OPEN SESSION

1. Status Report of DIRAC


3. Proposal to measure $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ at the SPS (SPSC-2005-013/P-326)

CLOSED SESSION


Apologies: Jos Engelen (represented by Dieter Schlatter), Juan Fuster Verdu
Apologies for the Tuesday *: Richard Batley
Apologies for the Wednesday **: Guido Altarelli, Marcello Piccolo and James Ritman

1. APPROVAL OF THE MINUTES OF THE 72nd MEETING OF THE SPSC, HELD ON JULY 5th 2005

The Minutes were approved, with minor comments.

J.B. Dainton thanked J.P. Riunaud on behalf of the SPSC, for his regular reports on the accelerator complex, and for his contributions to the work of the SPSC over the past several years, and welcomed Simon Baird who will take over this function.

2. REPORT FROM THE RESEARCH BOARD

Minutes from the last Research Board of September 1st 2005 were not yet available.

The chairman reported back (orally) from the Research Board meeting on September 1st 2005.
The Chairman’s report included:

a) appreciation by the SPSC of the work underway to consolidate the infrastructure in the CERN accelerator complex in this “fallow” year for fixed target physics, and concern by the SPSC that in future adequate resources will be provided to continue this important work;

b) the disappointment of the SPSC that the FT running period for 2006 will fall short of that originally anticipated, and that the impact of this shortfall on the horizon for completing the approved CERN FT programme in a timely manner could be considerable; the SPSC continues to press the experiments to make every possible investment and effort to ensure the most efficient use of available beam time for data taking for the foreseeable future; accordingly the SPSC is introducing an annual procedure whereby annually it will receive and consider requests for beam time from approved experiments and if necessary make recommendations in the face of any oversubscription (item 12 below);

c) a report on the annual review of OPERA at LNGS: despite impressive progress the schedule for taking data in 2006 looks very “tight”;

d) the excellent progress by the CAST experiment in both analysis of its first phase and preparation for its second phase;

e) the demonstration by HARP both that it is close to publishing first results of importance for neutrino experiments, and that it has made major progress in understanding the performance and calibration of its experiment to an extent that will have further major impact on neutrino physics;

f) the receipt of new letters of intent and proposals (K-decay, AD, crystalline electrodynamics) for which due process is beginning.

3. STATUS OF THE ACCELERATORS

S. Baird summarised the status of the shutdown work and machine development throughout the accelerator complex, and then went on to summarize operations so far this year.

• PS Shutdown work

The main outstanding issues, affecting the PS magnet renovation program, have now been resolved.

The main coils produced in Novosibirsk now meet specifications, and regular deliveries have started. Enough main coils for 11 magnets are currently in hand, and production is continuing well.

Pole face windings are being delivered, with improved quality, at a rate that now exceeds that required for installation.
Finally, a solution is now in place for repair of the loose laminations resulting from radiation damage.

The first refurbished magnet was re-installed in the PS tunnel on September 19, and the second followed on September 23, some six months behind schedule. The target rate for magnet refurbishment has been increased from 1 to 1.5 magnets a week, in an effort to partially recover from this delay. It is now anticipated that 20 magnets may be refurbished in the remainder of this shutdown, rather than the initially foreseen 40. Magnet refurbishment will then continue at the rate of six to eight per year, from 2007 onwards.

- **SPS Shutdown work**

The main shutdown activities in the SPS continues to progress according to schedule.

There is some concern with the surface treatment of the graphite beam dump in LSS1, which is to be re-installed by October 2005, but it is foreseen that this will not result in any delays.

Installation of all 105 magnets for the CNGS transfer line was completed on September 21, and installation of the vacuum equipment is currently ongoing.

- **AD**

An intervention is planned in November, to address the major problems with electron-cooling vacuum in the AD incurred during 2004. There is some concern about the potential for interference with the accelerated PS magnet refurbishment mentioned above, due to competing demands for vacuum specialists.

As previously stated, as part of the overall risk assessment and resource allocation, other parts of the AD consolidation plan were given lower priority and will not be carried out during this shutdown.

- **CTF3**

The additional accelerating structures in the LINAC for CTF2 and CTF3 have so far been successful. As of May, they have been providing 30 GHz power for 30GHZ cavity conditioning in CTF2. In September and October will continue 30GHz conditioning, and carry out beam studies in CTF3.

The CTF3 delay loop installation, spanning from June to September is now complete. Cabling will be completed by mid November, and delay loop commissioning will start end of November.

- **LINAC III & LEIR**

Following installation of the revised plasma chamber, the ion source for LINAC III was operational by June. O$^{4+}$ ions were delivered for LEIR injection line tests in June, and Pb$^{27+}$ ions were accelerated in July.

The injection line into the LEIR was commissioned with O$^{4+}$ ions in June, following which the optics were measured, corrected and validated with Pb$^{27+}$ ions.
Installation of the LEIR was completed in early September, with some four weeks additional delay due, in part, to problems with water leaks and a last minute vacuum leak.

Commissioning of the LEIR will start in October, two months later than initially scheduled. In order to simplify the initial stages of commissioning, longer-lived O\(^{4+}\) ions will be used, prior to switching to lead ions.

- LINAC II and PSB operations

The LINAC II and PSB operated efficiently so far, with 95\% or better beam availability for ISOLDE. Improved LINAC to Booster optics, and a change in the PSB working point now allow for 4.3\(\times\)10\(^{13}\) protons accelerated, and an improvement in emittance for LHC type beams.

Tests of LINAC II and PSB operations at a higher repletion rate, 900ms compared to the usual 1.2s, were successfully performed, both for standard SPS and LHC type beams.

Although in principle a 900ms duty cycle could result in increased deliverable proton rates, in practice there are a number of constraints, which will limit the actual benefit.

- Protons in 2006

Due to the reduction in running time to 2900 hours, the maximum number of spills for COMPASS will be close to 5\(\times\)10\(^5\), compared to the requested 7.2\(\times\)10\(^5\), provided very little is delivered to CNGS. Each 10\(^{19}\) protons delivered to the CNGS results in a decrease of 10\(^5\) spills available for COMPASS.

- CERN Control Centre

The CERN Control Centre (CCC) is on schedule for completion by the beginning of February 2006.

4. STATUS OF THE EXPERIMENTAL AREAS

L. Gatignon reported that work on the upgrade of the North Area control systems continues to make good progress, and then focused on the proton intensities achievable for COMPASS.

The radiation protection legislation in the Host States has been modified, and the limits for level B radiation workers have been decreased by a factor of 2.5, from 15 to 6mSv/year. With the present layout and operation mode, the M2 beam line to COMPASS would lead to a significant excess above the new limits. There have been a number of studies, aimed at avoiding maximising the proton intensities deliverable to COMPASS, while remaining within the reduced radiation limits. The present understanding is that it will be possible to maintain the previous proton intensities to COMPASS, and that the maximum scope for any possible increase is of order 20\%, up to about 1.45\(\times\)10\(^{13}\) protons per pulse.
Concerning the CNGS, following completion of the installation of all 73 bending magnets, quadrupole installation was completed on July 20th. Both helium tanks are now installed, and the shielding in the target chamber is complete. The target assembly was completed in the lab on August 15th, and final installation in the target cavern is under way. The reflector assembly in the lab is also making good progress.

5. PS AND SPS SCHEDULES

C. Rembser reported that the Research Board in its September meeting approved the 2006 accelerator schedule with no changes from the draft schedule presented by M. Hauschild at the July meeting of the SPSC.

The schedule foresees approximately 4000 hours of PS operation, 3000 hours of SPS operation and 2000 hours of AD operation.

CNGS beam commission is foreseen in the period from May 29 to July 10.

The LHC sector test, now foreseen for December 2006, is decoupled from SPS operation for physics.

In line with its updated procedures (item 12 below), requests for beam time in 2006 will be discussed by the SPSC at SPSC75.

6. DISCUSSION OF THE OPEN SESSION

6.1 DIRAC

The SPSC congratulates DIRAC for the publication of their first lifetime measurement, and notes good progress towards a detector ready for beam time in 2006.

The published lifetime measurement uses approximately 20% of the available statistics, and achieves a 17% error on the lifetime. There is steady progress on reducing the systematic errors and analysing the full data set, and the goal of a 10% precision on the lifetime, as set forth in the proposal, appears within reach. This will allow the determination of the scattering length difference \( a_1 - a_2 \) with a precision of 5%.

The SPSC is concerned with the tight schedule for timely completion of those parts of the apparatus and DAQ which are required to make full use of the 4 months running time requested in 2006.

The SPSC looks forward to further clarification of the expected sensitivity which can be achieved until 2008, based on the DIRAC collaborations improved understanding of the apparatus and of the theoretical corrections and uncertainties in the analysis.

6.2 NA48-1 and NA48-2

The SPSC congratulates NA48-1 on its progress. The experiment continues to produce impressive results on rare \( K \)-short and hyperon decays, which have a very direct bearing on our understanding of quark flavour physics.
The SPSC congratulates NA48-2, for the producing the first preliminary asymmetry measurements using data collected in 2003, in both the “charged” and “neutral-pion” $K$-decay modes. The precision achieved thus far is within a factor of 3 of that set forth in the Proposal, and the SPSC looks forward to final asymmetry measurements, using the full data set and improved evaluation of systematic uncertainties.

Impressive progress was reported in the analysis and understanding of the cusp in the $\pi^0\pi^0$ mass spectrum in $K^+ \rightarrow \pi^+\pi^0\pi^0$ decays with a view to extracting a precise measurement of the scattering length difference $a_0 - a_2$. The SPSC looks forward to forthcoming publications of first results with the 2003 data set.

The SPSC looks forward to the completion of the Ke4 analysis, and to the continuation of the exciting physics program on very rare kaon decays. It endorses the request of the Collaboration for the continuation of computing support at CERN.

6.3 NA48-3: P326

The SPSC welcomes the proposal, and reaffirms its appreciation of the physics motivation for this measurement.

The proposed experiment is both difficult and ambitious.

As pointed out by the proponents themselves, there are a number of critical developments for this proposal, all of which must succeed in order for the experiment to achieve its design goals.

Following discussion in the closed session, some outstanding issues are now being pursued with the proponents.

The SPSC endorses an R&D program aimed at demonstrating robust solutions to each of these critical issues, and recommends that this program be adequately supported.

The SPSC looks forward to a set of milestones by which this R&D program can be brought to successful completion, such that the experiment may then be approved for construction and operation.

7. COMPASS: ‘05 REVIEW FOLLOW UP

The SPSC reaffirms its support for a high statistics COMPASS muon run in 2006.

The upgraded COMPASS experiment should allow COMPASS to approximately double its charm yield for the $\Delta G/G$ measurement. However, the SPSC is concerned that, whereas the 2006 data is expected to improve the $\Delta G/G$ measurement from open charm by about a factor of two, nevertheless the precision achieved will fall substantially short of the initial aims of the experiment. The SPSC notes the progress being made in complementary methods of measuring $\Delta G/G$, most notably using leading hadron production at high $p_T$. 
Very good progress has been reported on all aspects of the upgraded detectors planned for 2006, and the new polarised target superconducting magnet has been shown to provide adequate field quality, despite a short circuit in one of the trim coils. However, the schedule for completion of the upgrade program is considered to be ambitious. In view of the importance of a timely and efficient start-up and data-taking period for COMPASS in 2006, the SPSC looks forward to closely monitoring progress with the COMPASS collaboration.

8. AD5 (ALPHA Proposal CERN-SPSC-2005-006; SPSC-P-325)

Milestones were given leading to the evaluation of trapping performance and to an assessment of the feasibility of 1s-2s spectroscopy with trapped anti-hydrogen over the period 2006 to 2008. They are appended to these minutes. The SPSC takes note of these milestones and looks forward to monitoring the progress of the experiment in the future.

9. AD4 (ACE) (Biological Effectiveness of Antiprotons Proposal for an Extension of Experiment CERN-SPSC-2005-027; SPSC-P-324-ADD-1)

The SPSC notes receipt of the proposal. The proponents are invited to make an open presentation at the meeting SPSC74, whence further consideration by the SPSC will follow.


The demand for beam time in the post-2005 era of CERN SPS fixed target (FT) physics is presently estimated to be in excess of that available for the muon/hadron (COMPASS) and the neutrino (CNGS) programmes. The advent of new experiments in the AD programme, for which already one new proposal has been approved by the SPSC, means that also the demand for antiprotons is now likely to exceed that hitherto. New proposals for new experiments are under consideration by the SPSC, and new Letters of Intent have been received. Furthermore, for the period 2006 to 2010, resources at CERN will be particularly pressed due to the commissioning and first operation of the LHC. In these circumstances it is important to reaffirm, and if possible to improve, the procedures which the SPSC uses to enable it to monitor the physics in its remit and to make recommendations to the CERN Research Board (RB).

With the above in mind, this note sets out the procedures followed by the SPSC. As such it reaffirms all procedures already in place, emphasizes the importance of their full implementation, and sets out one additional task concerning SPSC recommendations for prioritization of beam time at the start of each year in which FT data-taking is planned.
11. PRELIMINARY CALENDAR FOR 2006

The provisional calendar for the SPSC meetings during 2006 is listed below, together with the provisional calendar for the regular yearly reviews:

- January, 24 and 25 a.m.
  - AD1(ATRAP), AD3(ASACUSA), AD5(ALPHA)

- May, 2 and 3 a.m.
  - DIRAC, COMPASS, CNGS1(OPERA) CNGS2(ICARUS)

- July, 11 and 12 a.m.
  - CAST, PS124(HARP), NA60

- October, 3 and 4 a.m.

- November, 21 and 22 a.m.
  - AD2(ATHENA), AD4(ACE), NA48

12. A.O.B

12.1 LETTER OF INTENT: ELENA/AD (CERN-SPSC 2005-029/I-233)

The SPSC notes receipt of the LOI. An estimated 5 man-years of effort, over one year, would be required to move ahead with a detailed design study.

The SPSC considers it essential, in view of the nature of this LOI and its close relationship to CERN accelerators and the resource implications at CERN, that contact is made with the CERN management to discuss the scope for such a proposal. The SPSC looks forward to a more detailed evaluation of the impact of ELENA on the AD experimental program in which the benefits of ELENA for each AD experiment are delineated.

12.2 PROPOSAL: Electromagnetic Processes In Strong Crystalline Fields (CERN-SPSC-2005-030/P327)

The SPSC notes receipt of the Proposal. Whereas many potentially interesting measurements are mentioned, the program as presented is not sufficiently well defined, and SPSC requests further clarification.

A second referee will be appointed to continue the reviewing process into next year.
13. DOCUMENTS RECEIVED

1. Minutes of the 72nd Meeting on 5 July 2005; 2005-028/SPSC72

2. Extra Low ENergy Antiproton ring between the present Antiproton Decelerator and the experiments at AD/CERN; SPSC 2005-029/I-233

3. Electromagnetic processes in strong crystalline fields; SPSC 2005-030/P-327

4. Status Report of experiments NA48-1 and NA48-2; SPSC 2005-031/M-740

5. A Restatement and Update of SPSC Review Procedures (J. Dainton); SPSC 2005-032/G-029*)


*) Restricted circulation

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