MINUTES of the 122nd Meeting of the SPSC
Held on Tuesday 21 June and Wednesday 22 June 2016

OPEN SESSION

1. Status and plans of the COMPASS experiment    Oleg Denisov
2. Status and plans of the NA63 experiment        Ulrik Uggerhoi
3. Status and plans of AIDA2020                   Felix Sefkow
4. Status and plans of the ICARUS experiment      Jan Kisiel
5. Status and plans of the OPERA experiment       Giovanni De Lellis
6. Status and plans of the CLOUD experiment       Joachim Curtius

CLOSED SESSION

Present:

M. Brugger (for L. Gatignon), A. Bueno, M. Diehl, E. Elsen\(^1\), X. Fléchard, R. Forty, M. Kowalska, G. Lanfranchi, M. van Leeuwen, P. Moskal, B. Panzer-Steindl, C. Rembser (Scientific Secretary), G. Salam, G. Schnell, A. Specka, A. Stahl, R. Steerenberg, M. Tarbutt, F. Terranova, C. Vallée (Chair), H. Wilkens

\(^1\) present Wednesday only

Apologies: L. Gatignon, R. Losito, J. Monroe
1. DRAFT MINUTES OF THE 121st MEETING OF THE SPSC HELD ON 19 APRIL AND 20 APRIL 2016

The minutes of SPSC121 were approved (CERN-SPSC-2016-021, SPSC-121).

2. CHAIRMAN’S REPORT FROM RB216

The Chairman reported on the Research Board (RB) meeting, RB216. The following points were presented and, where necessary, discussed:

1) The SPSC congratulated the NA62 Collaboration for the intrinsic performances of the complete detector operated in 2015, and presented their plans for stable data taking in 2016.

2) New results from the RD52/DREAM Calorimetry Collaboration, based on new data taken in 2015, were presented, and one week of run was recommended in 2016, which will end the program unless new modules are constructed.

3) The Committee expressed its satisfaction with the consolidation of the Baby MIND (NP05) prototype construction and the focus of its beam test in the East hall, as well as with the synchronisation of the project with the WAGASCI experiment schedule in Japan.

4) The progress of the WA104 (NP01) Collaboration in refurbishing the ICARUS detector was presented, and more information requested about the plans to move the WARP cryostat to CERN in 2017.

5) The SPSC presented the progress on the single phase and double phase DUNE prototypes (ProtoDUNE-SP (NP04) and ProtoDUNE-DP (NP02)) at CERN, expressed its concerns to meet the schedule for beam time before LS2, and recommended to strengthen the cooperation between the two projects in all domains of common interest.

6) The SPSC summarised the plans and motivation of the ARIADNE LOI (SPSC-I-244) for a photographic LAr TPC readout, and recommended submission of a motivated test beam request at the PS once the prototype is operational at Liverpool.

7) The Committee presented the LOI to measure tau production in proton interactions with emulsions at the SPS (SPSC-I-245), and recommended a few days of beam tests in 2016, as well as to establish contact with SHiP to investigate the interest of the measurement for a beam dump facility.

8) The Committee recommended investigating the possibility to provide protons to AWAKE and to the AD until the start of the YETS in 2016.

The Research Board noted points 1) and 3) to 6), and endorsed points 2), 7) and 8). As regards point 8), delivery of protons to the AD will depend on the decision to be made on the schedule of the connection of the experiments to ELENA.

3. STATUS OF ACCELERATORS

Rende Steerenberg presented the status of the injector accelerators and summarised the progress and plans of the AWAKE beam line and the ELENA antiproton cooler and decelerator.
With respect to the injector schedule, which was presented in the last SPSC in April 2016, the AD had some delays in setting up with beam because of a vacuum leak on a cavity. However the start of the AD physics run was in time on 25 April 2016.

The SPS start was delayed by one week to 22 April 2016 because of a broken extraction septum. Furthermore, on 26 April 2016 a vacuum leak on the SPS high-energy internal beam dump developed. The leak has been identified to be inside the beam dump shielding that is neither visible nor accessible thus it cannot be repaired without significant downtime of the SPS. Thus the strategy is to continue SPS operation with the present dump with reduced but safe intensity and reduced duty cycle. This operation scheme has impact on LHC as a maximum of 72 bunches per batch can be injected from the SPS instead of 288 and has impact on the North Area physics programme. In case the vacuum decreases further, an old replacement dump can be installed. As long-term solution, a new dump is currently build and is planned to be installed during the shutdown at the end of the year.

The machine experts are also studying gradual but small increases of the intensity to reduce the losses for physics. Currently, status 20 June 2016, the integrated proton intensity at extraction is $9.85 \times 10^{17}$ protons only, compared to the usual intensity of $2.42 \times 10^{18}$ protons. This is 35% of what was planned and 6% of the total intensity for 2016.

On 27 April 2017 one of the seven operating capacitor banks of the PS main power supply POPS developed a short circuit which required to switch back to the old rotor generator MPS. About four weeks later the MPS high power switch burned. After six days of downtime, during which the POPS was partially repaired and validated, the PS returned to the POPS that is now operating in degraded mode but with full pulse capacity. To compensate for the time loss because of the PS power supplies, the Injector and LHC Technical Stop beginning of June was shortened.

This short Technical Stop however has impact on the AWAKE scheduling. The hardware commissioning of the proton beam line was successfully done in May 2016 but thermal tests of main magnets in the proton line are still missing. These were originally foreseen for the Technical Stop in June. To keep the original schedule for AWAKE, another Technical Stop before end of August is needed. In case such a stop will not be possible, the AWAKE planning will shift by four weeks, allowing only one week of physics run in 2016.

At ELENA the ring with all dipoles and quadrupoles is installed and the transfer lines need to be finished to start the commissioning of the ELENA ring. It is planned to complete the bake-out of the equipment end of August 2016 and to start ELENA with beam beginning of September 2016.

For the third quarter of 2016, for the injector accelerators it is planned to continue the commissioning of the machines with lead ions. Setting up the SPS with ions is moved forward and will start early August. A Technical Stop is foreseen for mid September 2016.

4. STATUS OF EXPERIMENTAL AREAS

Markus Brugger reported on the status of the East, North and AD experimental areas as well as on the AWAKE beam and experimental area preparations.

In the East Area the T9 and T10 test beams were ready to start as scheduled on 25 April and 26 April 2016. The CHARM and IRRAD facilities were still completing the installation work
for the radiation shielding studies and for a new conveyor. They started operation on 28 April with many spills on demand.

In the night of 18 to 19 May 2016 no beam was delivered to the users to allow the cool-down of the primary area for a water leak search. The leak was located on a connector of a cooling water hose and fixed during a stop the week after. When beam came back a fault on the converter for a quadrupole magnet needed to be repaired and the repair took a night from the T10 beam operation.

The Neutrino Experiment with a Xenon TPC NEXT, a recognised experiment at CERN RE27, has cancelled its future test campaign, a campaign without beam, in the East hall. End of May the SPSC has selected the winning teams of the 2016 Beamline for Schools competition. The experiments are Relatively Special from the UK to measure the Lorentz factor from proton decay and the Pyramid Hunters from Poland to validate the scanning of pyramids with muons. Both experiments will be carried out in September 2016 and preparations have already started.

In the North Area, despite the short setting-up period, beams are provided smoothly to the experiments and tests. However, because of the lacking preparation time, when special settings are required by the experiments, e.g. the recent H4 electron beam for CMS, this needs to be done often at inconvenient times and under time pressure and can also lead to delays in data taking.

Setting-up the UA9 proton beam went fast and good beam was provided very quickly to the experiment. Due to the delayed North Area start the UA9 beam time was reduced to 3.5 days out of 7 originally scheduled. Also NA63 could run with good beam quality, but lost a significant fraction of the beam time because of the delayed start.

COMPASS beam delivery was very efficient, but since beginning of June suffers from the severe reduction in intensity onto the T6 target, which affected severely the duration of the electron beam calibration and which will also affect muon beam physics.

The NA62 beam setting up went smoothly and nominal beam quality was provided rapidly. During the commissioning of the experiment, the intensity was low on NA62 request.

The NA61 VTX magnets are fully operational and therefore the NA61 physics programme for 2016 can be maintained. The Committee congratulates the teams involved on the consolidation and restart of the NA61 magnet. The SPSC is also pleased that a special task force has been set up at CERN to review the experimental magnets in the North Area to ensure their stable long-term operation.

The activities for the North Area extension are progressing well and the current planning for access to the pits is back to the original scheduled date. The design of the extension of the H4 beam line progresses towards a final version. The EHN1 area is prepared for the installation work.

Concerning the consolidation of the East and North Areas, good progress has been made. For the East Area, Council in the Medium Term plan approved the EA consolidation project, which will be carried out until the end of Long Shutdown LS2. For the North Area, a study team has been established to prepare a detailed consolidation proposal together with the CERN equipment and service groups. Mandate of the study team is to review and detail urgent activities, which are required to keep the North Area at the existing and high operational status beyond LS2 and to update the existing study within the new timeline until Long Shutdown LS3 in line with the EHN1 extension project.
The start-up of the AD experimental area went according to schedule and first 100MeV/c antiproton beams were sent to AEGIS on 25 April 2016. Excellent beam quality and very good deceleration efficiency have been achieved from the start. First results are available from the new Cryogenic Current Comparator (BCCC), a superconducting quantum interference devise providing beam intensity measurements during the deceleration ramps. In addition, a new beam current transformer allows for better monitoring of the target station efficiency.

The Committee notes that engineering change requests for the extensions of the ALPHA and ASACUSA experimental areas have been made by the collaborations to the Injectors and Experimental Facilities Committee (IEFC). The request from the ALPHA collaboration is motivated by a proposal for a new gravity measurement of antihydrogen. The SPSC has not yet received a proposal describing this measurement and experimental setup. An extended experimental area for the ASACUSA experiment will allow the collaboration to install the main experiments (CUSP and antiprotonic Helium) in the same experimental area at the same time, which will avoid time-consuming installation and de-installation of the experiments.

In the AWAKE experimental area, preparations are advancing well. The fire safety improvements as a new ventilation system, access doors, fire doors are installed and the shielding of the experiment is finished. The beam line to the experiment is installed, its vacuum closed, detectors installed and the laser and the laser compressor are installed. The hardware commissioning of the proton beam line has started in May 2016 and the departmental safety inspection has successfully been passed on 10 June 2016. AWAKE is on track for the first physics run by the end of this year. The special end-flange for the plasma cell is slightly delayed and its installation needs to be scheduled after the proton commissioning. For the latter, thermal tests of the main magnets in the proton line could not yet be done due to the shortening of the Technical Stop in June. Another Technical Stop before end of August would thus be ideal in order to maximize the available AWAKE physics time, depending on the arrival/commissioning of the plasma cell. Without a stop before end of August, only one week for physics would be available in the shifted baseline schedule.

5. PS AND SPS USER SCHEDULES

Henric Wilkens presented the updated AD user schedule, informed the Committee on the impact onto the physics programme by the reduced SPS intensity and summarised the support of the AIDA 2020 project to the CERN test beam users.

The updated AD user schedule takes into account the delayed start of the ATRAP experiment. The delay resulted from the re-assembly of the ATRAP instrument after the heat leak into the apparatus has been repaired. An extended AD user meeting is scheduled for 20 September 2016 to discuss the recommendation of the AD community on the connection of the existing AD experiments to the ELENA machine.

The reduced SPS beam intensity and reduced duty cycle because of the vacuum leak at the SPS high-energy internal beam dump affects all SPS users. The COMPASS experiment is most affected due to the high proton intensity needed for their programme. In the current
condition COMPASS may receive in 2016 about one third of the expected number of protons for this year.

Within the AIDA 2020 project, the trans-national access programme has supported 136 users during their participation in beam tests at CERN. Also a new beam telescope is being prepared and will soon be available for the PS East Area users.

6. DISCUSSION OF THE OPEN SESSION

6.1 NA63

The SPSC welcomes the preliminary results related to radiation reaction measurements with a positron beam shown by the NA63 collaboration from its 2016 data. The Committee takes note of the difficulties encountered by NA63 during the data-taking period due to the PS power converter incident.

The Committee looks forward to receiving a quantitative evaluation of the 2016 data including detailed comparisons of the data to simulations of all experimental configurations before considering a potential second run for the study of radiation reaction by NA63 with positrons in 2017.

6.2 ICARUS

The Committee is pleased with the progress made by the ICARUS Collaboration on the analysis of the cosmic ray and CNGS beam data sets. The SPSC encourages the Collaboration to complete the analysis of the full samples.

6.3 OPERA

The Committee is pleased with the steady progress achieved by the OPERA Collaboration in their neutrino oscillation analyses and their cosmic ray studies. The SPSC looks forward to the final results from the OPERA data including a comprehensive combined analysis of all three neutrino flavours.

The SPSC recognises the high scientific value of the OPERA neutrino samples and notes with pleasure the steps taken by the Collaboration and CERN towards long-term storage of the OPERA data and analysis tools.

6.4 COMPASS

The SPSC notes with satisfaction the progress of the COMPASS collaboration in the analysis of existing data sets and their publication. The Committee also notes with pleasure the substantial improvements in several sub-detectors for the ongoing run.

The Committee is pleased to see first physics results for deeply virtual Compton scattering (DVCS) from the analysis of the 2012 run. However the Committee notes that in the 2012 data a discrepancy in the number of reconstructed exclusive events for positive and negative beam charge is not understood and urges the Collaboration to take all steps necessary to resolve this issue in view of the measurement of the beam-charge asymmetry for DVCS in the 2016 and 2017 runs.
The SPSC **congratulates** the collaboration for the successful Drell-Yan run in 2015 and **is pleased** to see first results of the ongoing data analysis.

The SPSC **received** the request for a COMPASS Drell-Yan run in 2018. The Committee **recognises** the strong physics motivation to increase the precision of the target polarisation asymmetry with extra data and **is looking forward to** a first measurement of this asymmetry based on 2015 data to assess this request.

6.5 **CLOUD**

The SPSC **congratulates** the CLOUD consortium for the results obtained on biogenic nucleation and growth measurements. The Committee **is pleased** by the outcome of the CLOUD10 run and by the progress in the preparation of CLOUD11.

The SPSC **encourages** both CERN and the CLOUD consortium to provide adequate support on site in order to exploit the forthcoming runs on biogenic and anthropogenic nucleation.

6.6 **AIDA2020**

The SPSC **notes** the broad variety of the projects supported by AIDA2020 and **encourages** allocation of test beams at a level compatible with the overall test beam availability.

7. **AOB**

For the SPSC meetings in 2017 the following dates are foreseen:
- 17 and 18 January 2017;
- 4 and 5 April 2017;
- 20 and 21 June 2017;
- 17 and 18 October 2017.

8. **DOCUMENTS RECEIVED**

- Draft Minutes of the 121st Meeting of the SPSC, Tuesday and Wednesday, 19-20 April, 2016, CERN-SPSC-2016-021;
- OPERA Status Report, CERN-SPSC-2016-023, SPSC-SR-188;
- NA63: Status for 2016 and plans for 2017, CERN-SPSC-2016-024, SPSC-SR-189;
- COMPASS Status Report 2016, CERN-SPSC-2016-025, SPSC-SR-190;
- ICARUS report to the CXXII Meeting of the SPSC, CERN-SPSC-2016-027, SPSC-SR-191;
- Agenda of the 122nd Meeting of the SPSC, Tuesday and Wednesday, 21-22 June 2016, CERN-SPSC-2016-022, SPSC-A-122.

SPSC documents on the CERN Document Server (CDS):

Christoph Rembser
E-mail: Christoph.Rembser@cern.ch