CERN-SPSC-2024- 025
SPSC-154
September 2024

Minutes of the 154 Meeting of the SPSC
Tuesday 3 and Wednesday 4 September 2024

OPEN SESSION 3 September 2024

1. Final report from NA63	Ulrik Uggerhoj
2. Status and plans of NA64 e/mu	Benjamin Oberhauser
3. Status and plans of AMBER	Jan Friedrich

CLOSED SESSION 3 AND 4 SEPTEMBER 2024

Present:
Achim Geiser, Alessandro Bacchetta, Barbara Holzer, Carl Lindstrøm, Carlos Lourenço (Scientific Secretary), Christine Marquet*, Daniel Rodriguez, Eve Stenson*, Gabor Veres, Johannes Bernhard, Jordan Nash (Chair), Lars Eklund, Marcella Bona, Marco Contalbrigo, Michael Wurm*, Pippa Wells, Rende Steerenberg, Richard Hawkings, Rocio Vilar Cortabitarte, Thomas Udem*, Urs Wiedemann

* via zoom

1. MINUTES OF THE 153rd MEETING OF THE SPSC

The SPSC-153 minutes were approved (CERN-SPSC-2024-020, SPSC-153).

2. CHAIRPERSONS'S REPORT

The Chair reported on the last Research Board (RB 249) meeting. The following points were presented to the RB and, where necessary, discussed.

1) The SPSC presented the progress shown at the annual reviews for the Neutrino Platform experiments: NP02, NP04, NP06, NP07.
2) The SPSC recommended up to 8 weeks of beam time in 2025 for NP04 if it is ready to make productive use of the time.
3) The SPSC summarized the reports from the annual review for NA62.
4) The SPSC presented the progress for WCTE and recommended that the experiment be the first to operate in T9 in 2025.
5) The SPSC introduced the proposals for future running of MADMAX and the test run for MUonE.

The RB noted points 1, 3, and 5, and endorsed points 2 and 4.

3. STATUS OF THE ACCELERATOR COMPLEX

Rende Steerenberg began his presentation by discussing the remaining 2024 injector schedule, which foresees an additional 12 weeks of operation before the start of the Year-End Technical Stop (YETS). He noted that proton running is progressing well and is on track with the planned schedule. However, the availability of the Pb ion beam from Linac 3 was delayed by more than two weeks due to a breakdown of source-related equipment. This delay was mitigated during the LEIR re-commissioning by implementing several shortcuts. For instance, machine settings from last year's run were reused, although the initial plan was to start from theoretical models for further optimisation. Some of this optimisation work will still be carried out in parallel with beam commissioning in the PS and the SPS. Despite the delays, the delivery of Pb ions to the LHC and the North Area remains on schedule.

R. Steerenberg then presented updates to the draft 2025 Injectors schedule, which he initially shared at SPSC#153 in May. He mentioned that the restart of the North Area in 2025 is still under discussion, and the dates provided in the draft schedule are yet to be confirmed. Concluding the schedule-related topics, he informed the SPSC about potential alternative dates for LS3, emphasizing that discussions are ongoing. The current baseline start date remains 17 November 2025. The upcoming LS3 readiness review, scheduled for 11–13 September, will provide additional input for the CERN management to make a final decision.

R. Steerenberg also presented the SPSC-related facilities that have requested to operate parts of their facilities during LS3. He asked the SPSC to provide feedback on the merits of these requests, which should be forwarded to the Research Board for a final decision. He then provided an overview of the accelerator complex status, highlighting several key points: improvements to the energy stability of the Linac 4 beam, the status and future plans regarding the water leak in a PS Booster quadrupole, and the strong performance of the AD/ELENA. However, he also reported a problem with the AD horn, which was damaged due to sparking and had to be replaced. He concluded the status report by showing the SPS availability, issues encountered, and the ongoing improvements to the slow-extracted beam spill quality through the optimization of empty bucket channeling control.

R. Steerenberg wrapped up his presentation by summarizing the key points and reiterated the request for the SPSC to provide input to the Research Board regarding the operation of some facilities without beam during a portion of LS3.

4. STATUS OF EXPERIMENTAL AREAS

Johannes Bernhard reported on the status of the North and East Areas, as well as of the experimental areas of AD/ELENA.

In the North Area, a water leak on a magnet in the TCC2 target area limited the H2 beam line to a maximum momentum of 150 GeV/c for about 3 months, fortunately without major impact on the users due to optimized scheduling. The magnet was replaced in the last week of July during a 3-day intervention. A major issue with the first P42 XTAX in TCC2 has been found, making it unusable until its repair will be possible, during LS3, and also blocking the first H6/H8 XTAX. Operation with only the second set of XTAXs is possible until LS3 thanks to a safety derogation. Given this problem, the NA62 beam dump run had to be postponed for several days. The moving beam issue for H2 has slightly perturbed NA61 data taking until a mitigation was found. The issue is not yet resolved but an automatic correction of this movement is being prepared as a mitigation. The M2 beams for the AMBER APX run have been prepared in time and the CEDAR detectors showed improved performance after their refurbishment. A high intensity test shows promising results for increasing the M2 muon beam intensity in the future.

In the East Area, all works for the installation of the WCTE experiment in the T9 area have been completed in time and the area is ready to receive the experiment, currently being assembled in the East Hall. In T11, a test beam campaign for P349 has been prepared and successfully completed.

Concerning the AD/ELENA experimental areas, the new TELMAX (TEst Line for Machine And eXperiments) line and corresponding experimental area are taking shape and will be ready to receive the first experiment in the next weeks. The usable surface for users has been increased and standard services (such as electricity and demineralized water) are available.

5. NEWS FROM THE PS AND SPS COORDINATOR

Eva Barbara Holzer presented the version 3.2.1 of the User Schedule. The number of change requests from the user groups is even higher than in previous years. Fourteen User Schedule versions were produced since the last LHCC in May, with a total of 31 versions in 2024. As many as 28 beam slots, corresponding to 30 weeks of beam time, were cancelled by the users, not including the beam slots that had been immediately re-scheduled. Despite some of the cancellations being declared on a very short notice, almost all the slots could be taken over by other users. Several new beam requests could be accommodated as well. Due to the extension of the proton run, all users, even the non-revised ones, could be scheduled, if they were sufficiently flexible with the dates. Still, too many proton beam requests at the very end of the year meant that some of the not-reviewed activities had to be postponed to 2025.

The User Schedule for the lead beam was presented. CHIMERA will take 19 days in the PS East Area. In the SPS North Area, three weeks of 150 A GeV/c 208Pb82+ beam will be followed by one week of 13.5 A GeV/c. Fragmented ion beams for NA61 in the last week

means that no ion beam will be available in the H4 beamline in that week. The overbooking of the SPS Pb beam requires parallel running even during the ion beam period.

6. DISCUSSIONS ON PROJECTS PRESENTED IN THE OPEN SESSION

6.1 NA64

The SPSC **congratulates** the NA64 Collaboration for the publication of improved exclusion limits in the parameter space of feebly interacting particles, relevant for the observed relic dark matter density and muon g-2 anomaly, and is **looking forward to** the first results obtained exploiting muon or positron high-energy beams to reach an enhanced sensitivity in the mass range above 100 MeV.

6.2 AMBER

The SPSC **appreciates** the successful data-taking by AMBER dedicated to measuring the anti-proton production cross section of protons off protons and deuterons, and it **encourages** the collaboration to expedite the analysis of all data sets and publish the results as soon as possible. The SPSC **recommends** that the collaboration concentrates on the completion of the essential components required for the proton-radius measurement, so as to start the physics run in 2025 as early as possible.

7. DISCUSSIONS ON OTHER PROJECTS

7.1 Hyper-K Underwater Electronics Assembly

The SPSC sees no reasons, from a scientific perspective, preventing the realisation at CERN of the Hyper-K Underwater Electronics Assembly project.

7.2 MUonE

The SPSC has reviewed the proposal received from the MUonE Collaboration for a first phase of the experiment. The proposal presents a reduced-sized version of the experiment, requesting a physics run in the M2 beamline during 2025. The committee **recognizes** that this is an essential step towards the full-scale experiment and **recommends** the approval of this first phase of MUonE. The committee will monitor the progress of the preparation and will confirm its recommendation of beam allocation at the November SPSC meeting.

7.3 MADMAX

MADMAX presented a compelling programme for axion searches during LS3 in an addendum to their proposal that will probe axion masses around 80 μeV with unprecedented precision. The experimental technique has been demonstrated with smaller scale prototypes and their apparatus is on track to be ready for data taking in the North Area in 2026. The programme is compatible with the North Area activities during LS3 and the use of CERN resources is limited. Therefore, the SPSC **recommends** the approval of the proposed programme, under the assumption that it is sufficiently flexible to accommodate the ongoing EA work (NA-cons).

8. DOCUMENTS SUBMITTED

- Minutes of the 153rd Meeting of the SPSC, https://cds.cern.ch/record/2897394
- AMBER Status Report, https://cds.cern.ch/record/2907624
- NA64 Status Report, http://cds.cern.ch/record/2907892
- MUonE Phase 1 Proposal revisited, https://cds.cern.ch/record/2896293
- Hyper-K UEA Addendum to the LoI, https://cds.cern.ch/record/2887744

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

Carlos Lourenço
E-mail: Carlos.Lourenco@cern.ch