



## EUROPEAN LABORATORY FOR PARTICLES PHYSICS

CERN/SPSC 98-41  
SPSC 40  
20 November 1998

### SPS AND PS EXPERIMENTS COMMITTEE

Decisions taken at the 40th meeting on 3-4 November 1998

**OPEN SESSION** on Tuesday, 3 November at **9.00 h.**, Main Auditorium.

1. Update on the Neutrino Beam to Gran Sasso; SPSC 98/35/M622 (K. Elsener).
2. The K2K Project (K. Nakamura).
3. The FNAL-LBL Project (L. Camilleri).
4. Monte Carlo Methods and Analysis Tools (P. Lipari).
5. Possible LBL Neutrino Experiments at Gran Sasso: Summary of Proposals and Ideas (L. Di Lella).

### CLOSED SESSION

Present: P. Bagnaia, J.-P. Blaizot, W. Braunschweig, M. Cavalli-Sforza, A. De Roeck, Y. Déclais, C. Détraz, L. Foà, G. Goggi, P. Grafström, K. Hübner, K. Jakobs, K.-H. Kissler, B. Koene, K. Königsmann (Chairman), R. Landua, C. Llewellyn Smith\*, J. May, M. Pennington, A. Pich, L. Ristori, J.-P. Riunaud, D. Simon, J. Stachel, E. Tsesmelis (Secretary), M. Tyndel, C. Wagner, D. Websdale, G. Wilquet, A. Zalewska.

\* Part-time

Apologies: D. Drijard, D. Jacobs.

#### 1. Approval of the minutes:

The minutes of the 39th meeting were approved without modifications.

## **2. Report on the meeting of the Research Board:**

The Research Board approved the Proposal P308 for a 3-week run during which the collaboration should emphasize the production and measurement of the linear polarization part of the proposal. The new experiment will be referred to as NA59.

It also took note of the proposed neutron TOF facility and of the agenda for the joint meeting between the SPS and Gran Sasso Scientific Committees to discuss the exploitation of the neutrino beam to Gran Sasso.

## **3. Status report on the SPS:**

The SPS had been running well with performances better than those recorded in the previous Pb-ion run of 1996. The number of charges on all targets at the time of the meeting were  $5 \cdot 10^{15}$ , already surpassing that obtained in 1996. The chairman congratulated the teams in the SPS and PS for the excellent performances.

## **4. Status report on the PS:**

The PS-complex fault rate for the Pb-ion run at the time of the meeting was only 3 %, and the overall intensity accelerated in the PS was higher than that obtained at the corresponding stage in 1996.

The commissioning of the AD is proceeding well. The first proton beam at 3.5 GeV/c was successfully injected. Deceleration tests with antiprotons are foreseen for the end of 1998.

All beams in the East Hall are operational, including that to the DIRAC experiment.

## **5. Status report on SPS and PS experiments:**

The co-ordinator reviewed the status of the experiments running during the Pb-ion period. The experiments were pleased with the efficient start-up of the Pb-ion run and the high intensity delivered from the start. NA45 had a very productive first period setting-up their detector. The Vertex-Magnet-2 of NA49 was repaired and put into operation. The collaboration successfully used the Pb-ion beam impinging on a Pb or C converter to produce low-mass fragments. NA50 had been running at a nominal intensity of between 5 to  $6 \cdot 10^7$  ions per burst. A thinner 3 mm Pb target reduces re-interactions and improves the mass and transverse energy resolutions. NA52 had a very successful run and should complete their data-taking as scheduled on November 12. All detectors of NA57 had been performing well and with a lower beam-related background than in WA97. P305 took a significant amount of data, completing their physics programme.

All the DIRAC detectors except for the MSGCs had been installed and the trigger and DAQ were ready for tuning and for sub-detector tests with beam. The proton beam line had been completed and tested. The committee congratulates the collaboration on their impressive start-up.

## **6. Schedules of the machines:**

The co-ordinator presented the draft schedules of the SPS and PS, which are to be discussed with the users. He indicated that there is not much spare time left for late requests at the SPS and some time is still available at the PS. He also described the progress towards the beam tests for the ATLAS LAr barrel module-0 during the Pb-ion run in November 1998 and the planned installation of a neutron irradiation facility in the DIRAC beam dump during the 1998-1999 accelerator shutdown period.

The chairman thanked E. Tsesmelis, whose term expires at the end of 1998, for his work as SPS and PS co-ordinator. His efforts have been essential to the successful definition and operation of the SPS and PS physics programmes.

**7. Request for test beams with a 25 ns bunch structure:**

The committee heard a report for the provision of a test beam with a 25 ns bunch structure as requested by the ATLAS and CMS collaborations. Such a beam would be used by both experiments to verify their electronics and detector designs under realistic LHC operating conditions. The committee supports this request and recommends that the first of these tests, pending the submission of a detailed request, be performed at the beginning of 2000, by which time both collaborations will be ready to exploit this test beam. Such a beam will be seen simultaneously in both the West and North Areas of the SPS. The committee noted that this kind of operation is incompatible with the other users of the SPS and for this reason the committee will restrict this activity to a minimum and schedule LHC experiments to run concurrently.

**8. MICROMEAS:**

The committee congratulates the collaboration on the very successful development of this new type of detector. It feels that for further optimization, the collaboration should emphasize the implementation in actual experiments to help solve specific R&D issues. Test beam time should be discussed with these experiments. For generic R&D, the committee recommends the approval of a 1-week test beam period in each of the PS and SPS during 1999.

**9. Letter of Intent I220:**

The committee recognizes with great interest the importance of the physics to be addressed by this neutron TOF facility in the fields of astrophysics, nuclear physics, medicine and biology, nuclear transmutation and studies for the Energy Amplifier. It heard a report on the feasibility study performed by the PS and TIS Divisions for a test of this facility, concluding that the beam line implementation and a PS beam of one bunch at 24 GeV/c are both technically achievable. The committee decided to encourage the community interested in exploiting this facility to submit a proposal, demonstrating the uniqueness of this facility.

**10. Any other business:**

The Director General and Professor Lorenzo Foà took the opportunity of their last meeting to thank the SPSC for the vital role it has played in defining and implementing CERN's physics programme. In turn, the committee thanked the Director General and Professor Lorenzo Foà for the magnificent job they have done for CERN and for the community.

The dates of the SPSC meetings in 1999 had been fixed at the following dates:

Tuesday 19 and Wednesday 20 January

Tuesday 30 and Wednesday 31 March

Tuesday 25 and Wednesday 26 May

Tuesday 31 August and Wednesday 1 September

Tuesday 2 and Wednesday 3 November.

The 41st meeting will be held on **Tuesday 19 and Wednesday 20 January 1999.**

The 42nd meeting will be held on **Tuesday 30 and Wednesday 31 March 1999.**

## 11. Documents received:

- The OPERA  $\nu_\tau$  appearance experiment in the CERN-Gran Sasso neutrino Beam; (Aichi Educational Univ. Aichi, Japan - METU, Ankara, Turkey - Bern Univ. - Toho Univ. Funabashi - CERN, Geneva - Kobe Univ. - ITEP, Moscow - Münster Univ. - Nagoya Univ. - "Federico II" Univ. and INFN, Naples - Salerno Univ. and INFN - Utsunomiya Univ.); SPSC 98-25/M612.
- A short note on  $\nu_\mu$   $\bar{\nu}_\mu$  oscillations; F. Vannucci (LPNHE, Univ. of Paris 7); SPSC 98-26/M613.
- Oscillation search with the PS neutrino beam (METU, Ankara - Univ. di Bari and INFN - IIHE (ULB-VUB, Brussels - Univ. di Gagliari and INFN - Cavendish Lab. Cambridge - Univ. della Calabria and INFN, Cosenza - Univ. di Ferrara and INFN - CERN, Geneva - Univ. di Milano and INFN - Institute for Nuclear Research, Moscow - "Federico II" Univ. and INFN, Naples - Univ. di Padova and INFN - Univ. La Sapienza and INFN, Rome - Univ. of California, Santa Barbara - IFIC, Univ. de Valencia); SPSC 98-27/M614.
- Measurement of Atmospheric Neutrino Oscillations with a High-Density Detector (Dipartimento di Fisica, Univ. di Torino - Lab. Nazionali di Frascati - Dipartimento di Fisica, Univ. di Milano and INFN - Istituto di Cosmogeofisica, CRN Torino - Moscow Engineering Phys. Institute); SPSC 98-28/M615.
- A high sensitivity short baseline experiment to search for  $\nu_\mu \rightarrow \nu_\tau$  oscillation (The TOSCA Coll.); SPSC 98-29/M616.
- Physics Opportunities at a CERN-based Neutrino Factory; (The Neutrino Group of the prospective study on  $\mu^+\mu^-$ ; contactman: F. Dydak); SPSC 98-30/M617.
- On the Future of Neutrino Physics at CERN; (F. Dydak, CERN, Geneva): SPSC 98-31/M618.
- The N<sup>0</sup>E detector for a long baseline neutrino oscillation experiment (Dipartimento di Fisica dell'Univ. di Bari and INFN - Dipartimento di Fisica dell'Univ. di Bologna and INFN - INFN, Laboratori Nazionali del Gran Sasso - Dipartimento di Fisica dell'Univ. di Lecce and INFN - Institute of Nuclear Research, Moscow - Institute of Theoretical and Experimental Physics, Moscow - P.N.Lebedev Physical Institute, Moscow - Moscow engineering Phys. Institute - Institute for High Energy Physics, Moscow - Dipartimento di Scienze Fisiche dell'Univ. di Napoli and INFN - Dipartimento di Fisica dell'Univ. di Roma and INFN - Yerevan Physical Institute); SPSC 98-32/M619.
- ICARUS-Like technology for long baseline neutrino oscillations (ICARUS Collaboration); SPSC 98-33/M620.
- NICE: Sensitivity to long baseline neutrino oscillations of a large mass calorimetric and spectrometric detector (INFN and Univ. of L'Aquila - Lab. Nazionali di Frascati - INFN and Univ. Pisa - INFN and Univ. Roma 1 - INFN and Univ. Trieste); SPSC 98-34/M621.
- Progress on NGS beam studies (The CERN-INFN Technical Committee - Beam Optics Working Groups); SPSC 98-35/M622.
- Expression of Interest to participate in the Study, Construction and Use of a Neutrino Facility at the Gran Sasso Laboratory (Humboldt Univ. of Berlin - Univ. of Bochum - Univ. of Hamburg - IPN, Lyon - LAL, Orsay - LAPP, Annecy); SPSC 98-36/M623.
- Aqua-Rich: An atmospheric and long baseline neutrino experiment at Gran Sasso (INFN, Bologna - Univ. of Bologna - CERN, Geneva - Collège de France, Paris - Univ. of Uppsala - Univ. of Hawaii - Univ. of Alberta - Univ. of Dortmund); SPSC 98-37/M624.
- Design for a 7.5 kt Detector for Neutrinos to Gran Sasso (G.J. Alner, RAL); SPSC 98-39/M625.
- A CERN-PS experimental campaign to measure neutron cross-sections from 1 eV to 250 MeV with high resolution (CEN, Bordeaux Gradignan - CERN, Geneva - CRS4, Cagliari - EC, Joint Research Center, IRMM, Geel, Belgium - Univ. of Basel - Univ. of Thessaloniki); SPSC 98-15/I220, SPSC 98-40/M626.

## CLOSED SESSION

### Joint Meeting of the CERN-SPSC and Gran Sasso Scientific Committees

Present: P. Bagnaia, R. Barbieri (Chairman), S. Bertolucci, A. Bettini, J.-P. Blaizot, F. Bobisut, W. Braunschweig, L. Camilleri, M. Cavalli-Sforza, A. De Roeck, A. De Rujula, Y. Déclais, C. Détraz, L. Di Lella, U. Dosselli, L. Foà, G. Goggi, P. Grafström, A. Guglielmi, K. Hübner, K. Jakobs, K.-H. Kissler, B. Koene, K. Königsman (Chairman), R. Landua, L. Linssen, C. Llewellyn Smith\*, E. Lorenz, I. Mannelli, A. Marzari-Chiesa, A. Menzione, J. May, R. Mößbauer, J. Panman, M. Pennington, A. Pich, L. Ristori, J.-P. Riunaud, B. Sadoulet, R. Santonico, E. Scapparone, D. Simon, J. Stachel, E. Tsesmelis (Secretary), M. Tyndel, J.-L. Vuilleumier, C. Wagner, D. Websdale, G. Wilquet, G. Wolf, A. Zalewska.

\* Part-time

Apologies: D. Drijard, D. Jacobs, R. Turlay.

#### 1. Physics Projects for a Future CERN/LNGS Neutrino Programme:

The SPSC and LNGSC believe that the up/down asymmetry of atmospheric neutrinos detected in the Kamiokande and SuperKamiokande experiments is a robust result, unlikely to be explained by conventional physics effects. When combined with the upper limit on  $\nu_e$  disappearance measurements from the CHOOZ experiment, the above asymmetry is consistent with being due to  $\nu_\mu \rightarrow \nu_\tau$  oscillation.

This result calls for a combined experimental programme with the following goals:

- An independent check of neutrino oscillation with a massive atmospheric neutrino experiment having a good resolution in neutrino angle and energy. Such a detector would be sensitive to the mass range  $2 \cdot 10^{-4}$  to  $5 \cdot 10^{-3}$  eV<sup>2</sup>.
- A precise test of the  $\nu_\mu \rightarrow \nu_\tau$  oscillation hypothesis with an experiment utilizing the Neutrino beam to Gran Sasso (NGS) as laid out in the documents CERN 98-02 and CERN/SPSC 98-35. The feasibility of constructing such a neutrino beam has been demonstrated. The underground experiment would be able to determine the  $\nu_\mu \rightarrow \nu_\tau$  oscillation hypothesis in the mass range above 1 to  $2 \cdot 10^{-3}$  eV<sup>2</sup>. Ways of extending this mass range may exist by using a detector on the surface. The search for  $\nu_e$  appearance may also be coupled with  $\nu_\tau$  appearance experiments.

Both committees believe that all this constitutes an extremely appealing and realistic neutrino physics programme for CERN and LNGS and urge to proceed with the construction of the beam. To establish this programme, the committees recommend that collaborations proceed with the preparation of proposals for experiments to be submitted in the autumn of 1999.

The committees also took note of the scientific interest expressed by:

- A short baseline experiment to search for  $\nu_{\mu} \rightarrow \nu_{\tau}$  oscillation beyond the sensitivity reach of CHORUS and NOMAD.
- A low energy neutrino beam derived from the PS to search for  $\nu_{\mu} \rightarrow \nu_e$  oscillation in the range of parameters suggested by LSND.
- A long-term experimental neutrino programme at CERN based on a future Neutrino Factory, offering high flux neutrino beams originating from a high intensity injector proton booster and/or muon storage ring of a muon collider.

Emmanuel Tsesmelis