MINUTES of the 115th Meeting of the SPSC
Held on Tuesday 21 October and Wednesday 22 October 2014

OPEN SESSION

1. Status and plans of the CAST experiment  Stefan Neff
2. Status and plans of the OSQAR experiment  Pierre Pugnat
3. Status and plans of the AWAKE experiment  Allen Caldwell
4. Status and plans of the UA9 experiment  Walter Scandale
5. Status and plans of the DIRAC experiment  Leonid Nemenov
6. Status and plans of the NA61 experiment  Katarzyna Grebieszkow
7. Future NA61 measurements for the Fermilab Neutrino beams  Vittorio Paolone
6. Expression of interest for a full-scale detector engineering test and test beam calibration of a single-phase LAr TPC  Thomas Kutter

CLOSED SESSION

Present:
S. Bertolucci\(^1\), M. Diehl, R. Forty, L. Gatignon, A. Ianni\(^1\), I. Irastorza, A. Jokinen, M. Kowalska, G. Lanfranchi, B. Panzer-Steindl\(^1\), C. Rembser (scientific secretary), E. Rondio, M. Rozanska, R. Saban, G. Salam\(^2\), S. Schönert\(^1\), F. Sikler, A. Specka, R. Thompson, C. Vallée (Chair), H. Wilkens

\(^1\) Present on Tuesday only
\(^2\) Present on Wednesday only

Apologies: T. Lasserre, R. Steerenberg, M. Wing

The minutes of SPSC114 were approved (CERN-SPSC-2014-024, SPSC-114).

2. **CHAIRMAN’S REPORT FROM RB209**

The Chairman reported on the Research Board (RB) meeting, RB209. The following points were presented and, where necessary, discussed.

1) The Committee expressed its congratulations to the OPERA Collaboration for its observation of a forth tau neutrino event and summarised the prospects for completion of the data analysis with the full data set.

2) The SPSC summarised the technical achievements of the ICARUS Experiment and their publication in reference papers, and expressed its encouragements to the Collaboration to proceed with further analysis of its unique data set.

3) The SPSC presented the outstanding new spectroscopy results from COMPASS as well as its latest spin results, and summarised the status of the preparation of the future Drell-Yan and DVCS runs.

4) A comprehensive summary of the results obtained so far by CLOUD was presented, as well as an outline of their scientific strategy for the future. Data taking for the next three years was recommended.

5) The Committee summarized the NA63 data taking requests for 2015 and reiterated its recommendation for corresponding beam time.

6) The SPSC summarised its review of a proposal to study the polarisation of antiprotons produced in hadronic collisions and recommended the corresponding three weeks beam time at the PS.

7) The final benchmark run proposed by the ACE Collaboration at the AD was presented and recommended.

The Research Board noted points 1), 2), 3) and endorsed points 5) and 6).

Point 4) was endorsed under provision of a review of the external funding situation of CLOUD.

Point 7) was also endorsed with the understanding that this benchmark run should provide the basis for the final calibrations of ACE.

3. **STATUS OF ACCELERATORS**

Lau Gatignon, on behalf of Rende Steerenberg, gave a status report on the accelerators.

Following the end of the long shutdown LS1, where the majority of all the activities finished on schedule, the PS Booster had a very fast first beam accelerated indicating that the main function of the accelerator were functional, but then a period with rather slow progress followed mainly due to the large number of changes in combination with the resources available. By now ISOLDE receive beams with high intensity (more than $3 \cdot 10^{13}$ protons per pulse) and the PS receives all the required beams. Also the PS managed to deliver the required beam in time to the East Area, AD and the SPS. The AD beam was delivered as scheduled on 1 August 2014, following the AD horn
strip line repair. The SPS beam was ready for first injection on 11 September 2014. The SPS had a very busy restart with a number of problems. Beam to the North Area beam was scheduled for 6 October 2014 and despite difficulties was in time delivered to the T2 target. For T4 and T6 the beam was delivered a few days later. This delay was due to a configuration problem related to the wobbling settings that caused difficulties in steering the beam onto the T4 target. By now the SPS extracts successfully 8 \times 10^{12} protons per pulse, which results in about 7 \times 10^{12} protons per pulse shared over the different targets.

The AD physics start was delayed several times due to many consecutive problems. The first beam was circulating in the AD on 5 August 2014. However the AD physics run could start on 16 September 2014 only. The main problems causing the delay of the physics start were related to the GSM network that perturbed the stochastic cooling system, the re-commissioning of the completely renovated control system, issues with the polarity of the orbit correctors, unavailability of beam from the upstream machines, cabling errors as a side effect of work for the ELENA building and the difficulties to establish good beam trajectories through the electro cooler. Today the beams are delivered to the experiment, but there are still many challenges that are being addressed.

For Argon ions, LINAC3 is operating well, whereas LEIR is suffering from issues, which are consequences of the LS1 work. Nevertheless about 2 \times 10^{9} Argon ions per pulse are send to the PS (equivalent to 2.2 \times 10^{10} charges per pulse). The PS injected, accelerated and extracted the ions as planned by the end of August 2014. Currently about 8 \times 10^{8} ions per pulse are extracted from the PS as a result of a vacuum intervention with a slow recovery.

In the SPS the primary ion beam interlock installation is on schedule and the ion beam commissioning has started on 16 October 2014. The SPS is prepared for a set of different ion momenta of 13, 19, 30, 40, 75 and 150 GeV/c.

Between the 2014 and 2015 run there will be three weeks of a technical stop with only light interventions or repairs to avoid imminent risks to allow for a very quick restart, less than three weeks, for the entire ion and proton chain in order to be ready for the Argon ion run and the re-commissioning of the LHC in 2015.

4. STATUS OF EXPERIMENTAL AREAS

Lau Gatignon described the ongoing activities in the East, North and AD experimental areas.

In the PS East Area, the T9 and T10 test beams started on schedule on 15 July 2014 in spite of late readiness of most of the equipment. The large amount of upgrades during the long shutdown LS1 to hardware and front-end software lead to some problems, which were circumvented by anticipating for several months the migration to the beam control system, the same as used for the North Area beam lines. The two beam lines have been operating reliably since, with up to four user groups running in parallel in the T9 zone. The rearrangement of this zone has thus proven to be extremely useful. T9 also housed the ‘Beamline for Schools’ experiment, which was very successful.

In T11, as foreseen, CLOUD started very smoothly later in the year. The preparations for the P349 antiproton polarization experiment, scheduled in T11 after the end of the CLOUD run, are well under way.

The construction of the new IRRAD and CHARM facilities in the T8 beam is nearing
completion and first beam commissioning at low intensities has already started on 10 October 2014. The beam intensity is still limited because of the unforeseen non-availability of the ventilation system, the missing last layer of roof shielding and a problem with broken rollers for the mobile shielding in CHARM that need to be replaced. These issues should be solved soon and nominal beam is expected by the beginning of November.

The consolidation works in the SPS North Area primary target areas TCC2 and TDC2 have essentially been completed, including the recabling work near the very radioactive splitters. The only remaining task is the upgrade of the ventilation system controls, which is now planned for the 2015/2016 shutdown. As a consequence there is no intensity limitation on the primary beam intensities on the T2, T4 and T6 targets this year and there is no need for a prolonged stop between the 2015 ion and protons runs. The primary targets and their instrumentation were replaced and realigned and survey checks were made in all North Area beam lines. The beam control system was significantly updated. The hardware tests of the magnets and power converter suffered from a very long failure of the demineralised water distribution in BA81.

The shielding modifications for the NA61 ion run are well on track and the remaining work should not impact on the NA61 preparations.

The new GIF++ construction has advanced well and it is now ready to receive the irradiator by mid November. Commissioning with beam will start in December.

COMPASS suffered in its commissioning from a long interruption in the liquid Helium delivery for their polarized target, followed by a series of problems with their cold box. The NA62 beam and infrastructure was completed, apart from the ventilation system upgrade. The new vacuum system for the beam line and for the 500m³ decay tube is complete and operational. The double wall separating the TCC8 air volume from ECN3 is in place, but the overpressure system will only be in operation during the scrubbing week in November. The upgrade of the full ventilation system is planned for the first half of 2015. First beam was delivered on the T2 target on 3 October 2014, but due to issues with the new target instrumentation good beam was only available on the T4 and T6 targets on the 9 October 2014. The setting up of the secondary beam lines was quite fast from then on and most of the first users could be satisfied. The commissioning of the new beam line for NA62 has progressed well and the alignment and beam loss issues observed in the 2012 technical run seem to have been solved.

The commissioning of the beam lines in the AD was delayed by the late start-up of the machine. The failure in the central liquid Helium liquefier lead to significant extra delays for the experiments. The start-up was difficult but first beam for physics was delivered from 16 September 2014 onwards. In particular the ASACUSA experiment suffers from transverse position fluctuations, which reduce the acceptance of their Radio Frequency Quadrupole. Some controls issues in the AD beam lines are resolved gradually.

All the areas suffered from the severe power cut that happened on 16 October 2014. When the machines came back on in the course of 18 October, the experimental areas followed rather quickly. In the North Area a communication problem between the access system and the beam control caused an additional delay of a few hours.

The AWAKE installation work is progressing according to plan. The civil engineering work is almost finished. The cabling work is about to start.
5. PS AND SPS USER SCHEDULES

H. Wilkens presented a short summary of the test beam activities at the PS East Area facility over the last three months, the delayed restart of the AD machine for physics and the problems with the central liquefier plant which affected the delivery of liquid Helium to the AD experiment, NA61 and COMPASS.

The draft injector schedule for 2015 was presented, as well as a preliminary schedule for the test beam users during the Argon ion run, from 9 February 2015 until 5 April 2015. Main user of the ion beam will be the NA61 experiment and in parallel beam tests in the H4 and H8 beam line will be possible. The NA63, DAMPE, CALET, UA9, Medipix and NA61 SciFi experiments and detector tests will make use of the ion run.

Protons are scheduled for the experiments and beams tests from 27 May 2015 until 16 November 2015, which is about six weeks longer than first anticipated due to the excellent progress of the TDC2/TTC2 consolidation. The draft schedule is up for approval at the next meeting of the Research Board.

6. DISCUSSION OF THE OPEN SESSION

6.1 CAST

The SPSC is pleased with the successful commissioning of the new x-ray telescope and the low-threshold and low-background detectors for axion and chameleon searches in 2014. The Committee encourages the collaboration to finalise the publication of the ongoing analyses.

The SPSC recommends the proposed physics programme for 2015, which aims to improve the ALPs sensitivity and to pave the way for a new and unique test for searching for chameleons.

The SPSC will revisit the CAST physics programme beyond 2015 on the basis of a written document that addresses the details of the foreseen experimental setup and the corresponding physics reach in the search for chameleons and relic ALPs with CAST.

6.2 OSQAR

The SPSC welcomes the new, preliminary improvement in the limits of the ALP-photon coupling and is looking forward to the complete analysis of the 2014 data on the ALP search.

The Committee strongly encourages the collaboration in its work on the Fabry-Perot cavity to improve the ALPs search sensitivity.

The SPSC also strongly encourages the OSQAR collaboration to explore possible collaboration with other groups to improve and optimise the experimental setup.
The Committee takes note of the plans to perform a search for Matter-coupled scalars which acquire large effective masses (chameleons) in 2015 and will further review the proposal.

6.3 AWAKE

The SPSC is pleased with the significant progress made on all fronts in the development of the key components of the experiment. In particular, the SPSC welcomes the solution adopted for the electron injector.

The SPSC appreciates the strong and effective management of the project and the expansion of the collaboration.

The SPSC encourages the collaboration to support the new injection scheme by continuing with simulation studies.

6.4 UA9

The SPSC notes with pleasure the recent progress made in the simulation and detailed understanding of experimental results on crystal collimation obtained in the SPS.

The Committee congratulates the collaboration for the successful installation of the piezo-mechanical goniometers in the LHC during LS1.

The SPSC recommends that suitable SPS beam time in 2015 is allocated within the overall constraints of the accelerator and users schedule, to continue the experimental programme, with emphasis on testing of goniometers and calibration of the new Cherenkov counters.

6.5 DIRAC

The SPSC congratulates the collaboration for the publication of first results on the lifetime of $\pi K$ atoms. The Committee is pleased to see the progress towards establishing the existence of long-lived $\pi\pi$ atoms using the 2012 data. It looks forward to the completion of the ongoing analyses of data taken between 2007 and 2012.

6.6 NA61

The SPSC notes with pleasure the progress in the analysis of pp and Be+Be data relevant for neutrino and cosmic ray physics. The Committee is looking forward to their publication.

The SPSC is pleased with the progress of the extensive upgrade of the NA61 detector elements, electronics, and software.

The Committee supports the request for about ten days of primary Lead beam at the end of
2015 for tests of the upgraded detector. The SPSC **recommends** giving consideration to the request in the planning of the 2015 injector schedule.

The SPSC **received with interest** a proposal to perform hadron production measurements for Fermilab neutrino beams using the NA61 detector, SPSC-P-330-ADD-7. The Committee **considers** the physics case to be important and **welcomes** the corresponding extension of the NA61 collaboration. The SPSC **recommends** approval of the additional physics programme of the NA61 collaboration.

### 6.7 EOI011

The SPSC **welcomes** the Expression of Interest for a full-scale detector-engineering test and test beam calibration of a single phase LAr TPC, EOI011.

The Committee **supports** the motivations of the project and **recognises** its potential to foster cooperation and further develop synergies within the future worldwide long baseline LBNF collaboration.

The SPSC **encourages** the collaboration to proceed towards a technical proposal to be submitted to the Committee. For the proposal the Committee **requests** detailed information on the motivation and choice of the experimental set-up, including a specific justification in for a second cryostat if this is proposed, as well as on the required test beam parameters and annual beam time usage. The proposal should further contain a detailed schedule of the project, a description of how responsibilities and resources are to be shared within the Collaboration, with a particular focus on the areas of synergy with the WA105 project, and an estimation of the resources requested from CERN by the Collaboration.

### 7. FOLLOW-UP ON EXPERIMENTS AND PROPOSALS

#### 7.1 AD4 (ACE)

The SPSC **notes** the progress made in preparing a full analysis of the 2012 and 2010 datasets using the current version of FLUKA and **encourages** the collaboration to continue with their attempts to resolve the differences in the results from each dataset.

The Committee **looks forward** to receiving the results of the benchmark tests and a reanalysis of all datasets at its April 2015 meeting.

#### 7.2 AD8 (BASE)

The SPSC **congratulates** the BASE collaboration on the successful installation of the apparatus and the first observation of trapped cold antiprotons.

#### 7.3 NA63

The SPSC **welcomes** the receipt of the description of the setup for the Argon run in 2015.
8. **AOB**

8.1 **DRAFT: SPSC REVIEWS IN 2015**

The following draft schedule for annual reviews in 2015 was presented:

- 13./14. January 2015: ATRAP, ASACUSA, ALPHA, AEGIS, GBAR, BASE;
- 14./15. April 2015: WA104, WA105, NA62, ACE, RD52 (DREAM);
- 23./24. June 2015: COMPASS, OPERA, ICARUS, CLOUD, NA63;
- 20./21. October 2015: NA61, DIRAC, CAST, OSQAR, UA9, AWAKE.

9. **DOCUMENTS RECEIVED**

- Draft Minutes of the 114th meeting of the SPSC, Tuesday 24 and Wednesday 25 June 2014, CERN-SPSC-2014-024 ; SPSC-114;
- Agenda of the 115th Meeting of the SPSC, Tuesday and Wednesday, 21-22 October 2014, CERN-SPSC-2014-028 ; SPSC-A-115;
- Status report for the CAST experiment and planned running in 2015, CERN-SPSC-2014-036 ; SPSC-SR-149;
- Hadron Production Measurements for Fermilab Neutrino Beams, CERN-SPSC-2014-032 ; SPSC-P-330-ADD-7;
- Report from the NA61/SHINE experiment at the CERN SPS, CERN-SPSC-2014-031 ; SPSC-SR-145;
- Status and further Analysis Plans of the NA49 Collaboration, CERN-SPSC-2014-030 ; SPSC-M-786;
- Expression of Interest for a Full-Scale Detector Engineering Test and Test Beam Calibration of a Single-Phase LAr TPC, CERN-SPSC-2014-027 ; SPSC-EOI-011;
- AWAKE Status Report, CERN-SPSC-2014-026 ; SPSC-SR-143;
- DIRAC collaboration status report 2014, CERN-SPSC-2014-025 ; SPSC-SR-142;

CERN Document Server (CDS):
http://cdsweb.cern.ch/search?sc=1&p=SPSC

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