINAC2 and the Booster for the protons as well as LINAC3 and LEIR for the lead ions were operating without problems.
However, at the PS, the proton run had to stop a few days earlier than scheduled because of vacuum problems of the proton injection septum. An immediate exchange or repair of the septum was not possible because of high radiation levels and it was decided to stop the PS proton run to prevent further and severe damages. However, the scheduled heavy ion run was not affected.

The power supply for the PS magnets (POPS) was put back to operation beginning of September. After one week of operation the supply had to stop again because of failures of several equipment and the PS magnets were switched back to the power supply of the rotor generator. The problems for the POPS were fixed, the supply was put back into operation and was running smoothly until the end of the 2011 run. Further consolidation work on the POPS to ensure stable operation is scheduled for the winter shutdown.

The SPS was running smoothly and provided beam to the fixed target programme and to CNGS at high efficiency.
During the period with heavy ions, beams of secondary Beryllium ions were provided to the NA61 experiment at various energies, 40 GeV/A, 75 GeV/A and 150 GeV/A. In 2012 it is planned to deliver secondary Beryllium ions at 13 GeV/A, 20 GeV/A and 30 GeV/A. Performance test using lead ions at 80 GeV/A have been carried out for primary Argon and Xenon beams in 2014 and 2015.
The AD was operating at excellent efficiency and intensities, and with 83% of uptime for physics, a new record has been reached.

The schedule for the winter shutdown is demanding, as the injectors will already restart early February. For the Booster a new RF cavity has to be installed. At the PS the vacuum leak of the injection septum will have to be investigated and a repair will have to be made. Also a number of interventions on RF cavities, in particular 10 MHz cavities, have to be carried out. For the SPS, LEIR and the AD only standard maintenance activities are needed.

4. STATUS OF EXPERIMENTAL AREAS

L. Gatignon presented an overview on the operation of the East and North Areas, the AD experimental areas and the CNGS beam line during 2011 and reported on the scheduled shutdown activities.

In the PS East Area all beam lines operated smoothly until 9 November 2011, when a short occurred due to radiation damage on a magnet in the T10 beam line between the magnet interlock cables and the yoke. As the ambient dose around the magnet was very high, it was decided to stop the operation of the T10 beam line to allow repairs during the shutdown. On 15 November 2011 the PS septum failed, see report by S. Maury, and all beams to the East Area zones were stopped for 2011. Since the SPS103 the East Area hosted tests of ALICE/PIDRICH, ALICE/FOCAL, CALICE and the IRRAD facility and delivered beams to the CLOUD and DIRAC experiments. During the winter shutdown the standard maintenance will be performed on all systems of the East Area. As every year, the inspection of all magnets is scheduled to happen later in the shutdown for reasons of radiation safety. Additional work will be the replacement of the first quadrupole in the T9 beam line, which developed a water leak. This is a major intervention as it implies the shielding roof of the primary target area.

The East Area is expected to be ready for the start of physics on 16 April 2012.

L. Gatignon reported that the renovation and consolidation of the East Area is in preparation and an East Area Day will be organised in February where the present plans and requirements of the different users will be discussed. The outcome of the workshop will be summarised and reported to the LHC Injector and Experimental Facilities Committee (IEFC).
The North Area operated efficiently and stably until the end of the proton run on 7 November 2011, apart from a stop due to a kicker feed-through problem in the SPS ring. Since the SPSC103, beams were delivered to Nucleon, H4IRRAD, NA62-CEDAR, MonoPIX, TOTEM and UA9, DREAM and COMPASS.

The ion run started well for both, the NA61 experiment with 13 GeV/A and UA9 with fragmented beams. The change to 162 GeV/A was announced on very short notice and required quite some re-tuning of the super-cycle. This, as well as the incompatibility between the ion cycle with LHC filling, lead to significant down times in the machine in the early phases of the ion run.

Next to the standard maintenance, the following consolidation and repair work will be done for the North Area during the shutdown. A number of magnets and beam dump collimators (TAX, Target Attenuators experimental areas) need to be replaced or repaired. As well, the new access control to the EHN1 building will be put in service and a number of control rooms will be renovated. The roof of the huge EHN1 hall will be repaired and new doors will be installed in the COMPASS experimental hall.

The consolidation of the motorisations, which has been started in the 2009/2010 shutdown, will be completed. This remaining work concerns 60 (out of a total of 289) motors of magnetic collimators, M2 absorbers, beam dumps, ion splitter magnets and a few auxiliary systems. The North Area is scheduled to be back in operation for physics on 7 May 2012.

The preparatory work for the NA62 experiment is progressing well. The new beam dump has been installed and the beam line installation is under way, but delayed due to the failure of cranes. The blue decay tank module installation is ongoing and a test of a cryo-pump is being performed on a 15 m long blue tube sub-section. The aim is to be ready for beam into the area for a technical run of the experiment in the course of October 2012.

For CNGS in 2011 a record of number of protons delivered onto the target of $4.84 \times 10^{19}$ has been reached. To perform further studies of possible systematic effects along the secondary beam line for the measurement by the OPERA experiment of the neutrino velocity, the CNGS beam line was operated between 21 October 2011 and 6 November 2011 with a proton beam of different timing structure. This LHC type bunched beam allows
precise timing studies of each neutrino interaction and provides four proton bunches, each 2ns long, separated by 524ns which is short compared with the length of 10500ns of the nominal CNGS beam which is designed to provide neutrinos at high statistics. The results of the special CNGS run are foreseen to be included into the publication by the OPERA collaboration on the measurement of the neutrino velocity. To measure the timing of the extracted SPS beam towards LNGS, new diamond pixel muon detectors were installed during November 2011. First tests were successful and the detectors are expected to deliver important information during the 2012 CNGS run.

At the AD, the AEGIS (AD6) experiment continues the installation of the apparatus and antiproton beam was detected in the partly installed experiment during the last days of the AD run. New barracks have been installed outside the AD hall and are used as AEGIS control room since. In the AD experimental area, new software has been installed to ensure during access time to the zones a reduction of dose rates by dumping the beam inside the ring enclosure rather than at the beam stoppers in the experimental hall.

5. PS, SPS AND AD SCHEDULES

H. Breuker summarised the beam requests made for 2012 by the PS and SPS users and presented a first draft users schedule for 2012 for the PS East Area and SPS North Area.

The committee takes note of the large number of requests for beam tests and experiments in 2012 especially for the SPS North Area, which exceeds the number of available beam days. The committee supports the coordinator to adjust the schedule.

The committee received the documents from the R2E (Radiation to Electronics) project and the CALICE collaboration describing their beam requests.

The SPSC recognises the importance of the R2E project, which studies the impact of failures due to radiation effects on electronics on the Large Hadron Collider (LHC) operation in order to implement corresponding mitigation actions.

The SPSC supports the requested beam tests at the H4IRRAD zone for 2012 and asked the coordinator to try to allocate the beam time as close as possible to the requested number of days at a level compatible with the overall test beam availability.
The SPSC recognises the relevance of the CALICE calorimeter R&D Programme and recommends beam tests for 2012 at a level compatible with the overall test beam availability.

6. DISCUSSION OF THE OPEN SESSION

The SPSC notes with pleasure the continuous worldwide visibility of the recent AD physics results and congratulates the machine and the experiments for their achievements. The Committee notes the request of the AD experiments for technical support to keep the services to the experiments operational during the long shutdown in 2013 to allow further commissioning of the apparatuses. The Committee recommends that the requests be met as far as possible.

6.1 AD2-ATRAP

The SPSC notes with pleasure the progress in trapping cold antihydrogen which has been achieved by the ATRAP collaboration. The SPSC is looking forward to seeing the new Ioffe trap in operation for the 2012 run, which should allow for improved experimental conditions. The committee also takes note of a method which will be further developed in 2012 to measure the magnetic moment of the antiproton.

6.2 AD3-ASACUSA

The SPSC congratulates the collaboration for the publication of the antiproton-to-electron mass ratio to a precision within a factor of three to four from the one on the proton-to-electron mass ratio.

The SPSC is looking forward to developments and measurements from the cold 2-photon laser spectroscopy.

The committee is pleased with the preliminary results achieved extracting antihydrogen, the completion of the microwave spectroscopy apparatus and is looking forward to first results in 2012.

6.3 AD5-ALPHA

The SPSC congratulates the collaboration of the impressive results on trapping anti-hydrogen for more than 1000 s and the developments of the microwave techniques towards spectroscopy.
The SPSC is pleased by the progress in building the second phase of the ALPHA apparatus and is looking forward to new developments.

6.4 AD6-AEGIS

The SPSC notes with pleasure the significant progress in installing the AEGIS detector in the AD experimental area. The SPSC recognises that in 2012 the commissioning of the AEGIS apparatus will profit from an anti-proton beam and recommends the necessary beam time.

6.5 AD4-ACE

The SPSC notes that the ACE experiment aims to finish its programme in 2012. The Committee recommends one week of beam time at the AD early 2012 and will re-evaluate a possible second week depending on the results achieved and on the overall AD schedule.

7. FOLLOW-UP ON EXPERIMENTS AND PROPOSALS

7.1 PROPOSAL TO MEASURE THE GRAVITATIONAL BEHAVIOUR OF ANTIHYDROGEN AT REST (SPSC-P-342)

The SPSC further reviewed the proposal to measure the gravitational behaviour of antihydrogen at rest, SPSC-P-342.

The Committee appreciates the carefully worked out proposal and acknowledges the elegance of the proposed methods as well as the interest of the physics addressed.

The Committee received additional information satisfactorily answering the points raised in the review process. In the light of this the Committee recommends approval of the experiment.

The committee advises the collaboration to proceed towards an MOU with a detailed schedule and defined commitments of the partners.

7.2 PS212-DIRAC

The SPSC received the Addendum to the DIRAC proposal entitled “Search for long-lived states of π+π- atoms describing the difficulties of
the experiment in 2011 to search for long-lived states of $\pi^+\pi^-$ atoms as well as the solutions to circumvent them in a future data taking run. The Committee takes note and recommends beam time in 2012 to finish the programme on long-lived $\pi^+\pi^-$ atoms. This will complete the DIRAC data taking at the PS.

The SPSC recommends the collaboration to prepare the timely dismantling of the experimental apparatus to allow the future use of the East Area.

7.4 NA63

The SPSC received complementary information on the proposal to study positron production in a diamond by energetic electron impact and recommends 2 weeks of data taking in 2012.

8. A.O.B.

8.1 DISCUSSION OF PLANS TO MEASURE NEUTRINO VELOCITY

The SPSC received documents from the OPERA, ICARUS, BOREXINO and LVD experiments at the LNGS describing their plans to measure neutrino velocity in 2012. The Committee recommends data taking with bunched CNGS beam at the earliest possible time in 2012 and will assess further CNGS running in view of the results achieved.

9. DOCUMENTS RECEIVED

- Minutes of the 103nd Meeting of the SPSC held on Tuesday and Wednesday, 25 and 26 October 2011, CERN-SPSC-2011-041; SPSC-103. - 2011
- Requests for PS and SPS beam time in 2012 for the CALICE calorimeter prototypes, CERN-SPSC-2011-042; SPSC-P-341-ADD-1. - 2011
- Search for Long-Lived States of $\pi^+\pi^-$ Atoms - 9 -: Addendum to the DIRAC Proposal, CERN-SPSC-2012-001; SPSC-P-284-ADD-6. - 2012
• Agenda for the 104th Meeting of the SPSC on Tuesday 17 and Wednesday 18 January 2012, CERN-SPSC-2012-002; SPSC-A-104. - 2012
• Memorandum for the H4IRRAD 2012 beam request, CERN-SPSC-2012-003; SPSC-M-777. - 2012
• AD-6 annual report, CERN-SPSC-2012-005; SPSC-SR-096. - 2012
• ATRAP Progress: Trapped Antihydrogen and Ready to Measure the Antiproton Magnetic Moment, CERN-SPSC-2012-006; SPSC-SR-097. - 2012

CERN Document Server (CDS):