

**MINUTES on the 103rd Meeting of the SPSC
Held on Tuesday 25 October and Wednesday 26 October 2011**

OPEN SESSION

- | | | |
|----|---|--------------------|
| 1. | Status and plans of the NA61 experiment | Marek Gazdzicki |
| 2. | Status and plans of the NA63 experiment | Ulrik Uggerhoej |
| 3. | Status and plans of the CAST experiment | Ester Ferrer-Ribas |
| 4. | Status and plans of the OSQAR experiment | Pierre Pugnât |
| 5. | Status and plans of the UA9 experiment | Walter Scandale |
| 6. | A proposal to measure the gravitational behaviour of antihydrogen at rest | Patrice Perez |

CLOSED SESSION

Present:

S. Bertolucci, P. Bloch, H. Breuker, M. Charlton, O. Cremonesi, A. Denig, L. Falk¹⁾, L. Favart, L. Feld, E. Gallo²⁾, L. Gagnon, S. Maury, B. Panzer-Steindl, L. Ramello, C. Rembser (scientific secretary), E. Rondio, N. Severijns, A. Specka²⁾, C. Touramanis, C. Vallée (Chair), U. Wiedemann, I. Wingerter-Seez

¹⁾ Present on Wednesday only; ²⁾ present on Tuesday only

Apologies: P. Collier, M. Gonin



1. MINUTES OF THE 102nd MEETING OF THE SPSC HELD ON 28 JUNE AND 29 JUNE 2011

The minutes of SPSC102 were approved (CERN-SPSC-2011-027, SPSC-102).

2. CHAIRMAN'S REPORT FROM RB197

The Chairman reported on the Research Board (RB) meeting, RB197. The following points were presented and, where necessary, discussed:

- 1) The SPSC reported about the progress of OPERA in data analysis and publication of results, as well as on updated projections for ν_τ observation, and its encouragements for further timely analysis of the data.
- 2) The SPSC congratulated the ICARUS Collaboration for bringing its Liquid Argon (LAr) TPC in stable operation and for its good progress in automatic reconstruction of events, and expressed its wish to see physics results soon.
- 3) The new COMPASS spin and spectroscopy results on the 2007-2009 data as well as efficient data taking in 2010 were reported. The updated plans for 2012, including Primakoff and exploratory DVCS measurements, were presented and the corresponding data taking was recommended.
- 4) The SPSC shortly presented the DREAM request to be registered as a CERN RD project and expressed its positive recommendation.
- 5) The LOI for Proton Driven Wakefield Acceleration was presented together with the main points to be reviewed before recommendation.
- 6) The SPSC summarised the feedback of the experiments on the various options considered for the long LHC shutdown. The Committee expressed its concern about the potential impact of this shutdown on the CERN Fixed Target program and recommended operation of the LHC injectors in 2014 to provide data to the experiments.

The Research Board noted points 1), 2), 5) and 6). The RB endorsed point 3), with an amount of COMPASS data taking to be optimized together with the overall Fixed Target programme. The RB also endorsed point 4),

with DREAM being labelled as RD52 and to be reviewed by the SPSC in the future.

3. STATUS OF ACCELERATORS

S. Maury reported on the operation of the accelerators.

The performance of the injector accelerators during 2011 was very good and high beam availability has been achieved for all experiments and beam tests.

Common downtime for all machines during the last months was mainly caused by intermittent electrical glitches due to thunderstorms or damaged power cables of the 18kV power line. For other singular faults, like faults of splitter magnets, corroded connectors or pipes, a temporary repair was done in a number of cases and a thorough repair is scheduled for the winter shutdown.

On 7 October 2011 the total integrated intensity on the nTOF target passed 1.55×10^{19} protons, the goal for 2011, and on 26 October 2011 the integrated number of protons in 2011 on the CNGS target exceeded 4.7×10^{19} protons, which exceeds 4.5×10^{19} protons expected for 2011.

LINAC2 and Booster were operating at very high efficiencies without major problems.

Also the PS run went very smoothly, recurring problems with cavities, in particular the 10 MHz cavities, are under investigation. As the PS is continuously providing high intensity beams, e.g. for CNGS, the number of radiation alarms has doubled compared to the number in 2010.

The new main-magnets power converter of the PS (POPS) was restarted after modification work early August. Caused by insufficient quality of a material used for electric contacts at some parts of the power converters, the POPS was stopped again and the contacts were modified. It is expected that the POPS will resume operation mid of November 2011.

The SPS was delivering beams to CNGS and the North Area with high efficiency, reaching 81% of efficiency for the fixed target experiments and 82% for CNGS since July 2011. The main reasons for interruptions were caused by downtime of the injectors (LINAC, Booster and PS), by vacuum leaks in the SPS beam splitter zone and a main SPS dipole.

The CNGS beam line efficiency suffered from a problem with the power supply of the horn and reflector which required to be operated with reduced current for a couple of weeks before the issue was fixed.

The Injectors and Experimental Facilities Committee (IEFC) discussed possibilities to study systematic effects of the accelerators and CNGS beam line which might effect the measurement of the neutrino velocity performed by the OPEARA experiment. The committee initiated a study to send an LHC-type bunched beam to the CNGS target, which will provide a precise timing for each extraction onto the target.

Since the repair of a vacuum leak at an ion pump, the AD is operating very well and an uptime of the AD machine of 100% has been reached in the last two weeks. The decelerator is prepared and ready to send beam to the AEGIS experiment at the end of this month.

In September the first meeting of the ELENA community took place initiating the discussion and planning of the profiles for manpower and budgets together with the CERN Department representatives.

The preparations for the operation of the injector accelerators with lead ions are progressing well and LINAC3, LEIR, PS and SPS are getting ready to send the ions to the LHC on 4 November 2011.

The Committee **thanked** the CERN accelerator teams for all work and efforts to reach such excellent performance of the accelerators in 2011.

4. STATUS OF EXPERIMENTAL AREAS

L. Gatignon presented the status of the experimental areas.

The operation of the PS East Area was smooth and a multitude of tests and experiments were successfully performed. Minor problems were caused by two magnets of which one was replaced in a technical stop and the other is carefully monitored as a possible repair, because of high radiation levels, is possible during the shutdown only. It was decided that the splitter magnet which caused delays during the start-up of the area, will not be replaced during the 2011/2012 shutdown but during the long shutdown starting in 2013 to minimise radiation dose to personnel.

After the delayed start-up of the SPS North Area caused by an almost simultaneous failure of the motors of three main beam dump collimators (TAX, Target Attenuators experimental areas) of different beam lines, reduced but secure operation conditions for the TAXes have been

developed. These settings met all requirements for the ongoing physics programme. Consolidation work, defined and followed-up by a special working group, on the TAXes is foreseen for the next two shutdowns of the injectors.

After some initial problems, the new access system in the North Area is working well. The main remaining issue is a recurrent communication problem with one of the doors.

The COMPASS and the NA61 experiments have been running with good and stable conditions.

Large efforts have been made to prepare the ECN3 underground cavern for the NA62 experiment. To extend the cavern for a new beam dump more than 30000m³ of earth have been moved and the concrete floor inside the cavern was repaired. Improvements of the design of the K12 beam TAXes are being implemented, following the lessons learned from the TAX failure in the North Area. Detailed studies for the new ventilation system of the cavern are under way and the CEDAR for the NA62 beam line has been successfully tested.

Since a few weeks the AD experiments are provided with an improved beam bunch length. In the AD experimental area a new software, which inhibits the beam ejection from the AD ring as soon as an access is taken into a secondary beam zone, further minimises the radiation dose for AD users.

The installation work for the AEGIS experiment in the experimental zone and in the counting rooms is progressing well. For the two weeks of tests during which the AEGIS collaboration plans to attempt trapping of anti-protons the installation work will pause.

During the successful CNGS operation in 2011, 4.7×10^{19} protons were delivered which gives a total of 14.2×10^{19} protons delivered onto the CNGS target since 2006. The main issue was the failure of the power converter system of the horn and the reflector. Modifications were required to shield an electronic card which received accidental triggers by a close-by inductor. Thus from 26 September until 4 October the horn and reflector were operated with less current than usual. The system is now back to nominal operation.

To study systematic effects on the measurement of the neutrino velocity performed by the OPERA experiment, the experimental area and machine experts are working on two additional studies, which are planned to be performed during the remaining run time in 2011.

The first study is to investigate the time structure of the CNGS muon spill using very fast diamond detectors. These detectors will be installed during

the technical stop beginning of November 2011 and will be ready for first tests afterwards.

The second study is to send a bunched LHC-type beam with an intensity of 2.5×10^{11} - 3.5×10^{11} protons with a bunch width of about 1.6ns and 500ns bunch spacing onto the CNGS target from 27 October until 6 November 2011. For this type of beam OPERA expects to observe about one neutrino event per day. The commissioning of the beam will be done during the next days and should take two days for preparation off-line and two days of commissioning with beam.

After the test with bunched beam it is planned to continue with nominal CNGS beam for the studies with the diamond detectors for the muon time measurements.

5. PS, SPS AND AD SCHEDULES

The Committee **thanked** the CERN experimental area teams for providing such excellent help and support for the experiments and beam tests during this year.

H. Breuker reported on the status of the experiments and beam tests at the AD, PS East Area and SPS North Area.

Starting 4 November 2011, lead ions will be sent to the LHC. The end of the proton run for the North Area is scheduled for 7 November 2011. From 11 November 2011 onwards it is scheduled to delivery ions to the NA61 experiment in the North Area. The end of the 2011 proton run for the AD, nTOF and East Area is foreseen for 21 November 2011. The AEGIS experiment will start their tests with the AD beam on 7 November 2011.

The end of the heavy ion operation of all machines is scheduled for 8 December 2011.

At all machines the foreseen programmes have been achieved so far and the beam availability from all injectors has been excellent in 2011.

The call for beam request for the 2012 injector run was sent to the users early October and requests will be accepted up to 19 December 2011. Because of the long shutdown in 2013 and 2014, more user requests for 2012 are expected than usual, thus to discuss in the Committee possible conflicts for the 2012 run, a first version of the 2012 users schedule must be presented and discussed in the next meeting of the SPSC.

6. DISCUSSION OF THE OPEN SESSION

6.1 A PROPOSAL TO MEASURE THE GRAVITATIONAL BEHAVIOUR OF ANTIHYDROGEN AT REST

The SPSC **received** with interest a proposal to measure the gravitational behaviour of antihydrogen at rest. The Committee **acknowledges** the physics motivation and the potential interest of the experimental techniques developed. The SPSC **recognises** that the proposal fits well to the new possibilities of ELENA and **will further review** the proposal.

6.2 NA61-SHINE

The Committee **notes with satisfaction** that NA61 has completed the analysis and has published the 2007 data on pion production in proton-Carbon collisions, and that it has released preliminary data on kaon production.

The Committee **notes** the progress of the calibration on the 2009 data and **looks forward** to physics results from this data set.

The SPSC **appreciates** that NA61 is reorganising the analysis software and has successfully upgraded its detector to make full use of a light ion beam for its search of a critical point in the QCD phase diagram.

The SPSC **recommends** that adequate beam time is allocated in 2012 to allow for the completion of the energy scan with secondary light ions prior to the shut down in 2013.

The SPSC is **pleased** with the progress of the teams in the iThemba Labs in South Africa and in the CERN beam department towards determining the settings of the ion source for a primary Argon and Xenon beams. The SPSC **strongly recommends** that all steps will be taken to make full use of this development with the aim of delivering a primary Argon beam in 2014 and a primary Xenon beam in 2015 to the NA61 experiment.

6.3 NA49

The SPSC **notes with pleasure** that, since its last Annual Review, the NA49 collaboration has maintained a vigorous analysis programme to fully exploit the physics content of their data sets. A number of new results have been published which contribute significantly to the field, and

several more analyses are ongoing. In the light of this, the SPSC **recommends** continued support for the NA49 data analysis.

6.4 NA60

The SPSC **notes with pleasure** that, since its last Annual Review, the NA60 collaboration is continuing its analysis programme to fully exploit the physics content of their data sets. A number of new results have been published which contribute significantly to the understanding of heavy ion collisions at SPS energies and which are considered to be important in the field. Several more analyses are ongoing. In the light of this, the SPSC **recommends** continued support for the NA60 data analysis.

6.5 NA63

The SPSC **notes** the progress achieved by the NA63 collaboration in the analysis of the Landau-Pomeranchuk-Migdal, magnetic suppression and structured target resonance data and **notes** that the collaboration continues to publish their results.

The Committee also **notes** with interest the proposals of the NA63 collaboration to study positron production in a diamond by energetic electron impact and to study bremsstrahlung from ions.

In order to minimise the impact on the NA61 experiment, the committee **advises** the collaboration to focus in 2012 on the positron production in crystals. The Committee **encourages** the collaboration to finalise the experimental setup and **will further review** the proposal.

6.6 CAST

The SPSC **congratulates** the CAST collaboration for the successful conclusion of the ^3He programme and for the publication of the first ^3He results. The Committee **is looking forward** to the final publication of ^3He data.

The Committee **supports** the request for the ^4He running and for CERN infrastructure resources in 2012.

The Committee **acknowledges** the relevance of the ongoing R&D efforts to reduce background levels and further improve detectors for a new vacuum programme.

6.7 OSQAR

The SPSC **notes** that the OSQAR collaboration has submitted first results of its regeneration experiment for publication.

The SPSC **takes note** of the plans of the OSQAR collaboration to achieve in 2012 an improved axion search limit that is competitive with recent results of the ALPS Collaboration. The SPSC **recommends** support of the 2012 run.

6.8 UA9-CRYSTAL

The Committee **notes** with satisfaction the progress in both hardware and analysis which have been achieved by the UA9 collaboration.

The Committee **notes with pleasure** the encouraging proton and ion collimation results obtained with crystal channelling.

The Committee **supports** the request by the collaboration for further beam time in 2012 at the level of what has been provided in 2011.

7. FOLLOW-UP ON EXPERIMENTS AND PROPOSALS

7.1 DISCUSSION ON THE LOI ON PROTON-DRIVEN PLASMA WAKEFIELD ACCELERATION

The SPSC **recognises** the interest in testing plasma acceleration with proton drivers and its possible technological implications for future accelerators at CERN and elsewhere. The Committee **recognises** the opportunity to use the SPS beams for these studies. The Committee **encourages** the collaboration to work towards a Technical Design Report in order to allow CERN to fully assess the technical feasibility, the timescale and the resources within the overall CERN programme.

7.2 CNGS1 (OPERA)

The Committee **notes** the results presented by the OPERA collaboration on 23 September 2011 and **appreciates** the ongoing efforts at CERN and Gran Sasso to scrutinise and cross-check the measurement in a timely manner.

7.3 DISCUSSION OF THE PROPOSALS SPSC-P-343 AND SPSC-P-345

The Committee **received** a proposal on a comprehensive search for anomalies from neutrino and anti-neutrino oscillations with two LAr-TPC imaging detectors at different distances from the CERN-PS (SPSC-P-345). The proposal follows a memorandum the Committee received earlier this year (SPSC-M-773). The SPSC **notes** the progress made in the proposal on the technical aspects of the LAr-TPC. The committee also **notes** that other issues have not been addressed at an appropriate level of details, including the design, location and timescale of a CERN neutrino facility.

The Committee also **received** a complementary proposal to extend the physics capabilities of the proposed LAr-TPC experiment by adding two magnetic spectrometers for measuring charged current neutrino interactions (SPSC-P-343). The Committee **requests** that for further review the efforts described in the two proposals should merge. The SPSC **expects** the collaborations to submit a common Technical Design Report.

8. A.O.B.

8.1 The dates for the SPSC meetings in 2012 are

- 17 January and 18 January 2012;
- 3 April and 4 April 2012;
- 26 June and 27 June 2012;
- 23 October and 24 October 2012.

9. DOCUMENTS RECEIVED

- Minutes of the 102nd Meeting of the SPSC held on Tuesday and Wednesday, 28-29 June 2011;
CERN-SPSC-2011-02; SPSC-102. - 2011.
- Status of the evidence for the onset of deconfinement and the urgent need for primary Ar beams;
CERN-SPSC-2011-028; SPSC-M-775. - 2011.
- Proposal to measure the Gravitational Behaviour of Antihydrogen at Rest;
CERN-SPSC-2011-029; SPSC-P-342. - 2011.
- Prospect for Charge Current Neutrino Interactions Measurements at the CERN-PS;
CERN-SPSC-2011-030; SPSC-P-343. - 2011.
- Status and plans for 2012, CERN NA63;
CERN-SPSC-2011-031; SPSC-P-327-ADD-3. - 2011.
- A comprehensive search for “anomalies” from neutrino and anti-neutrino oscillations at large mass differences ($\Delta m^2 \sim 1 \text{eV}^2$) with two LAr-TPC imaging detectors at different distances from the CERN-PS;
CERN-SPSC-2011-033; SPSC-P-345. - 2011.
- Status and plans of the CAST Experiment;
CERN-SPSC-2011-034; SPSC-SR-090. - 2011.
- Report from the NA61/SHINE experiment at the CERN SPS;
CERN-SPSC-2011-035; SPSC-SR-091. - 2011.
- Agenda for the 103rd Meeting of the SPSC on Tuesday 25 and Wednesday 26 October 2011
CERN-SPSC-2011-036 ; SPSC-A-103. - 2011.
- UA9 Status Report for 2011;
CERN-SPSC-2011-037; SPSC-SR-092. - 2011.
- OSQAR Annual Report 2011;
CERN-SPSC-2011-038; SPSC-SR-093. - 2011.
- Memorandum of the NA49 Collaboration to the SPSC;
CERN-SPSC-2011-039; SPSC-M-776. - 2011.
- NA60 Status Report;
CERN-SPSC-2011-040; SPSC-SR-094. - 2011.

CERN Document Server (CDS):

<http://cdsweb.cern.ch/search?sc=1&p=SPSC+2011>