MINUTES of the 94th Meeting of the SPSC
Held on Tuesday and Wednesday November 24th and 25th 2009

OPEN SESSION:

1. NA48 / NA62  A. Ceccucci
2. UA9 – CRYSTAL  W. Scandale
3. OSQAR  G. Morville

CLOSED SESSION

Present:

S. Bertolucci¹, P. Bloch¹, B. Bloch-Devaux, H. Breuker, M. Charlton, F. Close, A. Ereditato, L. Feld, E. Gallo, L. Gatignon, L. Garrido, P. Giubellino, S. Katsanevas¹, J. Knobloch, M. Mannelli (Secretary), S. Maury, P. Newman, E. Rondio, C. Touramanis, C. Vallée (Chairman), U. Wiedemann

Apologies: P. Collier, M. Erdmann, P. Marage

1) Present on Tuesday only
2) Present on Wednesday only
1. MINUTES OF THE 93rd MEETING OF THE SPSC, HELD ON SEPTEMBER 29th and 30th 2009

The Minutes of SPSC 93 were approved with a minor change.

2. REPORT FROM THE CHAIRMAN

There has been no Research Board meeting since SPSC 93.

The Chairman reported about the requests for extension of the run by two weeks issued from the AD experiments and the CLOUD Collaboration. These requests have been briefly discussed between the Chairman, the corresponding SPSC referees and the experiments, and have been considered positively. These run extensions were then granted by the CERN Management.

3. STATUS OF ACCELERATORS

S. Maury reported on the status of the Accelerators.

It was announced that the LHC has had two beams simultaneously circulating with very good lifetimes. First test of synchronization of the beams and collision tests in the experiments have started. Great progress!

The LINAC2 was running since the last meeting at the end of September without any major problem. We shall only mention that the fire on the roof of the PS-MPS building hosting the transfer line power converters in September caused a few worries and perturbations due to the cleaning of the power converter after the use of the fire extinguishers.

The BOOSTER has been delivering all physics and MD beams, with minor problems due to the new RF tubes showing faster ageing than the previous ones; the operation was also disturbed by some stability issues of the ring 4 distributor.

A major failure due to a water leak inside the vacuum chamber of the injection septum of the PS occurred the 2nd of October. More than one week was required to replace to the septum magnet and bake out the new one. As a technical stop was foreseen the week after, and as a long period was necessary for the repair, the technical stop was advanced in all machines in order to minimize the time lost for operations. In the PS, the bus-bar of the main magnet 23 and the slow extraction sextupole in SS07 have been replaced. The bus bar is part of the ageing hardware of the PS. Minor problems occurred during the start-up period: the trip of the figure-of-eight loop, impossibility to operate the 80Mhz cavity for the ions, etc., which have disturbed operations.
A new pick-up configuration of the radial loop has improved the radial position of the beams during the transition crossing in the PS. As a result, all beams now require only minor readjustments, which eases the operation.

For the MTE about 17% of the intensity is regularly trapped in each of the four islands. The trajectory has been globally corrected in TT2/TT10 transfer line. The beam has been injected and accelerated in the SPS, and the extraction to CNGS has been set-up on one cycle. MTE extraction of the beam worked correctly, and a maximum intensity of $1.9\times10^{13}$ was extracted, with efficiency up to 98%. For a 7 hours shift all the CNGS beams were delivered using this MTE beam from the PS.

The SPS has also suffered with the PS septum magnet exchange. During the advanced technical stop 2 magnets have been exchanged and a quadrupole repaired. Similar to the PS machine, the start-up after the advanced technical stop was difficult due problems such as a wrong injection B-field, wrong settings on the extraction kicker, and so on.

Apart from that SFT and CNGS beams were delivered regularly with only minor problems. The MD period dedicated to the UA9 experiments with coasting beam at 120 GeV was very efficient and successful.

All physics programmes stopped on the 22nd of November except AD, AMS and CLOUD, which were extended until December 7th.

The CNGS has accumulated $3.5\times10^{19}$ protons on target during the run.

In October the operation efficiency in the AD was reduced, due to intermittent problems with the stochastic cooling electronics, kickers, power converters, and even a flood in TT6! In addition to that the beam stability was spoiled by a jitter of the RF synchronization between the PS and the AD. The situation was improved in November with the AD back to excellent performance.

2009 saw the end of the commissioning of the ion injection chain for the LHC. On October 23rd, for the first time, single-bunch beams of Pb$^{82+}$ were sent to the LHC through TI2 and observed interacting with the residual gas by the ALICE experiment.

The beam had the required characteristics for the ion run planned for the autumn 2010, or even better: $7\times10^7$ ions/bunch, normalized r.m.s. transverse emittance below $1\mu$m, bunch length below 1.8 ns, $\Delta p/p$ smaller than $3\times10^{-4}$, etc.

In addition to the good result obtained on the early beam, three weeks were used in the PS to establish the RF gymnastics to produce the structure of the nominal beam: a four-bunch train with 100 ns spacing, including two batch expansions, and a bunch splitting. The ion injector chain is now ready for the physics run in LHC at the end of 2010.

In conclusion, the main loss of time for operations in the accelerator complex occurred in October, and this was minimized by advancing the planned technical stop to take place in the shadow of the downtime due to equipment repair. In parallel with the operation and beam delivery to the experiments, the commissioning of the injector chain with the lead
ion beam was completed, and beam sent to the LHC, where it was observed by ALICE experiment.

4. STATUS OF EXPERIMENTAL AREAS

Lau Gatignon reported on the start-up on schedule of the East and North Areas.

In the East Hall the beam for DIRAC performed well, but the experiment lost about a week due to cooling and ventilation problems in their barrack and due to some trips of their spectrometer magnet. The irradiations and test beams have been operating without any major problem. Good beam was delivered to the CLOUD experiment starting on the 18th of November.

In the North Area NA61 has had a long and successful run where good beams were provided covering a wide range of beam momenta. Only the 10GeV/c point was delayed due to the low particle production rates at that low momentum. COMPASS has collected large samples of negative hadron beam data, complemented with electron beam calibration data and muon data for DVCS tests and Primakoff reference data. They ended the run with a successful short test with \( \pi^- \) beam for tests in preparation of a future proposal for Drell-Yan studies.

NA62 has successfully performed tests of a STRAW prototype in vacuum with 40GeV hadron beams, of a first LAV module integrated in the vacuum exposed to muon beams and very low energy electron beams and of a new muon veto prototype.

Stable beams of good quality were also provided to the UA9 experiment in the H4 and H8 beam lines and to the NA63 experiment, also located in H4. In parallel a dense program of test beam activities was performed in the EHN1 experimental hall. Only some minor problems of collimator and rectifier control degraded the convenience of operation during some periods, but without causing significant downtime.

In the AD the three main users were mostly provided with good quality beam of an intensity of about \( 4 \times 10^7 \) antiprotons per pulse, apart from a period in October where the up-time and efficiencies were lower. In mid-October the Brescia group in ASACUSA used the multi-ejection mode were six pulses were extracted in a 2.4 second interval. ASACUSA has completed on the 23rd of November some reconfiguration for the Yamasaki group, which allows them (as well as the other users) to take full advantage of the two-week extension of the AD run.

CNGS has been running very well and the integrated proton flux on the CNGS target at the end of the run was \( 3.52 \times 10^{19} \), some 10% above the aim for this year.
5. PS, SPS AND AD SCHEDULES

H. Breuker gave the update of the user’s schedules for PS, SPS and the AD.

The official end of fixed target physics was reached yesterday 23rd of November at 8 o’clock. For three projects, the CERN management granted an extension period.

The Alpha Magnetic Spectrometer (AMS), which is due to be launched and installed on the ISS by the middle of 2010, has control of the H8 beam up to the 16th of December. AMS will be installed in the test beam area from the 3rd to 7th of December. The plan is then to complete the beam campaign by December 12th. Protons will be delivered at 400 and 180 GeV/c and positrons or electrons at 180 and 100 GeV/c. This will allow AMS to precisely align their tracker and calibrate their electromagnetic calorimeter. Another aim is to study its powerful proton over positron rejection capacity.

The AD complex with its three experiments ALPHA, ATRAP and ASACUSA received an extension until Monday 7th of December 8 o’clock. This was mainly motivated by the first indications of trapped anti-hydrogen atoms, which need further confirmation.

Following a series of delays, the CLOUD experiment has finalized its installation, connected all necessary instrumentation and finished the work on the DAQ integration, and started data taking on the 18th of November. The data being taken now are essential for the preparation of next years run, and the CLOUD run was extended until Monday 7th of December 8 o’clock.

Overall, 2009 was an excellent year in terms of beam delivery, as all projects have received the amount of protons that were scheduled at the SPSC meeting of 16th of April. The exception to this is the DIRAC experiment on the T8 beam line. This can be attributed in part by the experiment’s own down time, and by an over estimate of the cycles available per super-cycle.

The 2010 Injector Accelerator Schedule (V1.1, 7/10/2009) has been prepared by M. Lamont. The foreseen start dates for fixed target physics are: EAST Hall: 29th of April, NORTH Area: 10th of May, AD: 10th of May (4 weeks earlier than in 2009), CNGS: 13th of May, nTOF: 17th of May.

The end for fixed target physics in 2010 is foreseen for the 22nd of November.

6. DISCUSSION OF THE OPEN SESSION

6.1 NA48 / NA62

The SPSC congratulates the NA48 / NA62 Collaboration for the excellent quality of the physics results being produced from the existing data sets, and notes with pleasure that further results are still forthcoming.
The SPSC notes with pleasure that the Collaboration continues to make rapid progress on all aspects of the new experimental apparatus, and continues to work towards an aggressive schedule for first data taking in 2012.

As the experiment starts to enter the construction and installation phase, the SPSC looks forward to a more detailed schedule, and a corresponding set of milestones, by which to monitor progress towards data taking.

6.2 UA9 – CRYSTAL

The SPSC congratulates the UA9 Collaboration for the successful data taking campaigns carried out in 2009. Both channelling and reflection have been studied, and the results appear to be promising in view of the use of crystals in accelerator collimation systems.

The studies so far have been performed using proton beams. In view of the potential applications in the LHC, these studies should also be extended to ion beams.

The SPSC supports additional data taking in 2010, with an improved experimental setup, which would allow further understanding of the performance potential of this technique for beam collimation.

6.3 OSQAR

In light of the substantial delays to the OSQAR program, due to the un-availability of spare LHC dipole magnets, the SPSC looks forward to a revised program, and a corresponding set of milestones, for further axion generation measurements.

The SPSC notes that OSQAR collaborators have produced accurate measurements of the electric bi-refringence in a variety of gases. The possible application of some of the techniques used for these measurements, to the VMB measurement was also presented.

7. FOLLOW UP ON EXPERIMENTS AND PROPOSALS

7.1 CNGS1 - OPERA

The SPSC notes with pleasure the continuing progress in the OPERA operations and data analysis procedures, and looks forward to seeing results from the 2008 data next year.

The SPSC supports the OPERA request for a running scenario in 2010 and beyond, which aims to provide the nominal $4.5 \times 10^{19}$ protons on target to the CNGS.

7.2 DIRAC

The SPSC notes with pleasure the improved signal to background for pi-K production in the 2008 data, thanks in particular to the commissioning of the scintillating fibre tracker.
The present results indicate that some running in 2010 appears to be necessary to provide conclusive evidence of the production of π-K atoms.

7.3 CLOUD

The SPSC notes with pleasure the successful installation of the experiment, and the start of data taking.

7.4 NA63

The SPSC notes with pleasure that, with the data taken in 2009, NA63 has successfully completed its approved program.

7.5 ELENA Proposal

The SPSC recognizes the substantial potential impact of ELENA on the AD experimental program, and welcomes recent studies of the possible integration scenarios of ELENA in the existing complex, which would minimize disruption to the ongoing experiments while also maximizing the floor space available for new experimental beam lines.

These scenarios also provide sufficient space to allow for possible further upgrades to ELENA, including in particular the possibility of a slow extraction. The SPSC recommends that the potential for such a future upgrade option be maintained in the detailed design of ELENA.

The SPSC also notes with pleasure, that a number of the Institutes participating in the AD are willing to contribute a substantial share of the costs for the ELENA project, and that some of these funds have already been secured.

The SPSC strongly supports the ELENA proposal, and encourages the parties concerned to write a full Technical Design Report, and to secure the full resources required to make this a viable project.

7.6 GIF++

The SPSC recognizes that the GIF++ is an important experimental facility at CERN.

The SPSC encourages further studies of the detailed design and of the exact location of the GIF++, in particular in order to minimize interference with the existing beam lines.
8. DOCUMENTS RECEIVED

1. Minutes of the 93nd Meeting of the SPSC Held on Tuesday and Wednesday September 29th and 30th 2009 (CERN-SPSC-2009-035/SPSC-093).

2. UA9 – CRYSTAL: Report for 2009 *)


4. DIRAC: Results from 2008 Data, in particular on πK-atoms with improved precision after 2007*).

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*) Will be submitted to the CERN Document Server by the authors to have an official CERN reference number.