MINUTES of the 126th Meeting of the SPSC
Held on Tuesday 20 June and Wednesday 21 June 2017

OPEN SESSION

1. Status and plans of the NA63 Experiment           Ulrik Uggerhoj
2. Status and plans of the CLOUD Experiment        Ken Carslaw
3. Status and plans of the NA64 Experiment          Sergei Gninenko
4. Status and plans of COMPASS Experiment          Oleg Denisov
5. Results from the OPERA Experiment               Giovanni De Lellis
6. Results from the ICARUS Experiment              Alessandro Menegolli

CLOSED SESSION

Present:

D. Bernard, D. Boer, A. Bueno\(^1\), E. Elsen, R. Forty, L. Gatignon, M. Krammer,
M. van Leeuwen, S. Malvezzi, J. Monroe, J. Nash (Chair), B. Panzer-Steindl, C. Rembser
(Scientific Secretary), G. Salam, G. Schnell, R. Steerenberg, F. Terranova, H. Wilkens,
G. Neyens, A. Stahl

\(^1\) Present on Tuesday only

Apologies: X. Fléchard, R. Losito, P. Moskal, M. Tarbutt,
1. **DRAFT MINUTES OF THE 125th MEETING OF THE SPSC HELD ON 4 APRIL AND 5 APRIL 2016**

The minutes of SPSC125 were approved (CERN-SPSC-2017-017, SPSC-125).

2. **CHAIRMAN’S REPORT**

The Chairman reported on last Strategic Policy Committee meetings (SPC) and the Research Board (RB) meeting, RB220. The following points were presented and, where necessary, discussed:

1) The SPSC presented preliminary results from the NA62 experiment and congratulated the collaboration for the successful run in 2016 with an excellent performance of the full NA62 apparatus.

2) The Committee noted that the NP01 collaboration had completed refurbishment of the ICARUS detectors which were about to be shipped to FNAL, and that the SPSC would no longer follow progress on this activity once the detector has arrived at FNAL.

3) The SPSC presented the progress on the NP05 (BabyMIND) experiment and congratulated the collaboration on the completion of the detector.

4) The Committee presented the status of the NP02 (ProtoDUNE-DP) and NP04 (ProtoDUNE-SP) detectors. The committee was pleased to see the substantial progress by both collaborations in preparing the detectors for usage of the NP beamline. The SPSC noted its concern that the schedules for both collaborations towards operation with beam before LS2 have very limited contingency. The SPSC noted that should the collaborations wish to extend operation beyond the start of LS2, the SPSC would expect a request to continue operations in EHN1.

5) The committee presented a summary of the final report from the RD52 collaboration. The SPSC congratulated the Collaboration on their results and noted that RD52 will not ask for more beam time beyond 2017.

6) The SPSC described the further addendum to the proposal by the OSQAR collaboration for a second Chameleon search run (SPSC-P-331-ADD-1-ADD-1) and recommended approval of such a run for summer 2017.

7) The SPSC congratulated the COMPASS Collaboration for the first measurement of transverse-spin-dependent azimuthal asymmetries in the Drell-Yan process.

8) The Committee noted the proposal by the NA64 collaboration to devote two weeks of this autumn’s run to the search for a new boson with visible decays to electron-positron pairs (SPSC-SR-211). The SPSC judged the proposal to be interesting and timely and recommended its approval.

The Research Board noted points 1, 2, 3, 4, 5, and 7 and endorsed points 6 and 8.

After discussion with the CERN management, the Committee is invited to continue the review of the proposals for future use of the Neutrino Platform infrastructure, including users who wish to have access to the use of the EHN1 beam lines after the LS2 shutdown. The SPSC will call for proposals for experimentation at the Neutrino Platform at regular intervals and hold a dedicated meeting. It will announce the selection of proposals to the RB, taking into account scientific quality, resource impact and schedule. The Committee aims to have details for the first call finalised by the October SPSC meeting.
3. STATUS OF ACCELERATORS

Rende Steerenberg presented the status of the accelerator complex and the progress since the last SPSC meeting (SPSC125).

Despite some delays in the powering of the PS Booster systems because of the cabling campaign, first beam for setting up was injected into the Booster on 17 April 2017, followed by beam to the PS the same day and to the SPS one week later.

The East Area, nTOF and AD physics started according to schedule on 1 May 2017. The SPS North Area physics also started in time, initially with lower intensity due to an aperture restriction in the SPS that could only be resolved during the technical stop on 31 May 2017. Today the intensity to the SPS North area is at the requested level. The first 2017 AWAKE run was also successfully setup and could be completed the weekend before this meeting.

In parallel, the ion chain was re-commissioned successfully with Xenon ions for the physics run in November and December this year. Presently the beam is being tuned in the PS and in the coming week the beam will be transferred to the SPS for further setting up. Although the Xenon ion physics run will start in a few months only, there is a need to have Xenon ion in the SPS for machine development purposes.

Since the start of the physics run the machine availability has been very high: 98% for the PS Booster, 92% for the PS and 91% for the SPS.

The Multi-Turn Extraction (MTE), which is used to extract beam form the PS to the SPS for the SPS North Area fixed target physics benefited from an important improvement on the regulation of the PS Pole Face Windings responsible for tune and chromaticity control in the PS and for which the ripple on the extracted spill was reduced from close to 100 mV after LS1 to just a few mV in 2017.

During the technical stop on 31 May 2017, two aperture restrictions in the SPS were addressed by exchanging a magnet and vacuum chamber in sector 1, while damaged RF fingers were replaced in sector 5. The aperture restriction in this sector is not fully removed and will be addressed again during the technical stop early July 2017, but does not form an intensity limit to the North Area beam.

The quality of the SPS extracted beam spill is good. The bursts, observed last year have disappeared with the repair of an intermittent short to ground at the end of 2016. The only perturbing frequency on the spill is a 50 Hz ripple and some of its harmonics. The 50 Hz are compensated regularly as the amplitude slowly drifts and can suddenly increase following a super cycle change.

The AD did setup in a record time and beam was available to the experiment as scheduled. The cryogenic current comparator is now operational and allows measuring the beam intensity throughout the entire cycle, where previously this was only possible during small periods of the cycle. As usual the beam is shared between the six experiments on the basis of eight-hour shifts.

The ELENA beam commissioning started already on 20 March 2017 with the local H- source that suffered from problems with the 100 kV transformer. Multiple replacements did not solve
the issue and it was therefore decided to run at 85 kV. Since 29 May 2017 three AD shifts per week are scheduled for ELENA commissioning with antiprotons, unfortunately not with much success until now due to beam loss in the AD to ELENA transfer line. The electron cooler should finally arrive in July at CERN after which it will have to be assembled, installed and commissioned.

Concerning the schedule for the remaining run in 2017, the technical stops scheduled for week 27 and week 38 might be moved forward by one day to avoid restarting the accelerators late Friday afternoon. Otherwise steady running is planned for the summer period and the Xenon ion run in the North Area will start on 23 October 2017.

4. STATUS OF EXPERIMENTAL AREAS

Lau Gatignon reported on the start-up and status of the various experimental areas.

The East Area had a smooth and timely start-up in spite of a dense programme of magnet replacements in the heavily shielded primary area. All users have been able to take beam according to schedule. The engineering Change Request for sending ions to the CHARM irradiation facility has been approved and the CHARM users have submitted a beam request.

The last part of the shutdown in the North Area was marked by a large number of water leaks in the primary target areas. During the setting up and the start of the run, a few access magnets, also in the primary target area, suffered from over-heating. This was probably related to adjustments of the water flow in those magnets combined with difficulties to do longer tests before switching on the beams. As also some of the shutdown activities were delayed by a few days, the beam-commissioning period was reduced from a week to 1.5 days. Nevertheless almost all beams delivered good beam in time.

Only the H8 microbeam for the UA9 experiment could not be made to work properly, in spite of lots of beam tuning and inspections. Further investigations are foreseen during the year. Therefore the primary proton beam for UA9 was essentially lost.

Apart from this, operation was generally quite smooth, except a few water-cooling problems due to the cooling water set temperature increase from 25°C to 27°C last autumn. This increase is related to limitations of the EHN1 cooling tower. The main impact was on the cooling of the power converter for the super-conducting M1 magnet in the H2 CMS area, which could not be operated at full magnetic field. This is still being worked on.

The SPSC supports the efforts by the experimental area team to instrument an additional user zone at the EHN1 H4 beam line, which would optimise the use of the heavily subscribed test beam lines and could also serve as a dedicated area for NA64.

The 3 MW power converter for the SM2 spectrometer magnet in the COMPASS experiment has been replaced. After some initial controls issues with the polarity switch and some current fluctuations, which now have been strongly reduced, the power converter works well. The beam intensity for COMPASS has slowly been increased to nominal.

Also NA62 is steadily running at almost the requested intensity, namely 60% of the nominal intensity, which is however not limited by the SPS beams but by the experiment. The SPS spill structures are in general much better than during the 2016 run.

In the EHN1 extension the beam lines installation could finally start. Work on the experimental installations and infrastructure is progressing well.
Despite of a very short start-up period, the AD provided good beam in time with 94% beam availability so far. Some beam position fluctuations at the experiments still remain, after improvements during the shutdown. ELENA beam commission has been planned with 3 shifts per week. The GBAR installation is continuing and first tests with H-beam will start soon. BASE and ASACUSA have received the beam permit, but ASACUSA is not yet allowed to switch on the laser.

The AWAKE funding for the remaining time of the AWAKE Run 1 has been approved in CERN’s Medium Term Plan (MTP), however studies for a Run 2 and laboratory space for plasma cell development are not in the 2017 MTP. The preparations for the first Self Modulation Instability run were completed in time and the run was very efficient and successful. The installation of phase 2, the electron acceleration, is now advancing well.

The Committee congratulates the CERN experimental area team for the excellent preparations and efficient start of the physics runs and beam tests in the beam facilities.

5. PS AND SPS USER SCHEDULES

Henric Wilkens presented the updates to the injector schedule 2017, to the 2017 PS and SPS user’s schedule and gave an outlook to the 2018 accelerator and user’s schedules.

For the 2017 run, on the accelerator side, three shifts of Machine Developments were exchanged to allow for two SPS scrubbing runs in week 41. As a consequence, for the users, the COLDEX test beam run in week 25, is not compatible with LHC running at that time, thus it is be moved to week 50, in the reserve period of the NA61 Xenon ion run.

Concerning the experimental magnets, a new magnet protection system has been installed on the ATLAS-Morpurgo magnet in the SPS H8 beam line and it is being prepared for tests this summer. A field mapping campaign will take place in the Goliath magnet. During such a campaign for the CMS-M1 magnet, cooling problems appeared when the magnet was tested up to half field. A better set point for the cooling water parameters will need to be found to continue the measurements.

The situation of the requested amounts of liquid Helium from the Central Liquefier, required by the AD experiments is still not solved. While the AD experiments would need 11500 l per week, the CERN cryolab wishes the AD experiments to stay below a total request of 10 000 l per week.

For the CERN Beamline for Schools competition, two teams of high school students were selected to come to CERN, the Charging Cavaliers from Canada which will use a liquid scintillator detector for a fractional charge search, and the TCO-ASA Team from Italy to study their home build Cherenkov detector in the PS T9 beam line for one week in September.

For 2018 the injector schedule foresees a start of SPS fixed target physics on 9 April 2018, and the end of the run on 10 December 2018. The SPS will provide Lead ions to the LHC during the last four weeks of the run. For preparing the user’s schedule 2018, an important element will be the length of the Lead ion run approved for NA61 (with 60 days presently requested), which is competing with delivering beam to NA62 and COMPASS. Several options for the FT ion run are proposed, and need validation against the LS2 planning.
6. DISCUSSION OF THE OPEN SESSION

6.1 COMPASS

The Committee is pleased to see that the DVCS/SIDIS run is continuing without problems in 2017 and notes with satisfaction that the liquid hydrogen target now functions as expected.

The SPSC acknowledges the efforts by the COMPASS Collaboration to improve the Drell-Yan measurement and looks forward to the additional data from the 2018 run.

6.2 NA64

The Committee congratulates the NA64 Collaboration for improving background suppression and pile-up algorithms in the preparation for a high-luminosity search for invisible decays of sub-GeV dark photons.

6.3 NA63

The Committee congratulates the NA63 Collaboration for the successful run in 2017 and looks forward to the precise comparison of the data with calculations of radiation reaction in the classical regime.

6.4 CLOUD

The SPSC congratulates the CLOUD Consortium for the successful 2016 run, for the results obtained in biogenic nucleation and for the development of global models based on experimental nucleation rates.

6.5 OPERA

The Committee congratulates the OPERA Collaboration on the completion of the emulsion scanning and identification of 10 candidate events.

The SPSC looks forward to the completion of the OPERA programme, aiming for a final annual review in the coming year.

6.6 ICARUS

The Committee congratulates the ICARUS Collaboration for their pioneering work on the Liquid Argon Time Projection Chamber technology and for the results achieved with the ICARUS-T600 detector. The SPSC wishes the ICARUS Collaboration success for the future operation at Fermilab.

7. FOLLOW-UP ON EXPERIMENTS AND PROPOSALS

7.1 AWAKE

The SPSC congratulates the AWAKE Collaboration on the completion of very successful beam time in June 2017 and is looking forward to seeing results from measurements with electron beam.
7.2 SPSC-EOI-016 (MUON-FLUX MEASUREMENTS FOR SHIP)

The Committee acknowledges receipt of an Expression of Interest, EOI-016, from the SHiP Collaboration to measure the muon flux from a SHiP-like target in the 400 GeV/c H4 primary proton beam. The SPSC recognises the importance of such a measurement for the SHiP programme and will continue to review the Expression of Interest.

7.3 SPSC-I-246

The SPSC acknowledges receipt of a Letter of Intent, SPSC-I-246, describing a modular approach for Liquid Argon TPC Neutrino Detectors for near detector environments.

8. AOB

8.1 PROVISIONAL DATES FOR SPSC MEETINGS IN 2018

For the meetings of the SPSC in 2018 the following dates are foreseen

- Tuesday 23 and Wednesday 24 January 2018;
- Thursday 19 and Friday 20 April 2018;
- Thursday 7 and Friday 8 June 2018;
- Tuesday 16 and Wednesday 17 October 2018.

The dates will be confirmed in the next meeting of the committee, SPSC127 in October 2017.

9. DOCUMENTS RECEIVED

- Muon-flux measurements for SHiP at H4, CERN-SPSC-2017-020, SPSC-EOI-016;
- Status report of the OPERA experiment, CERN-SPSC-2017-024, SPSC-SR-216;

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

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