

**MINUTES of the 112<sup>th</sup> Meeting of the SPSC**  
**Held on Tuesday 14 January and Wednesday 15 January 2014**

**OPEN SESSION**

- |    |                                                                       |                       |
|----|-----------------------------------------------------------------------|-----------------------|
| 1. | Status and plans of the ASACUSA experiment                            | Ryugo Hayano          |
| 2. | Status and plans of the ALPHA experiment                              | Jeffrey Hangst        |
| 3. | Status and plans of the ATRAP experiment                              | Gerald Gabrielse      |
| 4. | Status and plans of the BASE experiment                               | Stefan Ulmer          |
| 5. | Status and plans of the ACE experiment                                | Michael Holtzscheiter |
| 6. | Proposal for an experiment to search for light dark matter at the SPS | Sergei Gninenko       |

**CLOSED SESSION**

Present:

S. Bertolucci, M. Diehl, R. Forty, L. Gatignon, A. Ianni, I. Irastorza, A. Jokinen, M. Kowalska, G. Lanfranchi, T. Lasserre<sup>2)</sup>, S. Maury, B. Panzer-Steindl, L. Ramello, C. Rembser (scientific secretary), E. Rondio, M. Rozanska, G. Salam, S. Schönert, N. Severijns, A. Specka, R. Steerenberg, R. Thompson, C. Vallée (Chair), U. Wiedemann<sup>1)</sup>, H. Wilkens, M. Wing, I. Wingerter-Seez

<sup>1)</sup>Present on Tuesday only

<sup>2)</sup>Present on Wednesday only

Apologies: P. Collier, F. Sikler



1. MINUTES OF THE 111<sup>th</sup> MEETING OF THE SPSC HELD  
ON 22 OCTOBER AND 23 OCTOBER 2013

The minutes of SPSC111 were approved (CERN-SPSC-2013-033, SPSC-111).

2. CHAIRMAN'S REPORT FROM RB206

The Chairman welcomed the new members of the Committee, and thanked the outgoing members for their dedication and contributions over the past years.

The Chairman reported on the Research Board (RB) meeting, RB206.

The following points were presented and, where necessary, discussed.

- 1) The SPSC congratulated NA61 for the successful completion of the Beryllium-Beryllium ion scan and production of first results with these data, and showed their improved measurements of hadron production for neutrino beams.
- 2) The SPSC summarised the final results of NA63 for their approved programme and presented their progress is preparing the experimental setup for studying positron production in crystals.
- 3) The UA9 plans at LHC were presented as well as the tests foreseen at the SPS to commission their improved instrumentation.
- 4) The Committee reported on the successful OSQAR 2013 run and improved limits on Axion production, presented their progress in developing Fabry-Perrot cavities and recommended further support in 2014.
- 5) The SPSC summarized the further progress of CAST in instrumentation and low noise detectors, and supported the vacuum run scheduled in 2014 with an improved setup.
- 6) The Committee presented the main features of the IAXO LOI, as well as the EOI for a proton beam dump experiment, and summarized the main points under review for these two projects.

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

3. STATUS OF ACCELERATORS

S. Maury reported on the ongoing shutdown activities.

During the Long Shutdown 1 (LS1) in 2013 and 2014, work on all accelerators at CERN is ongoing. The work includes repairs, maintenance, consolidation of all machines as well as upgrades and work on performance improvements. New facilities as Linac4, HIE-ISOLDE and ELENA are build and preparations for major future upgrades are ongoing. All these activities are happening in parallel to the repair of the LHC magnet interconnects.

During the entire year 2013, work was ongoing at the ion source, RFQ and Linac3 to prepare for operation with Argon in 2015. The preparations were successful and the performance of the three injectors was shown to be reproducible even after longer machine stops.

At the PS Booster, in addition to the standard full maintenance programme, new RF cavities for Ring 4 are installed, new beam instrumentation is included and the beam dump is exchanged.

At the PS, next to the standard maintenance work, the ventilation system and the vacuum controls are upgraded, cables are replaced and magnets are refurbished. As well, additional shielding for the injection region (Route Goward) and the extraction region (above SS16) is installed.

Main activities at the SPS, next to the standard maintenance work, are the replacement of 18 kV transformers for the main power converters and the replacement of irradiated cables in BA1 and in TCC2. As well, new fibre systems in BA5, BA6 and BA1 are installed and magnets in BA5 receive a new coating. In addition major consolidation of the magnet valves is ongoing and the transfer tunnel TT10 is consolidated.

All work is on track for restarting the injector accelerator complex in time, the proton source will restart in March 2014, the PS is on schedule to resume operation for physics mid July 2014, the AD end of July 2014 and the work at the SPS is on track to deliver beam for the users mid October 2014.

#### 4. STATUS OF EXPERIMENTAL AREAS

L. Gagnon presented the status of the work and planned activities in the East and North experimental areas, as well as in the AD and AWAKE zones.

In the East Area the construction of the new irradiation facilities CHARM and IRRAD has started. In parallel to this activity, the CLOUD-8 run (a run without beam) took place successfully.

In the North Area the GIF++ design has been completed and it is foreseen to have this facility ready for commissioning by autumn 2014. The design of the EHN1 extension is being finalized with a view to start construction by mid 2014. It will house extensions of the two beam lines H2 and H4. In TCC8, the primary target area for the K12 beam line for NA62, the crane consolidation has started. Some minor modifications to the beam line were made, in particular to prepare a better location for the fast vacuum valve aiming to protect the straw detectors against the consequences of a rupture of the exit window of the CEDAR counter. For the NA61 ion run, full shielding (including a roof) upstream of the experiment is in preparation. COMPASS is actively preparing for the Drell-Yan run. The TCC2/TDC2 area has been prepared for the consolidation work. Having removed the most radioactive equipment, now the civil engineering repair activities are starting.

The work in the CNGS/AWAKE cavern has begun with in particular the removal of the CNGS shielding plugs (about 20 tons). The design of the tunnel for the electron beam has been finalized. In all aspects of the project one will use as much as possible CERN standards, as the experiment is fully integrated into the accelerator complex. This concerns drawings, software, DAQ and all interface issues in general.

The work in the AD ring is progressing well. A critical issue was the renovation of dipole magnet DR.BHN06, which will be reinstalled in February. The ejection line to include a branch-off to ELENA must be finished before the AD start-up. The installation of BASE experiment is progressing well, however the planning for the Y-shaped vacuum chambers

is tight and any delay in delivery may cause delay of the AD start-up. Also the construction of the new building B393 is on track.

## 5. PS AND SPS USER SCHEDULES

H. Wilkens presented the provisional injector accelerator schedules for 2014 and summarised the first version of the users schedule for 2014.

There were 25 requests for beam time in the PS East Hall and 39 requests for beam time at the SPS fixed target facilities.

At the PS all requests could be accommodated, beam time had to be reduced in one case only.

At the SPS, NA63 and Nucleon accepted to see their requests rescheduled to 2015. Typically half of the requested time could be scheduled in the H2, H4 and H8 beam line. In H6 two users have be scheduled in parallel when possible, which optimized the use of the beam time. The UA9 request for primary proton beam in the H8 beam line has not been scheduled as it conflicts with the NA62 physics run.

The PS/SPS user schedule will be made available to the users after it has been presented at the next meeting of the LHCC and the Research Board.

## 6. DISCUSSION OF THE OPEN SESSION

### 6.1 ASACUSA

The SPSC committee **appreciates** the improvements to the antihydrogen and antiprotonic Helium experimental setups.

The SPSC **looks forward to** two-photon spectroscopy on antiprotonic Helium and studies towards the spectroscopy on antihydrogen once beam is available at AD.

The SPSC **recognises** that the operation of the ASUCASA facility would benefit from the introduction of a second beam line for operation with ELENA.

### 6.2 ALPHA

The SPSC committee **welcomes** the rapid upgrade and optimisation of the ALPHA facility during 2012 and 2013.

The SPSC **is looking forward to** spectroscopy of antimatter when antiprotons will become available in the AD.

### 6.3 ATRAP

The Committee **congratulates** ATRAP on the publication of the results from 2012 and the construction of new experimental apparatus.

The SPSC **looks forward to** the installation of the new Ioffe trap apparatus at CERN and first antihydrogen results when the AD beam is available.

### 6.4 BASE

The SPSC **congratulates** the BASE Collaboration for achieving significant improvement in the performance of the detection and particle cooling systems. The Committee **notes**

**with satisfaction** that installation and commissioning of the setup are progressing well. The SPSC **acknowledges** the contributions by the BASE collaboration to the beam line construction and **recommends** that all efforts should be made to have it completed before the start of the AD physics run in 2014.

## 6.5 ACE

The SPSC **acknowledges** the progress by the ACE collaboration in disentangling the various contributions to the systematic error of the combined value of relative biological effectiveness (RBE) and **encourages** the collaboration to determine the dose values of the radiated samples.

The committee **recommends** the collaboration to investigate the possibility of a benchmark measurement at the AD in 2014 to be presented to the SPSC in a proposal.

The Committee **urges** the ACE collaboration to proceed in parallel with the analysis of all data sets towards a combined RBE value for antiprotons using the current version of a particle physics simulation programme for calculations of particle transport and interactions with matter (FLUKA).

## 6.7 P348

The Committee **welcomes** the received document SPSC-P-348 proposing the search for light dark matter using the SPS beam. The SPSC will **further review** the project.

# 7. FOLLOW-UP ON EXPERIMENTS AND PROPOSALS

## 7.1 LOI242 (IAXO)

The Committee **recognises** the physics motivation of an International Axion Observatory as described in the Letter of Intent SPSC-I-242, and considers that the proposed setup makes appropriate use of state-of-the-art technologies i.e. magnets, x-ray optics and low-background detectors. The Committee **encourages** the collaboration to take the next steps towards a Technical Design Report.

The Committee **recommends** that, in the process of preparing the TDR, the possibility to extend the physics reach with additional detectors compared to the baseline goal should be investigated. The collaboration should be further strengthened.

Considering the required funding, the SPSC **recommends** that the R&D for the TDR should be pursued within an MOU involving all interested parties.

## 7.2 EOI010

The Committee **received with interest** the response of the proponents to the questions raised in its review of EOI010.

The SPSC **recognises** the interesting physics potential of searching for heavy neutral leptons and investigating the properties of neutrinos.

Considering the large cost and complexity of the required beam infrastructure as well as the significant associated beam intensity, such a project should be designed as a general purpose beam dump facility with the broadest possible physics programme, including maximum reach in the investigation of the hidden sector.

To further review the project the Committee **would need** an extended proposal with further

developed physics goals, a more detailed technical design and a stronger collaboration.

### 7.3 NA63

The SPSC **notes with pleasure** the successful test of the MIMOSA detector setup at Aarhus. The committee **recommends** that adequate beam time should be granted in 2015 to study positron production in crystals.

### 7.4 OSQAR

The Committee **notes** the progress achieved by the OSQAR collaboration and **looks forward to** receiving a detailed plan for 2014 activities.

## 8. DOCUMENTS RECEIVED

- Minutes of the 111th meeting of the SPSC, Tuesday 22 and Wednesday 23 October 2013, CERN-SPSC-2013-033, SPSC-111-2013;
- Proposal for an Experiment to Search for Light Dark Matter at the SPS, CERN-SPSC-2013-034, SPSC-P-348-2013;
- NA63 - Detector tests and readiness for 2014, CERN-SPSC-2013-036, SPSC-SR-127-2013;
- BASE - Status Report 2013, CERN-SPSC-2014-001, SPSC-SR-128-2014;
- Report on Experiment AD-4/ACE, CERN-SPSC-2014-002, SPSC-SR-129-2014;
- ATRAP Technical Overview, CERN-SPSC-2014-003, SPSC-SR-130-2014;
- Status Report ASACUSA - Recent progress and plans for 2014, CERN-SPSC-2014-004, SPSC-SR-131-2014;
- ALPHA Experiment Status Report for 2013, CERN-SPSC-2014-005, SPSC-SR-132-2014.

CERN Document Server (CDS):

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