



CERN LIBRARIES, GENEVA



CM-P00045081

CERN/SPSC/84-9
SPSC/I 152
18 January 1984

LETTER OF INTENT

SEARCH FOR HEAVY, PENETRATING AND LONG-LIVED PARTICLES
IN THE NA3 SPECTROMETER

P. Charpentier, J.F. Detoeuf
CEN, Saclay, France

M. Hansroul, A. Michelini
CERN, Geneva, Switzerland

M. Crozon, P. Delpierre, P. Espigat, A. Tilquin
Collège de France, Paris, France

J. Badier, J. Bourotte
Ecole Polytechnique, Palaiseau, France

C. Bemporad, A.M. Gnops, F. Costantini, G.R. Giannini, P. Lariccia
Dipartimento di Fisica, Università di Pisa, Italy
and INFN, Pisa, Italy

J. Boucrot, O. Callot
Laboratoire de l'Accélérateur Linéaire, Orsay, France

J.K. Walker*
Fermilab, Batavia, Illinois (United States)

* Supported in part by Laboratoire de l'Accélérateur Linéaire, Orsay, France.

1. INTRODUCTION

The motivation for this experiment is to make a sensitive search for decays of particles whose existence is beyond the scope of the "Standard Model". Within the context of supersymmetry models the gluino, the fermionic counterpart to the gluon, appears most amenable to experimental investigation with existing fixed-target experiments. Because any evidence for supersymmetry would profoundly influence the future direction of physics it is important to thoroughly search for gluinos.

Existing experimental limits on the properties of the gluino indicate that for masses less than 5 GeV, the lifetime range 10^{-8} to 10^{-10} seconds is unexplored. As theoretical predictions on the gluino mass are extremely loose, even a negative search in this lifetime range would give the important result that masses lower than 5 GeV are excluded.

We propose using the NA3 spectrometer in its beam dump configuration to search for gluinos in this mass and lifetime range. The proposed experiment is not restricted to hadronic decays only, and thus will be sensitive to heavy long-lived and penetrating particles other than gluinos.

2. PHYSICS OBJECTIVE

Although we do not intent to restrict ourselves to a search for gluinos, we will give here our motivation for this search into supersymmetry. Large uncertainties remain in the predictions, but larger are the uncertainties on other unforeseeable particles!

2.1 Introduction

The current paradigm of gauge theories and unification of forces is satisfying in its simplicity and successful description of essentially all physical measurements. However, there is an arbitrariness of the standard model which suggests its incompleteness. It is natural to hope that supersymmetry might reduce or even eliminate this arbitrariness. In any such theory, every particle is related to a supersymmetric partner which differs by $1/2$ unit of spin and otherwise carries identical quantum numbers.

Among the known particles there are no satisfactory candidates for pairs related by supersymmetry. If supersymmetry were exact, each particle would be degenerate in mass with its superpartner. This is plainly not the case. For theories in which supersymmetry is broken, the mass degeneracy is lifted. The masses acquired by the superpartner are highly model-dependent. However, if supersymmetry is to contribute to a resolution of the hierarchy problem, supersymmetry should itself be unbroken above the electroweak scale. This suggests that the low-energy artifacts of supersymmetry, including the superpartners, should occur on a scale of ~ 1 TeV or below.

This proposal deals mainly with the gluino, \tilde{g} , which is the gauge fermion of superpartner the gluon, g . It may be light enough to be substantially produced and long enough lived to travel observable distances before decaying. It seems likely that these particles are best searched for using the high luminosity of a beam dump rather than high energy, low luminosity, of a colliding hadron facility.

2.2 Existing limits

The experimental limits on gluino masses have recently been reviewed by Dawson, Eichten and Quigg [1] and may be summarized as follows :

The gluino is generally supposed to be confined into stable hadrons [2,3], often termed "R-hadrons". The color singlet bound states of gluinos may be neutral ($\tilde{g}\tilde{g}$ or $g\tilde{g}$ or $\tilde{g}q\bar{q}$) or charged ($\tilde{g}q\bar{q}$). Existing experimental results give the limits displayed on Fig. 2 and 3, which are obtained from several assumptions on gluino production and lifetime; and on photino interactions. For instance the limits from CHARM or Fermilab [5] beam dump experiments use the following relation between the gluino lifetime and mass [6] :

$$\tau = 0.8 \times 10^{-6} \left(\frac{m_{\mu}}{m_{\tilde{g}}} \right)^5 \left(\frac{m_{\tilde{q}}}{m_w} \right)^4 \text{ sec}$$

where $m_{\tilde{q}}$ is the mass of the lightest supersymmetric partner to the quarks, (squarks).

The important conclusion of this study is that for gluino lifetimes in the range 10^{-8} sec. and to 10^{-10} sec. there is essentially no restriction on gluino masses. In Fig. 4 we show explicitly (based on the equation given above) the relationship between gluino mass, squark mass and gluino lifetime within the range of interest.

3. DETECTOR AND DETECTION STRATEGY

3.1 The detector

We propose to use the NA3 spectrometer, slightly modified as indicated in Fig. 5, to search for gluinos with mass less than ~ 5 GeV and lifetime in the range 10^{-8} sec $> \tau_{\tilde{g}} > 10^{-10}$ sec. This spectrometer would be used in a configuration close to the one used in previous dimuon studies, which has been described in details elsewhere [7]. For trigger purposes, this set-up would include two new hodoscopes :

- a) a small (60 x 60 cm) T1 hodoscope, divided into 8 horizontal strips, each strip being divided horizontally in two parts; the hodoscope consists of two layers of scintillation counters separated by 1 mm iron to perform strip-to-strip coincidences and thus ignore counting due to neutrons. This hodoscope would be put close to the end of the absorber.
- b) a T2 hodoscope, 1 x 1 m², situated at the entrance of the magnet, consisting also of 2 layers of strips of scintillators.

All other existing facilities of the NA3 set-up will be used without changes.

3.2 Production and detection

If gluino production is considered, the most likely production mechanism occurs via gluon fusion : $gg \rightarrow \tilde{g}\tilde{g}$. Thus we propose to use incoming pions of high energy (up to 350 GeV/c) to benefit from the harder gluon distribution in the pion [ref. 8].

This beam will be absorbed in a dump which may be the one used in the NA3 dimuon experiment, with a central conical tungsten plug in order to dump efficiently the incoming beam. The length of this dump has to be at least 1.8 to 2 m at 300 GeV/c to have a very low fraction of high energy usual hadrons emerging from it.

Glino production cross section should be rather substantial : compared to $q\bar{q}$ production, a color factor equal to 81/7 is expected at the same Q^2 [4]. Then the production cross section of massive gluinos could be of the order of several hundreds of microbarns for instance for gluinos having the same mass as the D meson, since $D\bar{D}$ production is about 40 μb from 360 GeV π^- mesons [9].

The absorber thickness is sufficient to absorb all high energy hadrons (p, π , K, A...) with nucleon absorption cross section in the range 15 - 40 mb. All hadrons (ϕ , J/ψ , D, A_c , B...) with low nucleon cross-section (1 - 15 mb), have short lifetimes ($\approx 10^{-12}$ sec.) and decay at an early stage in the absorber. Therefore, a very low yield of high energy hadrons will emerge from the absorber.

It is assumed that massive gluinos will have rather low nuclear cross section; this is connected to the observation that the charmed quark has a nuclear cross section around 1 mb, the strange quark 4.5 mb and the u quark ~ 12 mb : phenomenologically, the cross section decreases quickly as the mass increases. Therefore massive gluinos would have a finite transmission probability through the absorber.

The punch-through particles have then to decay in a free space, upstream the analysing spectrometer. We consider here a fiducial decay space of 2 meters, which gives about 20% decay probability for energetic gluinos with lifetime $\sim 10^{-9}$ s. The charged decay products of the gluino are then momentum analysed in the NA3 spectrometer, with a momentum resolution $\Delta p/p \sim 10^{-3}p$ (p in GeV/c) if we use half of the bending power of the NA3 magnet ($\int B dl = 2$ Tesla . meters with a momentum cut-off around 1.5 GeV/c). In addition, photons from neutral pions can be detected in the electromagnetic calorimeter with a vertical acceptance from 20 to 150 milliradians in the laboratory frame.

The charged particle multiplicity from gluino decay is expected to be like in the NA3 dimuon experiment and hence pattern recognition and track reconstruction should be easy and very fast (20 ms of CDC 7600 CP time for a complete event in the dimuon experiment).

The vertex spatial resolution for reconstructed events is expected, from present performances, to be better than 2 mm transverse and 1 cm longitudinal for gluino masses $1 \text{ GeV} < m_{\tilde{g}} < 5 \text{ GeV}$. The signature of a gluino should be a missing P_t (due to the unobserved photino $\tilde{\gamma}$) leading to a kind of "Jacobian peak" in the P_t spectrum of the observed decay products.

3.3 Trigger

We propose a three-level trigger which uses both existing NA3 facilities, and the new hodoscopes T1 and T2 described above. All the notations used below are given in Fig. 5.

i) Pretrigger : two kinds of pretrigger can be envisaged :

- a "neutral" pretrigger given by the coincidence $T0 \cdot \overline{T1} \cdot T2 \cdot \overline{H}$, where \overline{H} ensures the absence of any halo particle by a veto counter H mounted upstream of the beam absorber, and T0 the presence of a beam particle.
- a "charged" pretrigger $T0 \cdot T2 \cdot \overline{H} \cdot [T1 = 1] \cdot [\gamma3\overline{T3}] > 1$.

The condition $T1 = 1$ (only 1 strip hit in the T1 hodoscope, out of the 16 counters) reduces background from low-energy showers emerging from the dump. The condition $[\gamma3\overline{T3}] > 1$ uses the third part, $\gamma3$, of the electromagnetic calorimeter tuned to detect minimum ionising particles as a 40 strips hodoscope, and the corresponding strips of the T3 hodoscope which performs a muon veto signature. This condition vetoes triggers from beam particle punch through (due to the hole in the beam direction), and events with only muons from vector meson decays, and ensures the presence of at least one charged hadron in the back of the spectrometer.

ii) Hardware trigger : it is performed using multiplicity conditions on the events, which are achieved with two devices :

- a fast on-line cluster counting, NCH3, in two planes of the CH3 chamber; this can be done with fast ECL electronics and would be available about 100 nsec after the pretrigger.
- a veto, OVFL, on high multiplicity events which were clearly seen in the dimuon experiment as coming from showers escaping from the dump, or created in the magnet iron yokes.

Then for neutral particles we would have

$$\text{Trigger} = \text{neutral pretrigger} \times [\text{NCH3} > 2] \times \overline{\text{OVFL}}$$

and for charged particles

$$\text{Trigger} = \text{charged pretrigger} \times [\text{NCH3} > 3] \times \overline{\text{OVFL}}$$

iii) Software trigger : two existing powerful on-line processors can be used as a third level trigger before writing the events on tape :

- The hardware processor "MORPION" which reconstructs on-line all horizontal or vertical straight line projections of particle trajectories in chambers CH4 - CH5 - CH6, and works since 4 years.
- The emulator 168/E which is successfully working in the present experiment and is able to fully reconstruct the space straight lines and even the tracks in all the spectrometer for simple events before writing on tape. As the average multiplicity is expected to be around 2 to 3 particles in the proposed experiment, this programmable processor should be extremely powerful to reject fake events.

The proposed trigger allows to detect all long-lived and penetrating particle giving at least two charged particles (which may be hadrons or leptons).

4. RATES AND DATA TAKING

4.1 Event rate

It is of course very difficult to estimate a realistic rate of gluino production and detection, in the absence of any quantitative model either for gluino production or interaction with matter. Using reasonable assumptions we can expect about 10^{-3} gluinos per burst of 10^7 incoming particles. The incoming flux will be limited by the acceptable trigger rate which, for technical reasons, cannot exceed 200 per burst.

Several parameters may be adjusted to ensure a reasonable trigger rate :

- the beam flux
- the dump length
- the trigger constraints, which may be more selective and exclude for instance some leptonic decay modes
- the magnetic field, which may sweep all charged particles of $P < 3$ GeV/c when used at its maximum value.

4.2 Background

At the trigger level, expected backgrounds come from two main sources :

- i) interaction of punch-through hadrons in the decay volume : this effect can be reduced by increasing the length of the absorber, and using an helium bag (or even, if necessary, a vacuum tank) in the decay volume
- ii) slow neutron background : we know from our dimuon experiment that it is very important but may be eliminated at the trigger level by narrow coincidences (5 to 10 nanoseconds) between corresponding strips in T1, and T2 hodoscopes.

After reconstruction of events, punch-through K_S^0 or K_L^0 decaying in the fiducial decay volume will be eliminated by their low invariant mass, or by the K_S^0 peak signature; they will be however quite useful for the monitoring of the signature procedure. The only remaining background after vertex reconstruction comes from interactions of energetic punch-through hadrons with matter in the decay volume : this may be another reason to put a vacuum tank in this volume.

4.3 Data acquisition and off-line processing

All the existing on-line acquisition system and off-line analysis programs may be immediately applied to the proposed experiment. In order to obtain the most powerful reconstruction of events, minor modifications have to be done in the pattern recognition and momentum calculation of tracks not coming from the beam region. The new trigger is very easy to incorporate in the NA3 simulation program using the GEANT package.

SCHEDULE AND BEAM REQUESTS

As the spectrometer is already working, and the dump exists from previous runs, the only necessary new devices are T1, T2 and the cluster counting electronics for CH3. All these new devices are cheap (about 30 kSF) and simple to build, and may be ready for June 1984.

Hence we propose running a 10 days test with a π^- beam at 300 GeV/c in July 1984. If this test is successful, a 17 - days SPS period of data taking at the end of 1984 fixed target period will provide a very significant amount of data. The analysis of events will be quite fast and simple. We expect to be able, at the end of 84, to conclude if there is indication of some "gluino-like" particle, and in this case beam time may be requested for some tens of days at the very beginning of the 1985 SPS fixed target period.

REFERENCES AND FOOTNOTES

- [1] S. Dawson, E. Eichten and C. Quigg, Preprint LBL-16540, 1983.
- [2] G.R. Farrar and P. Fayet, Phys. Lett. 76B (1978) 575.
- [3] M. Chanowitz and S. Sharpe, Phys. Lett. 126B (1983) 225.
- [4] F. Bergsma et al., Physics Lett. 121B (1983) 429.
- [5] R.C. Ball et al., Preprint UMHE 83-13.
- [6] G.L. Kane and J.P. Leveille, Phys. Lett. 112B (1981) 319.
- [7] J. Badier et al., Nuclear Inst. and Methods 175 (1980) 319.
- [8] J. Badier et al., Zeitschrift für Physik C20 (1983) 101.
- [9] M. Aguilar-Benitez et al., Physics Lett. 123B (1983) 98.

FIGURE CAPTIONS

- Fig. 1 Diagram for gluino decay into a quark pair plus a photino.
- Fig. 2 Existing experimental limits in the $M_{\tilde{g}}, m_{\tilde{q}}$ plane.
- Fig. 3 Existing experimental limits in the $m_{\tilde{g}}, \tau_{\tilde{g}}$ plane.
- Fig. 4 Relationship between gluino mass squark mass and gluino lifetime.
- Fig. 5 Proposed layout of the NA3 spectrometer.

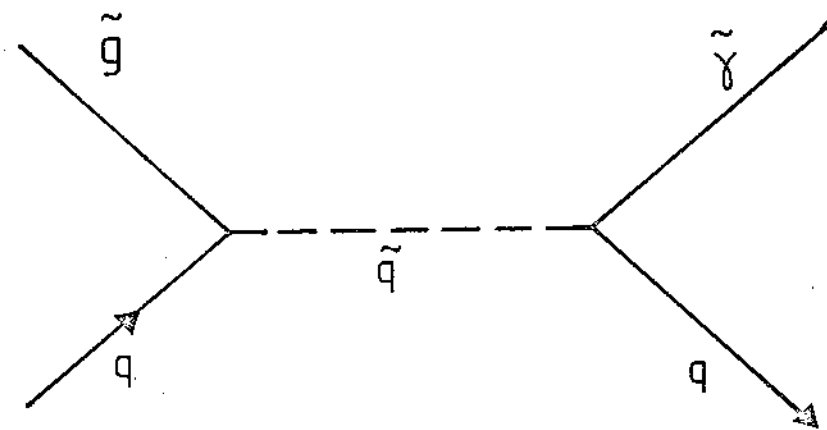
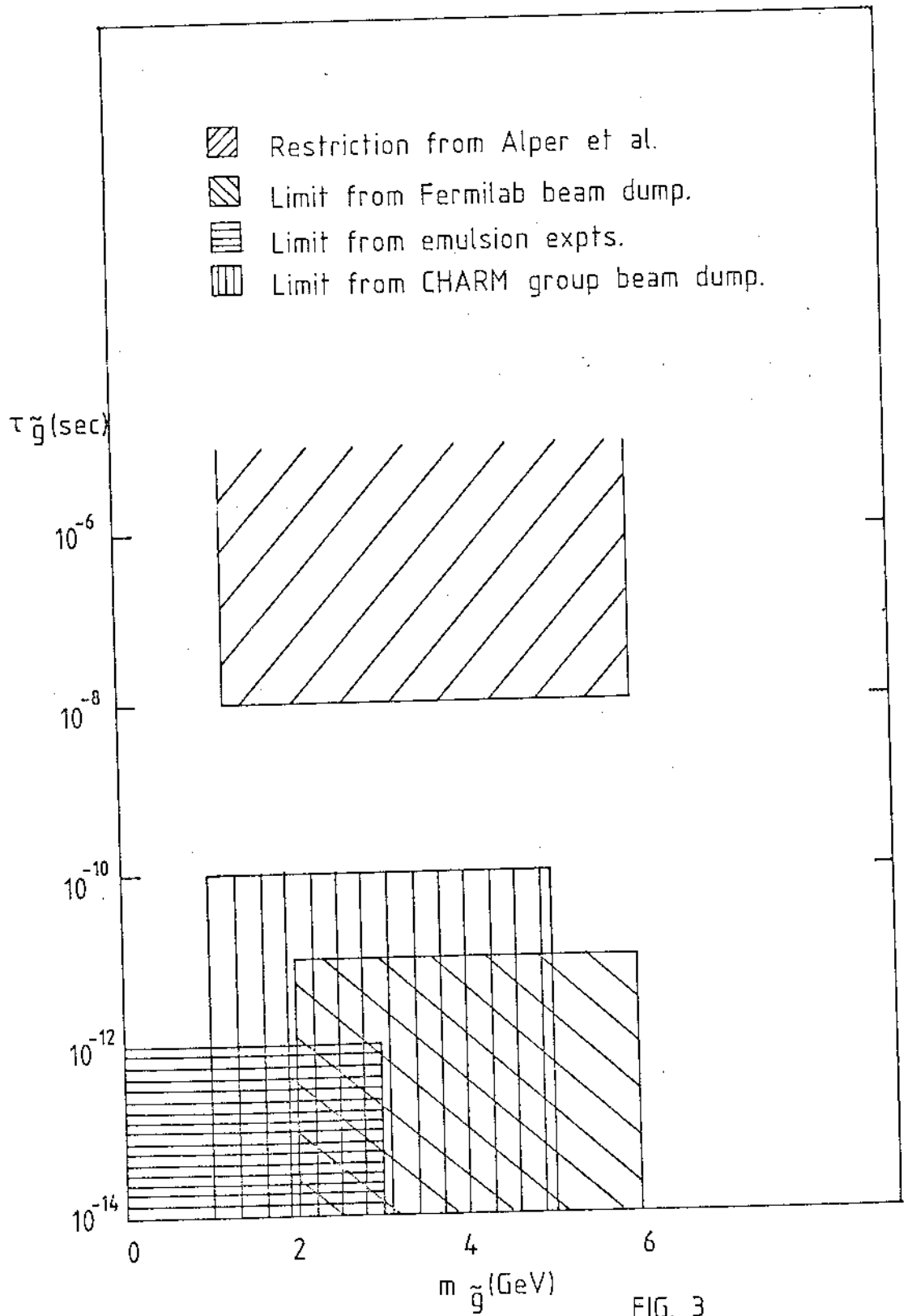


FIG. 1



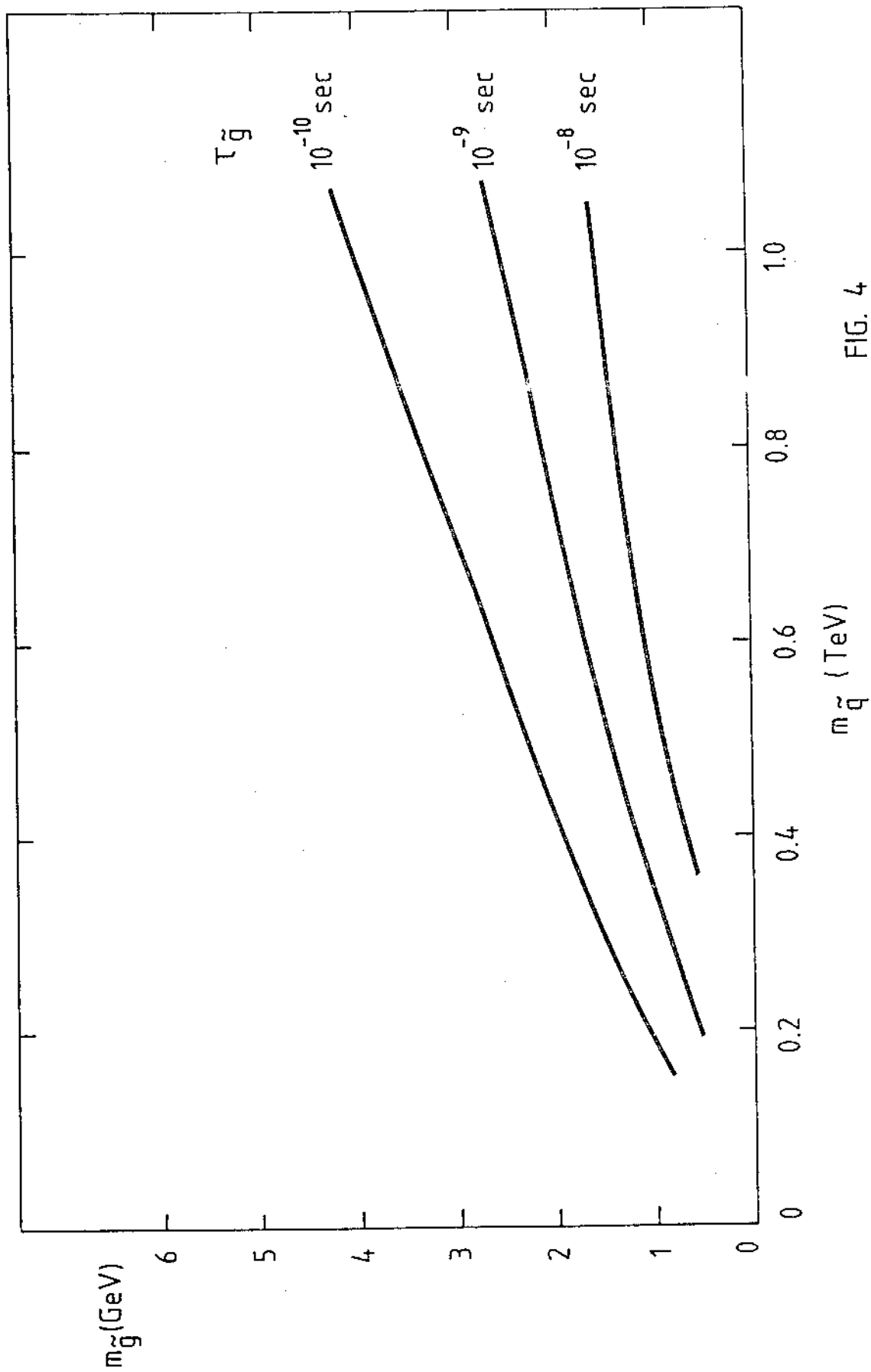


FIG. 4

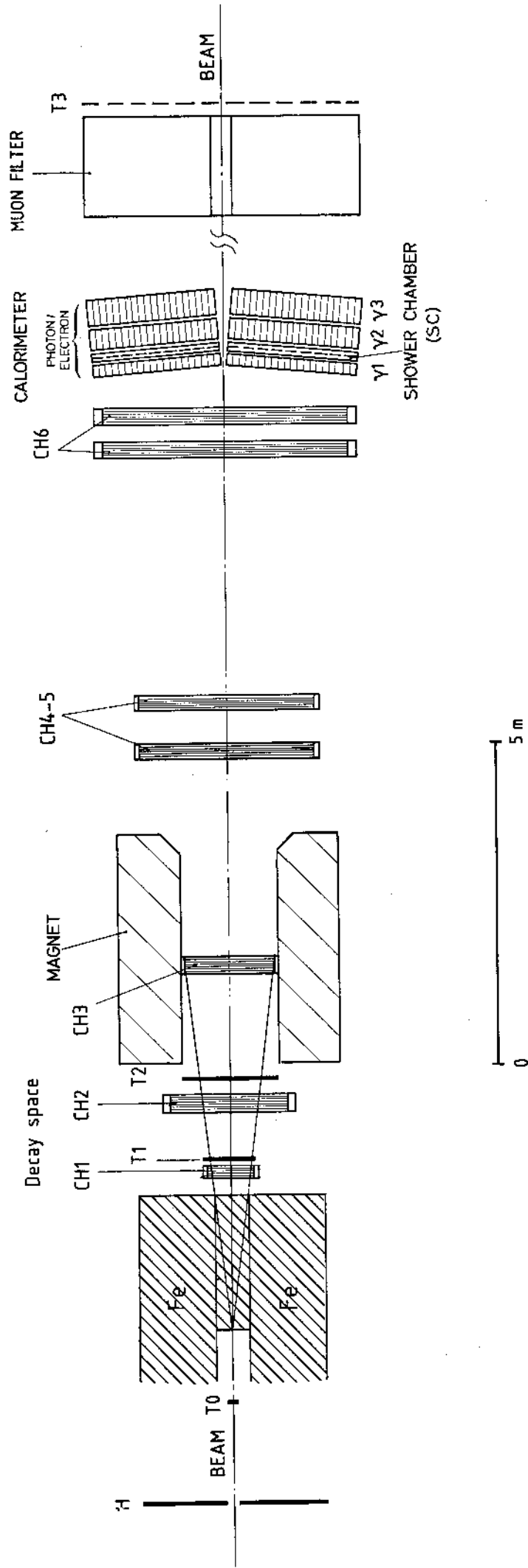


FIG. 5

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6
SPSC/G 39 (DD/SW/DB-SS)

REFERENCES

PARTICIPANTS

EXPERIMENT

SPSC/83-49/PlAB
SPSC/83-84/M369

WA1/2 N3 Measurement of $\sin^2(\theta_{W})$ squared in
semileptonic neutrino/Fe
interactions with
Preparation high precision

CERN
Dortmund Univ.
Heidelberg Univ.
Saclay CEN DPhPE
Warsaw Inst.Nucl.Res.

CERN
Dyda, F., Grant, A., Hagedorn, R., May, J.
RanJard, F., Steinberger, J., Taureg, H.
Von Rueden, W., Wachsmuth, H., Wahi, H.
Wetschack, J.
Dortmund Univ.
Bluemmer, H., Buchholz, P., Duda, J.
Eisele, F., Kleinkecht, K., Knobloch, J.
Pollmann, D., Pszola, B., Renk, B.
Heidelberg Univ.
Belusevic, R., Falkenburg, B., Gelges, R.
Geweniger, C., Hepp, V., Keliwerth, H.
Tittel, K.
Saclay CEN DPhPE
Debu, P., Guyot, C., Merlo, J.P., Para, A.
Perez, P., Perrier, F., Rander, J.
Schuller, J.P., Turlay, R., Vallage, B.
Warsaw Inst.Nucl.Res.
Abramowicz, H., Krollkowski, J.

DATE APPROVAL SPOKESMAN

15/SEP/1983 Steinberger, J.

CONTACTMAN

Steinberger, J.

CODE BEAM EXPERIMENT PARTICIPANTS REFERENCES

WA7 H1 Two-body reactions at large pt
 STATUS Completed
 10/MAY/1982

Annexy L. A. P. P.
 CERN
 Copenhagen Niels Bohr Inst.
 Genova Univ./INFN
 London, University College
 Oslo Univ.

SPSC/74-28/P9
 SPSC/74-49/P9/ADD.1
 SPSC/74-61/P9/ADD.2
 SPSC/74-109/M39
 SPSC/74-110/M40
 SPSC/76-12/M55
 SPSC/76-13/I80
 78-118/P9/ADD.3
 79-1/M 148
 79-9/M 152
 79-87/P9/ADD.4
 80-42/M232
 80-134/M 272

DATE APPROVAL SPOKESMAN
 04/SEP/1974 Gracco, V.
 21/OCT/1976 CONTACTMAN
 18/JAN/1979 Lundby, A.

Annexy L. A. P. P.
 Baglin, C., Gullieud, J. P., Poulet, M.
 CERN
 Bock, R. K., Bugge, L., Buran, T., Lundby, A.
 Mougilic, B.
 Copenhagen Niels Bohr Inst.
 Myrhejm, J.
 Genova Univ./INFN
 Buzzo, A., Ferroni, B., Gracco, V., Macri, M.
 Santroni, A.
 London, University College
 Aza'd, Z., Coupland, M., Davis, D. H. C.
 Duff, B. G., Heymann, F. F., Imrie, D. C.
 Lush, G. J., Phillips, M. H.
 Oslo Univ.
 Brobakken, K., Elder, A., Fearnley, T.
 Gjerpe, I., Haldorsen, I., Jacobsen, T. S. O.
 Kirsebom, K., Skjevting, B., Sorensen, S. O.

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6

SPSC/C 39

(DD/SW/DB-SS)

----- PARTICIPANTS -----

REFERENCES

CODE BEAM N1/N3 Study of semileptonic and leptonic neutral-current processes and of mu-polarization using counter techniques

WA18

STATUS Data-Taking

CERN
Hamburg Univ.
Amsterdam NIKHEF
Rome Univ. /INFN
Moscow I.T.E.P.

SPSC/74-1/I 58; 75-59/P 49
76-51/P 49/Add. 1; 76-114/M70
77-45/P 49/Add. 2; 78-72/M 114
78-111/M 137; 79-25/M 154
79-43/M 165+Corr.; 79-64/M 180
79-89/M192
79-109/M201
80-12/M217
80-102/M 261
SPSC/81-99/M308
SPSC/81-85/M305
SPSC/81-99/M308/Corr.
SPSC/82-65/M339
SPSC/83-26/M352
SPSC/83-33/M355
SPSC/83-39/M356
SPSC/83-82/M367

----- SPOKESMAN -----

CONTACTMAN

DATE APPROVAL 08/JUL/1976

SPOKESMAN Winter, K.

CONTACTMAN Winter, K.

CERN
Allaby, J. V., Amaldi, U., Capone, A.
Fleigel, W., Lanceri, L., Metcalfe, M.
Panman, J., Santoni, C., Winter, K.
Hamburg Univ.
Abt, I., Asplazu, G., Busser, F. W.
Daumann, H., Gall, P. D., Niebergall, F.
Schutt, P., Stahelin, P.
Amsterdam NIKHEF
Bergsma, F., Dorenbosch, J. P., Nieuwenhuis, C.
Rome, INFN
Barbierini, G., Baroncelli, A., Barone, L.
Borgia, B., Bosio, C., Diemoz, M.
De Notaristefani, F., Dore, U., Ferroni, F.
Longo, E., Luminari, L., Moncelli, P.
Tortora, L., Valente, V.
Moscow I.T.E.P.
Gorbunov, P., Grigoriev, E. A., Kaftanov, V. S.
Khovansky, V. D., Rosanov, A.

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6
SPSC/G 39

(DD/SW/DB-SB)

| CODE | BEAM | EXPERIMENT | PARTICIPANTS | REFERENCES |
|------|------|--|---|--|
| WA21 | N1 | High energy neutrino and antineutrino interactions in BEBC filled with H2 | Birmingham Univ. Bonn Univ. CERN London, Imperial College London, University College Munich MPI Oxford Univ. | SPSC/I73-2A SPSC/I 73-40 SPSC/74-91/P 25 SPSC/75-66/M52 77-94/M 93 76-111/M 69 78-143/M 143 79-51/M172 79-91/M194 80-69/M 239 80-73/M 242 SPSC/81-85/M305 SPSC/83-32/M354 SPSC/83-53/M360 SPSC/83-71/M363 SPSC/83-72/M364 |
| | | DATE APPROVAL | SPOKESMAN | |
| | | 25/AUG/1976 | Myatt, G. | |
| | | | CONTACTMAN | |
| | | | Morrison, D.R.O. | |
| | | | Birmingham Univ. Colley, D.C., Jones, G.T., O'Neale, S.W. Votruba, F. Bonn Univ. Boeckmann, K., Gebel, W., Gelch-Gimbel, C. Kokott, T.P.K., Nellen, B. CERN Butterworth, I., Grant, A., Mittendorfer, J. Morrison, D.R.O., Pape, L., Parker, A. Peyrou, C., Schmid, P., Simopoulou, E. Wachsmuth, H.W. London, Imperial College Barnham, K.W.J., Clayton, E.F., Miller, D.B. Mabayen, M., Villa-Lobos-Bailie, O. London, University College Bartley, J., Bullock, F.W., Esten, M. Miller, D.J. Munich MPI Aderholz, M., Deck, L., Schmitz, N. Settles, R., Wernhard, K.L., Wittek, W. Oxford Univ. Corrigan, G., Myatt, G., Radojcic, D. | |
| | | | London, Imperial College Saclay CEN DPHPE | SPSC/76-47/I 83 SPSC/76-52/P 72 77-92/M 91 |
| WA22 | N3 | Experiment in BEBC to compare neutral and charged current neutrino interactions induced by NU pi and NU K at the same energy | London, Imperial College Barnham, K.W.J., Bouseilnck, R. Butterworth, I., Clayton, E.F., Miller, D.B. Powell, K.J. Saclay CEN DPHPE Bloch, M., Vignaud, D. | |
| | | DATE APPROVAL | SPOKESMAN | |
| | | 26/AUG/1976 | Butterworth, I. | |
| | | | CONTACTMAN | |
| | | | | |

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6
SP5C/G 39

(DD/SW/DB-6S)

CODE BEAM EXPERIMENT PARTICIPANTS REFERENCES

WA25 N1 Neutrino and antineutrino interactions in deuterium
STATUS Data-Taking
Amsterdam NIKHEF
Bergen Univ.
Bologna Univ.
Padova Univ.
Pisa Univ./INFN
Saclay CEN DPhPE
Torino Univ.
SPSC/I 73-56
74-09/I 56/ADD.1
74-72/P 16
74-105/P 16/ADD.1
76-05/P 16/ADD.2
77-93/M 92
78-78/M 117
79-50/M171
79-93/M195
79-103/M197
80-26/M 225
SPSC/81-45/M 292
SPSC/81-62/M 295
SPSC/82-18/M319
SPSC/83-56/M361

DATE APPROVAL SPOKESMAN CONTACTMAN
26/AUG/1976 Tenner, A.
CONTACTMAN

Amsterdam NIKHEF
Bariag, S., Jongejans, B., Tenner, A.
Van Apeldoorn, G., Van Dam, P., Visser, C.
Wigmans, M.
Bergen Univ.
Froese, A.G., Mastuft, A., Halsteinslid, A.
Grung, B., Myklebost, K., Rognebakke, A.
Skjeggstad, O., Time, R.
Bologna Univ.
Capiluppi, P., Giacomelli, G., Graziani, G.
Mandrioli, G., Rossi, A.M., Serra Lugaresi, P.
Padova Univ.
Baldo-Ceolin, M., Bobisut, F., Calliani, E.
Clampolillo, S., Derkaoui, J., Huzita, H.
Loret, M., Pugliese, G., Sconza, A.
Pisa Univ./INFN
Angelini, C., Bertanza, L., Bigli, A.
Casali, R., Fantechi, R., Flamini, E.
Nappi, A., Pazzi, R., Petri, C.
Pierazzini, G.M.
Saclay CEN DPhPE
Bolognese, T., Borg, A., Faccini-Turluer, M.L.
Lovedec, C., Vighaud, D.
Torino Univ.
Alfasi, D., Bianchi, F., Bisi, V., Camba, D.
Marzari-Chiesa, A., Riccati, L., Romero, A.
Bologna Univ.
CERN
Moscow Khurchatov Inst.
Novosibirsk Inst. Nucl. Phys.
Serpukhov I.H.E.P.
SPSC/77-37/P 85
80-129/SPSC/M 270

WA38 N3 Magnetic monopole search at the SPS
STATUS Data-Taking
DATE APPROVAL SPOKESMAN CONTACTMAN
16/JUN/1977 Martemianov, V.P.
CONTACTMAN
Lazeyras, P.

Bologna Univ.
CERN
Lazeyras, P.
Moscow Khurchatov Inst.
Gurevich, I. I., Khakimov, S. Kh.
Martemianov, V.P., Mishakova, A. P.
Ogurtsov, V. V., Tarasenkov, V. G.
Novosibirsk Inst. Nucl. Phys.
Barkov, J. M.
Serpukhov I.H.E.P.
Bugorski, A. P.

APPROVED SPS EXPERIMENTS

CODE BEAM EXPERIMENT PARTICIPANTS REFERENCES

WA42 Y1 An experiment on the strong interactions and radiative decays of hyperons

STATUS Completed
 01/JUN/1982

DATE APPROVAL 17/NOV/1977
 SPOKESMAN Extermann, P.
 CONTACTMAN Extermann, P.

Bristol Univ.
 Geneva Univ.
 Heidelberg Univ.
 Lausanne Univ.
 London, Queen Mary College
 Rutherford Lab.
 Bristol Univ.
 Gibson, W.M., Owen, R.C., Smith, V.J.
 Wood, A.T.
 Geneva Univ.
 Bourquin, M., Extermann, P., Modis, T.
 Muhlemann, P., Perrier, J., Ragan, K.
 Schirato, P.
 Heidelberg Univ.
 Burckhart, H., Siebert, H.W., Strelt, K.P.
 Lausanne Univ.
 Dore, C., Galloud, M., Jacot, P.
 Rosselet, P., Walli, R.
 London, Queen Mary College
 Biagi, S., Carter, A.A.
 Rutherford Lab.
 Brown, R.M., Gee, C.N.P., Gray, R.
 Jeffreys, P.W., Saunders, B., Thresher, J.J.
 Yanagisawa, C.

SPSC/77-24/P 82
 77-90/M 90
 79-90/M193
 SPSC/81-1/M 274
 SPSC/81-26/P 82 Add.1

WA44 N1 Search for quarks in high energy neutrino interactions

STATUS Data-Taking

DATE APPROVAL 08/DEC/1977
 SPOKESMAN Zichichi, A.
 CONTACTMAN Massam, T.

Bologna Univ.
 Bologna INFN
 CERN
 Frascati Nat. Lab. (INFN)
 Rome Univ./INFN
 Bologna Univ.
 Basile, M., D'Alì, G., Palmorari, F.
 Sartorelli, G.
 Bologna INFN
 Bonvicini, G., Cara Romeo, G., Del Papa, C.
 Giusti, P., Massam, T.
 CERN
 Cifarelli, L., Contini, A., Nania, R.
 Rohrbach, F., Zichichi, A.
 Frascati Nat. Lab. (INFN)
 Curatolo, M., Esposito, B., Spinetti, M.
 Susinno, G., Votano, L.
 Rome Univ./INFN
 Laakso, I.

SPSC/77-10/P 81
 77-73/P 81/ADD.1
 80-130/SPSC/M 271
 SPSC/81-108/M314

REFERENCES

SPSC/79-90/M193
SPSC/81-11/M 274
SPSC/81-26/P 82 Add.1

PARTICIPANTS

EXPERIMENT

WAS2 Y1 Search for the charmed strange baryon A(0)

Bristol Univ.
Geneva Univ.
Heidelberg Univ.
Lausanne Univ.
London, Queen Mary College
Rutherford Lab.

STATUS
Completed
01/JUN/1982

DATE APPROVAL SPOKESMAN

13/DEC/1979 Streit, K.P.

CONTACTMAN

Streit, K.P.

Bristol Univ.
Gibson, W.M., Smith, V.J.
Geneva Univ.
Bourquin, M., Extermann, P., Modis, T.
Muhlemann, P., Schirato, P.
Heidelberg Univ.
Burckhart, H., Igo-Kemenes, P., Siebert, H.W.
Streit, K.P.
Lausanne Univ.
Dore, C., Gaillood, M., Jacot, P.
Rosselet, P., Weill, R.
London, Queen Mary College
Biagi, S., Britten, A., Carter, A.A.
Rutherford Lab.
Brown, R.M., Gee, C.N.P., Gordon, J.
Louis, W.C., Thresher, J.J.

WAS5 N1 Further study of prompt neutrino production in 400 GeV proton nucleus collisions

CERN
Hamburg Univ.
Amsterdam NIKHEF
Rome, INFN
Moscow I.T.E.P.

STATUS
Completed
13/SEP/1982

DATE APPROVAL SPOKESMAN

22/MAY/1980 Winter, K.

CONTACTMAN

Winter, K.

SPSC/80-31/P 142
80-102/M 261
SPSC/81-21/P 142 Add.1
SPSC/81-99/M308
SPSC/81-99/M308/Corr.
SPSC/83-26/M352
SPSC/83-33/M355
SPSC/83-39/M356

CERN

Allaby, J.V., Amsidi, U., Barone, L.
Capone, A., Flegel, W., Lanceri, L.
Metcalfe, M., Panman, J., Winter, K.
Hamburg Univ.
Aspiazu, G., Busser, F.W., Daumann, H.
Galli, P.D., Niebergall, F., Schutt, P.
Stahelin, P.

Amsterdam NIKHEF

Bergsma, F., Dorenbosch, J.P., Jonker, M.
Nieuwenhuis, C., Udo, F.

Rome INFN

Barbellini, G., Baroncelli, A., Borgla, B.
Bosio, C.

Rome Univ./INFN

De Notaristefani, F.

Rome INFN

Dlemez, M., Dore, U., Ferroni, F., Longo, E.
Luminari, L., Monacelli, P., Santoni, C.
Tortora, L., Valente, V.

Moscow I.T.E.P.

Gorbunov, P., Grigoriev, E.A., Kaftanov, V.S.
Khovansky, V.D., Koshov, A.

APPROVED SPS EXPERIMENTS

CODE BEAM EXPERIMENT PARTICIPANTS REFERENCES

WASS N1 Further study of prompt neutrino production in proton-nucleus collisions using BEBC
 Completed 13/SEP/1982
 Aachen TH
 Athens Demokritos
 Bonn Univ.
 CERN
 London, Imperial College
 Munich MPI
 Oxford Univ.
 Saclay CEN DPhPE
 Stockholm Univ.

DATE APPROVAL 22/MAY/1980
 SPOKESMAN Huith, P.O.
 CONTACTMAN Wachsmuth, H.W.

Aachen TH
 Bosetti, P., Hasert, F.J., Grassler, H.
 Lanske, D., Schulte, R.
 Athens Demokritos
 Dris, M., Simgopoulou, E., Vayaki, A.
 Bonn Univ.
 Boeckmann, K., Gelch-Gimbel, C., Nellen, B.
 Wuensch, B.
 CERN
 Cocconi, V.T., Cundy, D.C., Foeth, H.
 Grant, A., Morrison, D.R.O., Pagliola, E.
 Pape, L., Parker, A., Peyrou, C., Schmid, P.
 Wachsmuth, H.W.
 London, Imperial College
 Barnham, K.W.J., Butterworth, I., China, J.
 Miller, D.B.
 Munich MPI
 Aderholz, M., Deck, L., Schmitz, N.
 Settles, R., Wernhard, L., Wittke, W.
 Oxford Univ.
 Myatt, G., Perkins, D.H., Radojicic, D.
 Salitta, B., Wells, J.
 Saclay CEN DPhPE
 Bloch, M., Bolognese, T., Vignaud, D.
 Stockholm Univ.
 Huith, P.O., Walck, Ch.

SPSC/80-34/P 143
 80-70/M 240
 SPSC/82-30/M325

APPROVED SPS EXPERIMENTS

----- PARTICIPANTS -----
----- REFERENCES -----

WA68 N1 Further study of prompt
neutrino production in a
proton beam dump experiment
CERN
Dortmund Univ.
Heidelberg Univ.
Saclay CEN DPhN
Saclay CEN DPhPE
Warsaw Inst. Nucl. Res.

DATE APPROVAL 19/MAR/1981
SPOKESMAN Steinberger, J.
CONTACTMAN
Steinberger, J.

CERN
Dyddak, F., Hageberg, R., Knobloch, J.
Krolikowski, J., May, J., Ranjard, F.
Steinberger, J., Taureg, H., Von Rueden, W.
Wahl, H., Wotschack, J.
Dortmund Univ.
Buchholz, P., Duder, J., Eisele, F.
Kleinknecht, K., Polimann, D., Pszola, B.
Renk, B.
Heidelberg Univ.
De Groot, J. G. H., Flottmann, T., Gawniger, C.
Herden, R., Kellwerth, H., Magnussen, N.
Tittel, K.
Saclay CEN DPhN
Debu, P., Schuller, J. P.
Saclay CEN DPhPE
Guyot, C., Merlo, J. P., Perez, P., Rander, J.
Turlay, R.
Warsaw Inst. Nucl. Res.
Abramowicz, H., Szeptycka, M., Szczekowski, M.
Para, A.
Fermilab
Berge, P.

WA69 E1 Photoproduction in the
energy range 70-200 GeV
CERN
Lancaster Univ.
Manchester Univ.
Rutherford Lab.
Sheffield Univ.

DATE APPROVAL 23/APR/1981
SPOKESMAN PAUL, E.
CONTACTMAN
Morris, J. V.

Bonn Univ.
Baake, M., Diekmann, B., Heinloth, K.
Holzkamp, S., Jakob, H-P., Jung, M.
Koersgen, G., Liebenau, V., Oedingen, R.
Paul, E., Reidenbach, M., Rotscheldt, H.
Schloesser, A.
CERN
Eades, J.
Lancaster Univ.
Brodbeck, T. J., Charity, T., Clegg, A. B.
Henderson, R. C. W., Newton, D.
Manchester Univ.
Coyle, P., Barberis, D., Dickinson, B.
Donnachie, A., Ellison, R. J.
Hughes-Jones, R. E., Ibbotson, M.
Lafferty, G. D., Mercer, D., Reid, D.
Thompson, R. J., Waterhouse, J., Worsell, M. F.
Rutherford Lab.
Apsimon, R., Davenport, M., Flower, P. S.
Halliwell, G., Hutton, J., Morris, J. A. G.
Morris, J. V., Paterson, C. N., Sharp, P. H.
Uden, C.
Sheffield Univ.
Bunn, J. J., Danaher, S., Galbraith, W.
McClatchey, R., Thompson, L.

SPSC/80-17/SPSC/P 140
SPSC/80-75/P 140/Add. 1
SPSC/80-137/P 140/Add. 2
SPSC/80-18/M 218
SPSC/81-22/M 282
SPSC/82-34/P140/Add. 3

SPSC/80-68/SPSC/P 149

APPROVED SPS EXPERIMENTS

CODE BEAM EXPERIMENT PARTICIPANTS REFERENCES

WA70 H1 Study of direct Photon events in hadronic collisions
STATUS Data-taking
Geneva Univ.
Glasgow Univ.
Liverpool Univ.
Milan Univ./INFN
Neuchatel Univ.
SPSC/80-61/P 147
SPSC/80-108/P 147/Add.1
SPSC/82-23/M322
SPSC/82-37/M327

DATE APPROVAL 22/OCT/1981
SPOKESMAN Martin, M.
CONTACTMAN Martin, M.
Geneva Univ.
Dorsaz, P. A., Fischer, J., Klenzle, M. N.
Martin, M., Mathys, L., Pensotti-Rancoita, S.
Rosselet, L., Rutschmann, J., Werlen, M.
Glasgow Univ.
Frame, D., Hughes, I. S., Lynch, J. G.
Negus, P. J., Stewart, D. T., Thompson, A. S.
Turnbull, R. M.

Liverpool Univ.
Booth, P. S. L., Caroli, L. J., Donald, R. A.
Edwards, D. N., Jackson, J. N., Kelly, M.
Ranger, W. H., Rumford, I.
Milan Univ./INFN
Bonesini, M., Cavalli, D., Cecchet, G.
Costa, G., Mandelli, L., Mazzanti, M.
Tamborini, M.
Neuchatel Univ.
Bohvin, E., Fluri, L., Jornod, A., Perrin, D.
CERN
Perini, L.

CODE BEAM EXPERIMENT PARTICIPANTS REFERENCES

WA71 H1 An experiment to study Beauty production and lifetime in the upgraded Omega prime Spectrometer
 STATUS Data-taking
 CERN Geneva Univ./INFN 159
 Milan Univ./INFN 159/Add. 1
 Moscow Lebedev Phys. Inst. SPSC/81-39/M289
 Paris VI Univ. SPSC/81-56/M293
 Rome Univ./INFN SPSC/81-64/M296
 Santander Univ. SPSC/82-13/M317
 Valencia Univ. SPSC/82-36/M326
 SPSC/83-19/M350
 SPSC/83-18/M349

DATE APPROVAL 22/OCT/1981
 SPOKESMAN Diambri-Palazzini, G.
 CONTACTMAN Vanderhaeghe, G.R.
 CERN Garcia, J., Higon, E., Rossi, L., Tentindo, S.
 Vanderhaeghe, G.R.
 Geneva Univ./INFN Dameri, M., Darbo, G., Osculati, B.
 Sannino, M., Tomasini, G., Vitale, S.
 Milan Univ./INFN Manfredi, P.F., Mariotti, D., Meroni, C., Micheleletti, E., Vagni, G.
 Moscow Lebedev Phys. Inst. Adamovich, M.I., Alexandrov, Y.A., Chernyavsky, M.M., Gerasimov, S.G., Kharlamov, S.P., Larionov, V.G., Mendjelal-Peresadko, N.G., Orlova, G.I., Salmanova, N.A., Shtarkov, L.N., Tretyakova, M.I., Yhukova, M.Y.
 Paris VI Univ. Cloarec, M.M., Levy, F., Lory, J., Schuner, D., Tsai Chu, Willot, B.
 Rome Univ./INFN Baroni, G., Diambri-Palazzini, G., Ghinobbi, P., Lamanna, E., Mazzoni, M.A., Meddi, F., Petrerà, S.
 Santander Univ. Niembro, R., Ruiz, A., Villar, E.
 Valencia Univ. Bolta, J.M., Cabrera, J., Llosa, R., Sanchis, M.A., Senent, F.

WA72 S1 A study of fast proton production in $Pi^{(+-)}$ -nucleus interactions using the Omega Spectrometer
 STATUS Completed
 DATE APPROVAL 22/MAR/1982
 SPOKESMAN Szeptycka, M.
 CONTACTMAN Beusch, W.

CERN Beusch, W., Burns, A., Knudson, K., Palano, A., Guercigh, E., Zitoun, R.
 Lisbon Nat. Inst. Sci. Res. Abreu, M.C., Gago, J.M., Pimenta, M.
 Neuchatel Univ. Perrin, D.
 Paris VI Univ. Armstrong, T.A., Baubillier, M., Er Schaldat, N.
 Warsaw Univ. Jacholkowski, A., Otwiński, S., Szeptycka, M., Tkaczyk, S., Waliczak, R.
 SPSC/81-54/P 164

APPROVED SPS EXPERIMENTS

----- PARTICIPANTS -----
 ----- EXPERIMENT -----
 ----- REFERENCES -----

SPSC/81-106/P173

WA74 S1 Antiproton-proton glory scattering

CERN
 Lisbon Nat.Inst.Sci.Res.
 Neuchâtel Univ.
 Paris VI Univ.

STATUS
 Completed
 02/MAY/1982

DATE APPROVAL SPOKESMAN

17/FEB/1982 Gago, J.M.

CONTACTMAN

Sonderegger, P.

CERN Sonderegger, P., Zitoun, R.
 Lisbon Nat.Inst.Sci.Res.
 Dias de Deus, J., Gago, J.M., Pimenta, M.
 Neuchâtel Univ.
 Perrin, D.
 Paris VI Univ.
 Armstrong, T.A., Baubillier, M., Brient, J.C.
 Sene, M., Strachman, Z.
 Paris College de France
 Kahane, J., Sene, R.
 Moscow I.T.E.P.
 Galaktionov, Yu.

WA75 H3 An experiment to observe directly Beauty particles selected by muonic decay in emulsion and to estimate their lifetimes

Bari Univ.
 Brussels, IiHE
 CERN
 Dublin Univ. College
 Japan U.G.
 London, University College
 Rome Univ.
 Torino Univ.

SPSC/81-69/P166
 SPSC/82-60/M338

DATE APPROVAL SPOKESMAN

22/APR/1982 Musset, P.

CONTACTMAN

Sietten, H.

Bari Univ.
 Arkenhise, N., Erriquez, O., Muciaccla, M.T.
 Natali, S., Nuzzo, S., Romano, F.
 Ruggieri, F.
 Brussels, IiHE
 Barth, M., Bertrand-Coremans, G., Roosen, R.
 CERN
 Chesl, E., Musset, P., Pluz, F., Poulard, G.
 Ramello, L., Rosa, G., Sietten, H.
 Dublin Univ. College
 Breslin, A., Montwill, A.
 Japan U.G.
 Hazawa, M., Hoshino, K., Isogane, Y.,
 Maeda, Y., Miyamishi, M., Nakamura, M.,
 Ni, K., Niwa, K., Chashi, M., Sato, Y.
 Shibuya, H., Tsunooka, Y., Ushida, N.
 Yamakawa, O., Yanagisawa, Y.
 London, University College
 Bartley, J.H., Davis, D.H., Duff, B.G.
 Esten, M.J., Heymann, F.F., Imrie, D.C.
 Lush, G.J., Tovee, D.N.
 Rome Univ.
 Baroni, G., Di Liberto, S., Manfredini, A.
 Romano, G., Sgarbi, G.
 Torino Univ.
 Allasia, D., Bisi, V., Gamba, D.
 Marzari-Chiesa, A., Riccati, L., Romero, A.
 Marseille C.P.P.M.
 Albanese, J.P.
 Strasbourg Univ.
 Arnold, R.
 London, Birkbeck College
 Coupland, M., Trent, P.

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6
SPSC/G 39 (DD/SW/DB-SS)

REFERENCES

REFERENCES

PARTICIPANTS

SPSC/82-3/P175

CODE BEAM

EXPERIMENT

WA76 H1A Study of the mesons produced centrally in the reaction pp giving pp plus $X(\phi)$ and $p\bar{p}$ giving $p\bar{p}$ plus $X(\phi)$ at 85 GeV/c

Athens Univ.
Bari Univ.
Birmingham Univ.
CERN

STATUS

Completed
16/JUN/1982

DATE APPROVAL

SPOKESMAN

22/APR/1982 French, B. R.

CONTACTMAN

Palano, A.

Athens Univ.
Angelopoulos, A., Apostolakis, A.
Papailias, P., Rozaki, R., Stassinaki, M.
Vassiliadis, G.
Bari Univ.
Evangelista, E., Ghidini, B., Lenti, V.
Zito, G.
Birmingham Univ.
Bloodworth, I. J., Carney, J. N., Kinson, J. B.
Shaylor, H. R., Votruba, M. F.
CERN
Burns, A., Eades, J., French, B. R.
Knudson, K., Lussalle, J. C., Palano, A.
Quercigh, E., Zitoun, R.
Michigan State Univ.
Armstrong, T. A.
Vienna, Inst. H. En. Phys. (HEPHY)
Mitaroff, W.

WA77

Search for direct production of gluonium states in high $p\bar{p}$ collisions at 350 GeV/c

STATUS

Setting-up

DATE APPROVAL

SPOKESMAN

18/NOV/1982 Quercigh, E.

CONTACTMAN

Burns, A.

SPSC/82-62/P181
SPSC/82-78/P181/Add.1

Athens Univ.
Bari Univ.
Birmingham Univ.
CERN
Paris College de France
Paris VI Univ.
Athens Univ.
Angelopoulos, A., Apostolakis, A., Rozaki, H.
Stassinaki, M., Vassiliadis, G.
Bari Univ.
Evangelista, C., Ghidini, B., Lenti, V.
Navach, F., Palano, A., Zito, G.
Birmingham Univ.
Bloodworth, I. J., Carney, J. N., Kinson, J. B.
Shaylor, H. R., Votruba, M. F.
CERN
Baubliller, M., Beusch, W., Burns, A.
French, B. R., Goldschmidt-Clermont, Y.
Knudson, K., Lussalle, J. C., Petronzio, R.
Quercigh, E.
Paris College de France
Benayoun, M., Kahane, J., Leruste, P.
Maitant, A., Narjoux, J. L., Sene, R.
Paris VI Univ.
Parrie, R., Sene, M., Strachman, Z.
Zitoun, R.

 CODE BEAM EXPERIMENT PARTICIPANTS REFERENCES

SPSC/83-14/P185

WA78 Search for the hadroproduction
 of B/anti-B pairs

STATUS
 Preparation

DATE APPROVAL SPOKESMAN
 16/JUN/1983 Pistilli, P.
 CONTACTMAN

Bari Univ.
 Brussels, IIHE
 CERN
 London, University College
 Rome Univ./INFN
 Torino Univ./INFN

Bari Univ.
 Arnesise, M., Erriquez, O., Muciaccia, M.T.
 Natali, S., Nuzzo, S., Romano, F.
 Ruggieri, F.
 Brussels, IIHE
 Van Homwegen, M., Roosen, R.
 CERN
 Carboni, G., Fidecaro, G., Fidecaro, M.
 Gerke, C., Musset, P., Piuze, F., Poulard, G.
 Ramello, L., Rosa, G., Sletten, H.
 London, University College
 Bartley, J.H., Coupland, M., Davis, D.H.
 Duff, B.G., Esten, M.J., Heymann, F.F.
 Imrie, D.C., Lush, G.J., Tovee, D.N.
 Trent, P.
 Rome Univ./INFN
 Cesaroni, F., De Vincenzi, M., Diliberto, S.
 Frenkel, A., Marini, G., Martelotti, G.
 Nigro, A., Penso, G., Petrolo, E.
 Pistilli, P., Romano, G., Sclubba, A.
 Torino Univ./INFN
 Bisi, V., Gamba, D., Riccati, L.

SPSC/83-24/P186
 SPSC/83-37/P186/Add.1
 SPSC/83-83/M368

WA79 Study of neutrino-electron
 scattering at the SPS

STATUS
 Preparation

DATE APPROVAL SPOKESMAN
 16/JUN/1983 Winter, K.
 CONTACTMAN
 Flegel, W.

CERN
 Busi, C., Flegel, W., Metcalf, M., Panman, J.
 Winter, K.
 Hamburg Univ.
 Abt, I., Asplazu, J., Blobel, V., Busser, F.W.
 Daumann, H., Gall, P.D., Niebergall, F.
 Schutt, P., Stahelin, P.
 Moscow I.T.E.P.
 Gorbunov, P., Grigoriev, E.A., Khovansky, V.D.
 Rosanov, A.
 Naples Univ./INFN
 Ereditato, A., Grancagnolo, F., Palladino, V.
 Strollin, P.
 Rome, INFN
 Barone, L., Capone, A.
 Diemoz, M., Dore, U., Ferroni, F., Longo, E.
 Luminari, L., Tortora, L.

APPROVED SPS EXPERIMENTS

CODE BEAM EXPERIMENT PARTICIPANTS REFERENCES

NA2 M2 Electromagnetic Interactions of Muons
 STATUS Data-Taking
 Annecy L.A.P.P.
 CERN
 Freiburg Univ.
 Hamburg DESY
 Kiel Univ.
 Lancaster Univ.
 Liverpool Univ.
 Marseille C.P.P.M.
 Oxford Univ.
 Rutherford Lab.
 Sheffield Univ.
 Torino Univ.
 Wuppertal Univ.
 SPSC/I 73-15
 I73-15/REV.
 74-78/P 18
 75-62/M51
 76-76/M59
 77-113/P 18/ADD.1
 78-112/M 138
 79-17/P 18/ADD.2
 79-121/M207
 80-211/M221
 SPSC/81-83/M303
 SPSC/81-101/M309
 SPSC/81-102/M310

DATE APPROVAL SPOKESMAN
 12/MAR/1975 Sloan, T.
 21/OCT/1976
 15/FEB/1979 CONTACTMAN Sloan, T.

Annecy L.A.P.P.
 de Bouard, X., Bertsch, Y., Colinet, G.
 Favier, J., Malre, M., Minssieux, H.
 Moynot, M., Pessard, H., Schneegans, M.
 Thenard, J.M., Vivargent, M.
 CERN
 Dobinson, R.W., Goessling, C.
 Montgomery, H.E., Osborne, A.M., Sloan, T.
 Watson, E.
 Freiburg Univ.
 Haas, J., Landgraf, U., Mohr, W., Rith, K.
 Smith, R., Stier, H.E.
 Hamburg DESY
 Brasse, F.W., Flauger, W., Gayler, J.
 Korbel, V., Nassalski, J.
 Kiel Univ.
 Altkofer, O.C., Bohm, E., Dau, W.
 Lancaster Univ.
 Bee, C., Bird, I., Coughlan, J.
 Liverpool Univ.
 Brown, S., Court, G.R., Gabathuler, E.
 Gamet, R., Hayman, P., Holt, J.R.
 Williams, D.A., Wimpenny, S.
 Marseille C.P.P.M.
 Albanese, J.P., Aubert, J.J., Benchouk, C.
 D'Agostini, G., Mermet-Guyennet, M., Payre, P.
 Oxford Univ.
 Williams, W.B.C.
 Rutherford Lab.
 Botterill, D., Chima, S., Clifft, R.
 Edwards, M., Norton, P.R., Oakham, G.
 Sproston, M., Thompson, J.C.
 Sheffield Univ.
 Combley, F., Foster, J.
 Torino Univ.
 Arneodo, M., Costa, F., Ferrero, M.I.
 Peroni, C.
 Wuppertal Univ.
 Becks, K.H., Drees, J., Edwards, A.
 Forsbach, H., Hamacher, K., Pietrzyk, U.
 Stockhausen, W., Wahlen, H.
 Bonn Univ.
 Leenen, M.
 Budapest Res. Inst.
 Nagy, E., Urban, L.

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6
SPSC/G 39 (DD/SW/DB-55)

CODE BEAM EXPERIMENT PARTICIPANTS REFERENCES

NA3 HB Direct photon production in hadron-hadron collisions at the SPS
STATUS Data-Taking

CERN Orsay Linear Acc. Lab. (LAL)
Palaiseau Ec. Poly. L.P.N.H.E.
Paris College de France
Pisa Univ./INFN
Saclay CEN DPhPE

BPSC/74-90/P 24
77-4/M 71; 77-57/M83
78-142/I115; 79-5/I115/Add.1
79-41/M164; 79-60/M177
79-78/M188
79-105/M199; 79-113/M199/Add.1
80-128/M209
80-37/M230
80-64/M 237
80-81/M 246
80-106/SPSC/P 153
SPSC/81-36/M 287
SPSC/81-85/M305
SPSC/83-69/M362

DATE APPROVAL SPOKESMAN
12/MAR/1975 Michellini, A.
15/FEB/1979 CONTACTMAN
13/DEC/1979
27/NOV/1980 Michellini, A.

CERN Constantini, F., Mansrouf, M., Michellini, A.
Rahai-Calliot, G., Runolfsson, O.
Orsay Linear Acc. Lab. (LAL)
Bardach-Otwinowska, M., Boucrot, J.
Calliot, O., Cohen, M., Decamp, D., Moniez, M.
Palaiseau Ec. Poly. L.P.N.H.E.
Badier, J., Bienvenue, H., Bourotte, J.
Karyotakis, Y., Pare, E., Welsz, S.
Paris College de France
Crozon, M., Delpierre, P., Espigat, P.
Maillard, J., Tiliquin, A.
Pisa Univ./INFN
Bemporad, C., Chops, A.M., Giannini, G.R.
Lariccia, P.
Saclay CEN DPhPE
Charpentier, P., Detoeuf, J.F., Gandols, B.
Le Du, P.

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6
SPSC/C 39

(DD/SW/DS-SS)

CODE BEAM EXPERIMENT PARTICIPANTS REFERENCES

NA4 M2 Inclusive deep inelastic muon scattering
 STATUS Data-Taking

Bologna Univ.
 CERN
 Dubna J. I. N. R.
 Munich Univ.
 Saclay CEN DPhPE

SPSC/74-79/P 19
 74-103/P 19/ADD. 1
 74-108/P 19/ADD. 2
 74-120/P 19/ADD. 3
 74-82/M 56
 77-12/P 19/ADD. 4
 77-40/M 78
 79-44/M166
 79-132/M211
 80-23/M223
 80-97/M 256
 SPSC/81-97/M305
 SPSC/81-85/M305
 SPSC/83-27/M353
 SPSC/83-76/M365

DATE APPROVAL SPOKESMAN
 07/MAY/1975 Staude, A.
 12/MAY/1977
 15/FEB/1979 CONTACTMAN
 Voss, R.

Bologna Univ.
 Benvenuti, A. C., Bollini, D., Bruni, G.
 Camporesi, T., Helman, G., Laurenti, G.
 Mohari, L., Navarria, F.

CERN
 Argento, A., Delters, K., Mannl, F.
 Staude, A.

Dubna J. I. N. R.
 Cvach, I., Fadeev, N. G., Golutvin, I. A.
 Ivanchenko, I. M., Kerjavin, V.
 Kiryushin, Y. T., Kiselev, V. S., Khabarov, V. S.
 Kondor, A., Krivokhizhin, V. G., Kukhtin, V. V.
 Savin, I. A., Smirnov, E. I., Smolin, D. A.
 Strachota, J., Sultanov, G., Todorov, P.
 Volodko, A. G., Zacek, J., Zarubln, A. V.

Munich Univ.
 Jamnik, D., Kopp, R., Meyer-Berkhout, U.
 Teichert, R., Trier, R., Voss, R.
 Zupancic, C.

Saclay CEN DPhPE
 Cribrier, M., Feltesse, J., Fournier, J. P.
 Leveau, A., Michau, J. C., Milsztajn, A.
 Ouraou, A., Rich-Hennion, P., Sacquin, Y.
 Smedja, G., Verrechia, P., Vesztegombi, G.
 Virchaux, M.
 Trieste Univ.
 Piemontese, L.

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6
SPSC/C 39

(DD/SW/DB-SS)

EXPERIMENT

PARTICIPANTS

REFERENCES

NA7 H4 Measurement of the
electromagnetic form factors
of P_1 and K mesons at the SPS

STATUS
Completed
01/JUN/1982

CERN Frascati Nat. Lab. (INFN)
London, Westfield College
Milan Univ./INFN
Pisa Univ./INFN
Southampton Univ.
Torino Univ.
Trieste Univ.

SPSC/77-30/P 83
77-53/P 83/ADD. 1
80-8/M215
80-86/M 248

DATE APPROVAL SPOKESMAN

22/SEP/1977 Frank, S.G.F.

CONTACTMAN

Bellamy, E.H.

CERN
Laurelli, P.
Frascati Nat. Lab. (INFN)
Beck, G.A., Celani, F., Codino, A.
Fabbri, F.L., Rivelino, G., Satta, L.
Spillanti, P., Zallo, A.
London, Westfield College
Bellamy, E.H., Fiducato, F., Heath, G.
London, M., March, P.V., Strong, J.R.
Von Schlippe, W.
Milan Univ./INFN
Meroni, E., Moroni, L.
Pisa Univ./INFN
Amendolia, S.R., Bedeschi, F., Bertolucci, E.
Bettoni, D., Bosio, L., Bradascchia, C.
Dell'Orso, M., Foa, L., Focardi, E.
Glazotto, A., Giorgi, M., Marrocchesi, P.S.
Menzione, A., Ristori, L., Scribano, A.
Tenchini, R.
Southampton Univ.
Coughlan, M., Frank, S.G.F.
Torino Univ.
Beck, G.A., Bilokon, H., Bologna, G.
D'Etторе Piazzoli, B., Mannocchi, G.
Picchi, P.
Trieste Univ.
Batignani, G., Budinich, M., Lilello, F.
Piazzoli, H.L., Ragusa, F., Rolandi, L.
Stefanini, A.

----- PARTICIPANTS -----

NA9 M2 Study of final states in deep inelastic muon scattering
 STATUS Data-Taking
 CODE BEAM EXPERIMENT
 Aachen TH
 Anney L.A.P.P.
 CERN
 Freiburg Univ.
 Hamburg DESY
 Hamburg Univ.
 Kiel Univ.
 Lancaster Univ.
 Liverpool Univ.
 Marseille C.P.P.M.
 Mons Univ.
 Munich MPI
 Orsay Linear Acc. Lab. (LAL)
 Oxford Univ.
 Rutherford Lab.
 Sheffield Univ.
 Torino Univ.
 Uppsala Univ.
 Wuppertal Univ.
 Aachen TH
 Dumont, J.J., Duren, M., Hasert, F.J.
 Lanske, D., Schultze, K., Urban, L.
 Anney L.A.P.P.
 Bertsch, Y., de Bouard, X., Colgnat, G.
 Favier, J., Jancso, G., Maire, M.
 Minssieux, H., Moynot, M., Pessard, H.
 Schneegans, M., Thenard, J.M., Vivargent, M.
 CERN
 Dobinson, R.W., Goessling, C., Gustafsson, L.
 Kellner, G., Montgomery, H.E., Muller, H.
 Osborne, A.M., Sloan, T., von Holtey, E.
 Watson, E.
 Freiburg Univ.
 Dreyer, T., Ernst, T., Haas, J.
 Hertenthaler, H., Jung, H., Kabuss, E.M.
 Kroesen, G., Landgraf, U., Mohr, W., Rith, K.
 Schlagbohrer, A., Schroeder, T., Smith, R.
 Stier, H.E., Tleck, E., Wallucks, W.
 Hamburg DESY
 Brasse, F.W., Flauger, W., Gayler, J.
 Korbel, V., Nassalski, J., Poensgen, B.
 Hamburg Univ.
 Bucholtz, G., De la Torre, A., Figlel, J., Hoppe, B., Janata, F., Rondio, E., Studt, M.
 Kiel Univ.
 Altkofer, O.C., Bohm, E., Dav, W.
 Lancaster Univ.
 Bee, C., Bird, I., Coughlan, J.
 Liverpool Univ.
 Brown, S., Court, G.R., Gebathuler, E.
 Gamet, R., Hayman, P., Holt, J.R.
 Pellingale, J., Wimpenny, S.
 Marseille C.P.P.M.
 Albanese, J.P., Aubert, J.J., Benchouk, C.
 D'Agostini, G., Mermet-Guyennet, M.
 Montanet, F., Payre, P.
 Mons Univ.
 Beaufays, J., Callebaut, D., Grand, F.
 Hanton, J., Windmolders, R.
 Munich MPI
 Dangler, F., Derado, I., Eckardt, V., Manz, A.
 Schmitz, N., Shiers, J., Wolf, G.
 Orsay Linear Acc. Lab. (LAL)
 Blum, D., Heusse, P., Jacholkowska, A.
 Jaffre, M., Pascaud, C.

DATE APPROVAL 16/FEB/1978
 23/MAR/1979
 SPOKESMAN Sloan, T.
 CONTACTMAN Sloan, T.

APPROVED SPS EXPERIMENTS
CERN/SPSC/84-6
SPSC/G 39 (DD/SW/DB-55)

CODE BEAM EXPERIMENT PARTICIPANTS REFERENCES

NAL4 E12 Photoproduction at high energy and high intensity
STATUS Data-Taking
Athens Nat. Tech. Univ.
CERN
London, Imperial College
Orsay Linear Acc. Lab. (LAL)
Palaiseau Ec.Poly. L.P.N.H.E.
Paris College de France
Saclay CEN DPhPE
Southampton Univ.
Strasbourg Univ.
Warsaw Univ.

SPSC/78-76/P 109
78-139/P 109/Add. 1
79-111/M202
79-124/M208
80-29/M226
80-89/M 251
SPSC/81-6/M 276
SPSC/82-24/M323

DATE APPROVAL SPOKESMAN
14/DEC/1978 Treille, D.
13/DEC/1979 CONTACTMAN
Treille, D.

- Athens Nat. Tech. Univ.
- Fillipeas, T., Fokitis, E., Karpathopoulos, S.
- Katsoufis, E.C., Papadopoulos, T., Trakkas, C.
- CERN
- Andersson, L., Burmeister, H., Engelen, J.
- James, F., Lassalle, J.C., Pattison, J.B.
- Treille, D.
- London, Imperial College
- Astbury, P., Duane, A., Gregory, P.
- Hancock, S., Kyberd, P., Miller, D.B.
- Morris, J.W., Namjoshi, R., Slotis, T.
- Virdee, T.S., Websdale, D.M.
- Orsay Linear Acc. Lab. (LAL)
- Bouquet, B., D'Almagne, B., Ferrer, A.
- Petroff, P., Richard, F., Roudeau, P., Six, J.
- Wojcik, W., Wormser, G.
- Saclay CEN DPhPE
- Barate, R., Boreyre, P., Bonamy, P., David, M.
- Lemoigne, Y., Mouchet, J., Villet, G.
- Zolnierowski, Y.
- Saclay CEN DPhN
- Marshall, T.
- Southampton Univ.
- McEwen, J.G., Shooshtari, H.
- Strasbourg Univ.
- Bloch, D., Engel, J.P., Guyonnet, J.L.
- Schaeffer, M.
- Warsaw Univ.
- Gorski, M., Hofmaki, T., Jacholkowska, A.
- Sobczynski, C.
- Paris College de France
- Brunet, J.M., De Bellefon, A., Lefevre, B.
- Poutot, D., Tristram, G.
- Palaiseau Ec.Poly. L.P.N.H.E.
- Benkheiri, P., Costa Ramos, S., Rouge, A.
- Wuthrick, J.P.
- Milan Univ./INFN
- Rancolta, P.G.

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6
SPSC/G 39

(DD/SW/DB-58)

EXPERIMENT

M14/2 A program of heavy
flavour photoproductionSTATUS
Preparation

PARTICIPANTS

Athens Nat. Tech. Univ.
CERN
London, Imperial College
Orsay Linear Acc. Lab. (LAL)
Palaiseau Ec. Poly. L.P.N.H.E.
Paris College de France
Saclay CEN DPhPE
Southampton Univ.
Strasbourg Univ.
Warsaw Univ.

BPSC/82-73/P109/Add. 2
BPSC/83-22/M351

REFERENCES

DATE APPROVAL 25/APR/1983
SPOKESMAN Treille, D.
CONTACTMAN
Treille, D.

Athens Nat. Tech. Univ.
Filippas, T., Fokitis, E., Karpathopoulos, S.
Katsoufis, E., Papadopoulos, T., Trakkas, C.
CERN
Andersson, L., Burmelster, H., Carena, F.
Engelen, J., James, F., Lassalle, J.C.
Fattison, J.B., Treille, D.
London, Imperial College
Burtchell, M., Cattaneo, M., Dixon, J.
Duane, A., Gregory, P., Hall, J., Nooh, P.
Sees, C., Stotis, I., Virdee, T.S.
Websdale, D.M.
Orsay Linear Acc. Lab. (LAL)
D'Almagne, B., Ferrer, A., Guryh, W.
Petroff, P., Roudeau, P., Six, J., Wormser, G.
Palaiseau Ec. Poly. L.P.N.H.E.
Benkheiri, P., Costa Ramos, S., Rouge, A.
Wuthrick, J.P.
Paris College de France
Brunet, J.M., De Bellefon, A., Lefevre, B.
Poutot, D., Tristram, G.
Saclay CEN DPhPE
Barate, R., Bareyre, P., Bonamy, P.
Borgeaud, P., De Lesquens, A., David, M.
Legendre, R., Lemoigne, Y., Polinsignon, J.
Primout, M., Rancolta, P.G., Villet, G.
Zolnierowski, Y.
Southampton Univ.
Counihan, M., McEwen, J.G., Shoochitari, H.
Strasbourg Univ.
Bloch, D., Engel, J.P., Guyonnet, J.L.
Schaeffer, M.
Warsaw Univ.
Gorski, M., Hofmaki, T., Bobczynski, C.

APPROVED SPS EXPERIMENTS
 CERN/SPSC/84-6
 SPSC/G 39 (DD/SW/DB-95)

REFERENCES

CODE BEAM EXPERIMENT PARTICIPANTS

BPSC/79-94/P 131; 79-95/P 132

NA17 Momentum and angular correlations study in pi-nuclei jets at high energies using an emission telescope technique with magnetic field
 Jadaipur Univ.
 Lyon Univ. Univ.
 Santander Univ.
 Strasbourg Univ.

DATE APPROVAL SPOKESMAN
 20/SEP/1979 Villar, E.
 CONTACTMAN
 Jacquot, C.

NA20 H2 Measurement of P_{\perp}^{+} , k_{\perp}^{+} , p_{\perp}^{+} yields in 400 GeV proton beryllium and copper collisions
 CERN
 Rutherford Lab.

STATUS Data-Taking

DATE APPROVAL SPOKESMAN
 15/NOV/1979 Wachsmuth, H.
 CONTACTMAN
 Atherton, H.W.

NA21 H2 A high statistics study of anti-proton-proton annihilation physics at the EHS
 Liverpool Univ.
 Mons Poly.
 Paris College de France
 Paris VI Univ.
 Serpukhov I.H.E.P.
 Strasbourg Univ.

DATE APPROVAL SPOKESMAN
 15/OCT/1980 Duboc, J.
 CONTACTMAN
 Mulrhead, H./Montanet, L.

Liverpool Univ.
 Evans, W.H., Fry, J.R., Houlden, M.A.
 Mason, P., Mulrhead, H., Wormald, J.R.
 Mons Poly.
 Henri, V.P., Herquet, P., Kesteman, J.
 Skura, J.
 Paris College de France
 Defoix, C., Dolbeau, J., Lutz, P.
 Marjoux, J.L.
 Paris VI Univ.
 Briand, H., De Billy, L., Duboc, J.
 Laberrigue, J., Nguyen, H.K., Ylou, T.P.
 Serpukhov I.H.E.P.
 Moiseev, A.M., Patalakha, D.I.
 Starchenko, E.A., Vlasov, E.V.
 Strasbourg Univ.
 Braun, H., Etienne, F., Huss, D., Gerber, J.P.
 Kurtz, N., Maurer, G., Michalon, A.
 Riedinger, M., Voltolini, C.

SPSC/78-38/P 101
 80-65/P 101/Add.1
 SPSC/82-68/M342

BPSC/79-107/P 134

REFERENCES

SPSC/78-40/I 107
 SPSC/80-51/P 144
 80-125/M 269

PARTICIPANTS

EXPERIMENT

NA22 H2 The influence of parton structure on hadronic interactions in EHS with a $K^0 \rightarrow \pi^+ \pi^-$ beam at 250 GeV/c
 STATUS Completed
 14/AUG/1983

DATE APPROVAL 16/OCT/1980

SPOKESMAN Kittel, W.

CONTACTMAN

L. Montanet/D. Toet

- Aachen TH
- Berlin(E) Inst. H. Eh. Physics
- Brussels, IIHE
- Cracow Inst. Nucl. Phys.
- Erevan Phys. Inst.
- Heisinki Univ.
- Nijmegen Cath. Univ.
- Rio de Janeiro Phys. Res. Center
- Serpukhov I. H. E. P.
- Warsaw Univ.

- Aachen TH
- Deutschmann, M., Graessier, H., Ransone, G.
- Schulte, R., Schmitz, P.
- Berlin(E) Inst. H. Eh. Physics
- Boettcher, H., Friebel, W., Gensch, U.
- Naumann, T., Wischniewski, R.
- Brussels, IIHE
- De Roek, A., De Wolf, E., Van Immerseel, M.
- Theocharopoulos, P., Verbeure, F.
- Cracow Inst. Nucl. Phys.
- Coghen, T., Eskreys, A., Eskreys, K.
- Kisielewska, D., Michalowska, B.
- Oikiewicz, K., Suszycki, L.
- Erevan Phys. Inst.
- Agababian, N.M.
- Heisinki Univ.
- Leuhakangas, R., Riipinen, E., Saarikko, H.
- Saarikko, T.
- Nijmegen Cath. Univ.
- Crijns, F. G. H., van Hal, P., Kittel, W.
- Meyers, F., Scholte, L., Sterglou, A.
- Rio de Janeiro Phys. Res. Center
- Allen, P., Begalli, M., Frelre-Endler, A.M.
- Oliveira, L.C.S.
- Serpukhov I. H. E. P.
- Belokobitov, Yu. A., Chlapanikov, P.V.
- Palaeov, V. P., Kniazev, V., Kurnosenko, A.I.
- Nikolaenko, V. I., Petrovich, L.P., Rybin, A.M.
- Sorokin, G.I., Tchikilev, D.G., Vorobjev, A.P.
- Warsaw Univ.
- Abramowicz, H., Adamus, M., Blalikowska, H.
- Stepaniak, J., Wroblewski, A.K., Zieminski, A.
- Amsterdam NIKHEF
- Toet, D.
- CERN
- Brun, R.

APPROVED SPS EXPERIMENTS

----- PARTICIPANTS ----- REFERENCES -----

SPSC/78-35/I 105
SPSC/80-53/P 145
SPSC/81-85/M305

REFERENCES

PARTICIPANTS

EXPERIMENT

Study of diffractive dissociation especially into strange and charmed particles with the EHS

NA23 H2
STATUS Completed
01/AUG/1982

DATE APPROVAL 16/OCT/1980
SPOKESMAN Markytan, M.
CONTACTMAN Montanet, L.

- Bombay, Tata Inst.
- CERN
- Genova Univ./INFN
- Innsbruck Univ.
- Japan U.G.
- Madrid J.E.N.
- Mons Univ.
- Rutgers Univ.
- Serpukhov I.H.E.P.
- Tennessee Univ.
- Vienna Akad. Wissensch.
- Bombay, Tata Inst.
- Banerjee, S., Ganguli, S.N., Gurtu, A.
- Malhotra, P.K., Raghavan, R., Shenkar, K.
- Subramanian, A., Sudhakar, K.
- CERN
- Benot, M., Bruyant, F., Dykes, M.
- Gusewell, D., Herve, A., Hrubec, J.
- Johansson, E.K., Lecoq, P., Marin, J.C.
- Montanet, L., Pijligroms, B., Poppleton, A.
- Reucroft, S., Squarcia, S.
- Genova Univ./INFN
- Caso, C., Contri, R., Fontanelli, F.
- Monge, R., Trevisan, U.
- Innsbruck Univ.
- Epp, B., Girtler, P., Kuhn, D., Weiss, J.
- Japan U.G.
- Chiba, Y., Emura, T., Hamatsu, R., Hirose, T.
- Kaneko, S., Kita, I., Kitamura, S., Kohno, H.
- Matsumoto, S., Takahashi, K., Yamagata, T.
- Madrid J.E.N.
- Ferrando, A., Ladrón de Guevara, P.
- Rodrigo, M.T., Rubio, J.A.
- Mons Univ.
- Beaufays, J., Grand, F., Herquet, P.
- Rutgers Univ.
- Bruckner, E.B., Jacques, P., Koller, E.L.
- Miller, P., Plano, R.J., Stamer, P.
- Taylor, S., Watts, T.L.
- Serpukhov I.H.E.P.
- Fisjak, V., Iolobov, G., Kholodenko, A.G.
- Kistenev, E.P., Minbaev, N.G., Pollakov, B.
- Stopchenko, V., Yarba, V.A.
- Tennessee Univ.
- Bugg, W.M., Cohn, H.O., Condo, G.T.
- Handier, T., Hart, E.I., Rogers, A.H.
- Vienna Akad. Wissensch.
- Bartl, W., Dibon, H., Mac Naughton, J.
- Markytan, M., Neuhofer, G., Porth, P.
- Regier, M.
- Stockholm Univ.
- Rohrlinger, H.
- Paris, College de France
- Aguilar-Benitez, M.

CODE BEAM

| CODE | BEAM | EXPERIMENT | EXPERIMENT | PARTICIPANTS | REFERENCES |
|------|------|---|---|--|---|
| NA24 | H2 | Investigation of deep inelastic scattering processes involving large p(T) direct photons in the final state | DATE APPROVAL 27/NOV/1980 SPOKESMAN Pretzl, K.P. CONTACTMAN Polakos, P. | Bari Univ. Freiburg Univ. Moscow I.T.E.P. Munich MPI Bari Univ. De Marzo, C., De Palma, M., Favuzzi, C. Macchia, G., Maggi, G., Posa, F., Ranieri, A. Seivaggi, G., Spinelli, P. Freiburg Univ. Bamberger, A., Fuchs, M., Heck, W., Marx, R. Runge, K., Skodzack, E., Weber, H.C. Wulker, M. Moscow I.T.E.P. Artemiev, V., Galaktionov, Yu., Gordeev, A. Gorodkov, Y., Kamyshev, Y., Kossov, M. Lubimov, V., Piyaskin, V., Pojidaev, V. Shevchenko, V., Tchudakov, V. Munich MPI Fent, J., Freund, P., Gebauer, H.J. Polakos, P., Pretzl, K.P., Schouten, T.E. Beyboth, P., Seyerlein, J. | 79-115/SPSC/I 124 80-83/SPSC/P 151 SPSC/81-103/M311 SPSC/83-3/M344 |
| NA25 | H2 | Study of charm and bottom particles production using a holographic bubble chamber | DATE APPROVAL 23/APR/1981 SPOKESMAN Tavernier, S. CONTACTMAN Johansson, E.K. | Bari Univ. Brussels, IIHE Mons Univ. London, University College Paris VI Univ. Strasbourg Univ. Vienna Akad. Wissensch. Bari Univ. Armenise, N., Calicchio, M., Erriquez, O. Muciaccia-Fogli, M., Natali, S., Nuzzo, S. Romano, F., Ruggieri, F. Brussels, IIHE Bertrand, D., Dumont, J.J., Roosen, R. Tavernier, S. CERN Drevermann, H., Gjerpe, I., Herve, A. Johansson, E.K., Lecoq, P., Olivier, P. London, University College Bullock, F.W., Coupland, M., Cranfield, R. Davis, D.H., Duff, B.G., Esten, M.J. Heymann, F.F., Hobson, P., Imrie, D.C. Lush, G.J., Tovee, D.N., Williams, R. Mons Univ. Beland, J.F., Grand, F., Henri, V.P. Herquet, P., Kesteman, J. Paris VI Univ. Borataev, M., Touboul, M.C., Touchard, A.M. Strasbourg Univ. Berard, A., Braun, H., Gerber, J.P. Maurer, G. Vienna Akad. Wissensch. Hrubez, J., Neuhofer, G., Taurok, A. | SPSC/80-120/SPSC/P 155 SPSC/81-16/M 280 SPSC/81-98/M307 SPSC/82-14/M318 SPSC/82-42/M330 SPSC/82-43/M331 SPSC/82-57/M341 |

APPROVED SPS EXPERIMENTS

----- PARTICIPANTS ----- REFERENCES -----

EXPERIMENT

EXPERIMENT

EXPERIMENT

EXPERIMENT

EXPERIMENT

EXPERIMENT

EXPERIMENT

EXPERIMENT

EXPERIMENT

EXPERIMENT

NA26 H2 A prototype experiment to study charmed particle production and decay using a holographic high resolution hydrogen chamber (HOLEBC) and the European Hybrid Spectrometer

SPSC/80-116/SPSC/P 154
SPSC/80-118/M 265
SPSC/80-119/M 266
SPSC/81-43/M 290
SPSC/81-104/M312

DATE APPROVAL 21/MAY/1981
SPOKESMAN Fisher, C. M.
CONTACTMAN Zumerle, G.

Brussels, IIHE
Bertrand, G., Lamonne, J., Van Homweghen, G.
Wickens, J.H.

CERN
Barone, L., Bizzarri, R., Bruyant, F.
Dykes, M., Herve, A., Kurtz, N., Lecoq, P.
Leutz, H., Montanet, L., Poppleton, A.
Reucroft, S.

Oxford Univ.
Allison, W.W.M., Hughes, P., Lyons, L.
Mulvey, J.H.

Padova Univ.
Bettini, A., Cresti, M., Mazzucato, M.
Pascoli, D., Peruzzo, L., Rossi, P.
Sartori, G., Ventura, L., Zumerle, G.

Rome Univ.
Bagnata, P., Cesaroni, F., Ciapetti, G.
De Pedis, D., Di Capua, E., Gentile, S.
Iori, M., Laakso, I., Loverre, P.F., Marel, G.
Marzano, F., Piredda, G., Zanillo, L.

Rutherford Lab.
Crennell, D.J., Fisher, C.M., Sekulin, R.L.

Stockholm Univ.
Holmgren, S.O., Nilsson, S., Selliden, B.

Trieste Univ.
Castelli, E., Checchia, P., Poropat, P.
Sessa, M., Troncon, C.

Vienna Akad. Wissenschaft.
Bartl, W., Dibon, H., Regler, M.

Belgium F.N.R.S.
Vilain, P.

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6 (DD/SW/DB-66)
SPSC/G 39

----- PARTICIPANTS -----
----- EXPERIMENT -----
----- REFERENCES -----

EPSC/81-86/PI59
SPSC/83-85/M370

NA27 H2 An experiment to measure accurately the lifetime of the $D(0)$ D^+ F^{++} Λ baryons and to study their hadronic production and decay properties

Aachen TH
Brussels, IIHE
Bombay Univ.
CERN
Genova Univ./INFN
Japan U.G.
Liverpool Univ.
Madrid J.E.N.
Mons Univ.
Oxford Univ.
Padova Univ.
Paris College de France
Paris VI Univ.
Rome Univ.
Rutgers Univ.
Rutherford Lab.
Serpukhov I.H.E.P.
Stockholm Univ.
Strasbourg Univ.
Tennessee Univ.
Torino Univ.
Trieste Univ.
Vienna Akad. Wissensch.

DATE APPROVAL 09/DEC/1981
SPOKESMAN Montanet, L.
CONTACTMAN Montanet, L.

Aachen TH
Deutschmann, M., Otter, G., Schluetter, H.
Schmitz, W., Struczinski, W.
Brussels, IIHE
Bertrand, G., Lemonne, J., Tavernier, S.
Van Homweghen, G., Van Immerseel, M.
Vilain, P., Wickers, J.H.
Bombay Univ.
Ganguli, S.N., Gurtu, A., Malhotra, P.K.
Raghavan, R., Shankar, K., Schrenkar, A.
Subramanian, A., Sudhakar, K.
CERN
Bagnala, P., Bruyant, F., Herve, A.
Johansson, E.K., Leutz, H., Montanet, L.
Poppieon, A., Reucroft, S., Richardson, J.A.
Schooten, M., Wright, P.
Genova Univ./INFN
Caso, C., Contri, R., Fontanelli, F.
Squarcia, S., Trevisan, U.
Japan U.G.
Chiba, Y., Emura, T., Hamatsu, R., Hirose, S.
Kabeko, S., Kita, I., Kitamura, S., Kono, H.
Matsumoto, S., Takahashi, K., Yamagata, K.
Liverpool Univ.
Evans, W.H., Fry, J.R., Houlden, M.A.
Mason, P., Muirhead, H., Patel, G., Whyman, B.
Madrid J.E.N.
Aguiar-Benitez, M., Ferrando, A.
Hernandez, J.A., Ladrón de Guevara, P.
Lloza, R., Rubio, J.A., Salicio, J.
Mons Univ.
Grard, F., Herquet, P., Pillette, P.
Polnet, C.
Oxford Univ.
Allison, W.W.M., Lyons, L., Mulvey, J.H.
Padova Univ.
Bettini, A., Cresti, M., Gasparini, U.
Mazzucato, M., Peruzzo, L., Rossi, P.
Sartori, G., Ventura, L., Zotto, P.
Zumerle, G.
Paris College de France
Belliere, P., Dolbeau, J., Lafoum, M.

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6
SPSC/G 39

(DD/SW/DB-SS)

CODE BEAM

EXPERIMENT

PARTICIPANTS

REFERENCES

Paris VI Univ.
 Bland, H., De Billy, L., Dumarchez, J.
 Nguyen, H.K., Zleinski, W.
 Rome Univ.
 Bizzarri, R., Ciapetti, G., Di Capua, E.
 Dionisi, C., Forni, A., Gentile, S., Iori, M.
 Lloverre, P.F., Marei, G., Marzano, F.
 Piredda, G., Zanello, L.
 Rutgers Univ.
 Cohn, H.O., Kalekar, M., Plano, R.J.
 Rutherford Lab.
 Fischer, C., Crennell, D.J., Mac Dermott, M.
 Serpukhov I.H.E.P.
 Belokopytov, V., Chlapnikov, P.V., Fisjak, Y.
 Klitenev, E.P., Minaev, N.G., Stopchenko, V.
 Tchikilev, O.G., Vorobjev, A.P.
 Stockholm Univ.
 Hauff, L., Hellman, S., Holmgren, S.O.
 Moe, T., Nilsson, S., Sellden, B.
 Strasbourg Univ.
 Braun, H., Kurtz, N., Michalon, A.
 Michalon, M.
 Tennessee Univ.
 Bugg, W.M., Rogers, A.H.
 Torino Univ.
 Borreani, G., Candelari, C., Marchetto, F.
 Rinaudo, G.
 Trieste Univ.
 Castelli, E., Cauz, D., Checchia, P.
 Poropat, P., Sessa, M., Troncon, C.
 Vienna Akad. Wissensch.
 Bartl, W., Dibon, H., Hrubec, J., Neuhofer, G.
 Porth, P., Regier, M., Rohringer, H.
 Amsterdam NIKHEF
 Toet, D.
 Edinburgh Univ.
 Pijligoms, B.

APPROVED SPS EXPERIMENTS

----- PARTICIPANTS -----
----- EXPERIMENT -----
----- REFERENCES -----

MA28 M2 Study of shadowing and hadron production in high energy muon scattering using nuclear targets
STATUS Setting-Up

Aachen TH
Anhecy L. A. P. P.
CERN
Freiburg Univ.
Hamburg DESY
Hamburg Univ.
Kiel Univ.
Lancaster Univ.
Liverpool Univ.
Marseille C.P.P.M.
Mons Univ.
Munich MPI
Orsay Linear Acc. Lab. (LAL)
Oxford Univ.
Rutherford Lab.
Sheffield Univ.
Torino Univ.
Uppsala Univ.
Wuppertal Univ.

Aachen TH
Dumont, J.J., Duren, M., Hasert, F.J.
Lanske, D., Schultze, K.
Anhecy L. A. P. P.
Bertsch, Y., de Bouard, X., Colinet, G.
Favier, J., Jancso, G., Maire, M.
Minsieux, H., Moynet, M., Pessard, H.
Schneegans, M., Thenard, J.M., Vivargent, M.
CERN
Dobinson, R.W., Goessling, C., Gustafsson, L.
Kellner, G., Montgomery, H.E., Muller, H.
Osborne, A.M., Sloan, T., Watson, E.
Freiburg Univ.
Dreyer, T., Ernst, T., Haas, J.
Hartenheller, H., Jung, H., Kabuss, E.M.
Kroesen, G., Landgraf, U., Mohr, W., Rith, K.
Schlagbohm, A., Schroeder, T., Smith, R.
Stier, H.E., Tleck, E., Wallucks, W.
Hamburg DESY
Brasse, F.W., Flauger, W., Gayler, J.
Korbel, V., Nassalski, J., Poensgen, B.
Hamburg Univ.
Bucholtz, G., De la Torre, A., Figliel, J.
Hoppe, B., Janata, F., Rondio, E., Studt, M.
Kiel Univ.
Lancaster Univ.
Lee, C., Bird, I., Coughlan, J.
Liverpool Univ.
Brown, S., Court, G.R., Gabathuler, E.
Garet, R., Hayman, P., Holt, J.R.
Pettigale, J., Wimpenny, S.
Marseille C.P.P.M.
Albanese, J.P., Aubert, J.J., Benchouk, C.
D'Agostini, G., Mermet-Guyennet, M.
Montanet, F., Payre, P.
Mons Univ.
Beaufays, J., Callebaut, D., Grand, F.
Hanton, J., Windmolders, R.
Munich MPI
Dengler, F., Derado, I., Eckardt, V., Manz, A.
Schmitz, N., Shiers, J., Wolf, G.
Orsay Linear Acc. Lab. (LAL)
Blum, D., Heusse, P., Jacholkowska, A.
Jaffre, M., Pascaud, C.
Oxford Univ.

DATE APPROVAL 17/FEB/1982
SPOKESMAN Sloan, T.
CONTACTMAN Sloan, T.

SPSC/82-4/P176

APPROVED SPS EXPERIMENTS

CODE BEAM EXPERIMENT PARTICIPANTS REFERENCES

- Geddes, N., Johnson, A.S., Loken, J., Long, K.
- Mount, R., Renton, P.B., Taylor, G.
- Villiers, M., Williams, W.S.C.
- Rutherford Lab.
- Best, C., Botterilli, D., China, J., Clifft, R.
- Edwards, M., Norton, P.R., Oakham, G.
- Sproston, M., Thompson, J.C.
- Sheffield Univ.
- Combley, F., Foster, J., Wheeler, S.
- Torino Univ.
- Arneodo, M., Costa, F., Ferrero, M.I.
- Giubellino, P., Maselli, S., Peroni, C.
- Stalano, A.
- Uppsala Univ.
- Arvidson, A., Badelek, B., Calen, H.
- Dahlgren, S., Grafstrom, P., Hagberg, E.
- Kullander, S.
- Wuppertal Univ.
- Becks, K.H., Braun, H., Bruck, H., Drees, J.
- Edwards, A., Forbach, H., Manacher, K.
- Korzen, B., Kruger, J., Paul, L., Pavel, N.
- Peschel, H., Pletrzyk, U., Poetsch, M.
- Preissner, H., Schneider, A., Stockhausen, W.
- Wahlen, H.
- Budapest Res. Inst.
- Eszes, G., Nagy, E., Ribarics, P., Toth, J.
- Urban, L.

SPSC/81-80/P168

NA29 H4 Study of p(16minus)p(16zero)
 production via Primakoff
 Effect on nuclei

STATUS
 Completed
 31/MAY/1982

DATE APPROVAL 17/FEB/1982
 SPOKESMAN Bellini, G./Foa, L.
 CONTACTMAN Fabbri, F.L.

- Clermont-Ferrand Univ.
- Capparo, L., Levy, P., Querrou, M.
- Verbeck, C., Verbeken, M.
- Frascati Nat. Lab. (INFN)
- Celani, F., Enorini, M., Fabbri, F.L.
- Laurelli, P., Riveillini, G., Satta, L.
- Spillanti, P., Zallo, A.
- Milan Univ./INFN
- Bellini, G., Bonetti, S., Di Corato, M.
- Manfredi, P.F., Meroni, E., Moroni, L.
- Palazzi-Cerrina, C., Palermo, F., Regusa, F.
- Sala, S.
- Pisa Univ./INFN
- Amendola, S.R., Bertolucci, E., Bettoni, D.
- Bosio, L., Bradaschia, C., DelliOrso, M.
- Fidecaro, F., Foa, L., Focardi, E.
- Glazotto, A., Giorgi, M., Menziona, A.
- Ristori, L., Scribano, A., Tanchini, R.
- Torino Univ.
- Beck, G.A., Bilokon, H., Bologna, G.
- D'Ettore Piazzoli, B., Mannocchi, G.
- Picchi, P.
- Trieste Univ.
- Batignani, G., Budinich, M., Liello, F.
- Paver, N., Piazzoli, M.L., Rolandi, L.
- Stefanini, A.
- London, Westfield College
- Bellamy, E.H., Heath, G., March, P.V.
- Marrocchesi, P.S., Landon, M., Strong, J.R.

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6 (DD/SW/DB-SS)
 SPSC/E 39

REFERENCES

SPSC/82-35/PI77/Rev.
 SPSC/82-40/PI77/Add.1

PARTICIPANTS

EXPERIMENT

CODE BEAM

NA30 H6 Precision determination
 of the lifetime of
 the neutral pion

Ames Lab.
 CERN
 Chicago Univ.
 Lund Univ.
 Paris VI Univ.

STATUS
 Setting-Up

DATE APPROVAL SPOKESMAN

17/JUN/1982 von Dardel, G.

CONTACTMAN

Coet, P.

Ames Lab.
 CERN
 Atherton, H.W., Boyet, C., Coet, P.,
 Desajvo, R., Dobie, N., Mafleyran, R.

Chicago Univ.
 Cronin, J.W., Milliken, B.
 Lund Univ.
 von Dardel, G., Kulka, K.
 Paris VI Univ.
 Boratav, M.

NA31 K4 Measurement of the ratio of
 magnitudes squared of
 $\eta \rightarrow 00$ and $\eta \rightarrow \pi^+\pi^-$

SPSC/81-110/PI74
 SPSC/82-32/PI74/Add.1
 SPSC/82-39/M328
 SPSC/82-53/M336
 SPSC/83-78/M366

STATUS
 Preparation

CERN
 Dortmund Univ.
 Edinburgh Univ.
 Orsay Linear Acc. Lab. (LAL)
 Pisa Univ./INFN
 Siegen GHS

DATE APPROVAL SPOKESMAN

16/SEP/1982 Wahl, H.

CONTACTMAN

Wahl, H.

CERN
 Burkhardt, H., Cundy, D.C., Dobie, N.,
 Mannelli, I., Steinberger, J., Taureg, H.,
 Wahl, H.
 Dortmund Univ.
 Dietrich, G., Elsele, F., Heinke, W.,
 Kasemann, M., Kleinknecht, K., Renk, B.
 Edinburgh Univ.
 Candlin, D.J., Muir, J., Peach, K.J.
 Pi Jigroms, B.
 Orsay Linear Acc. Lab. (LAL)
 Fournier, D., Heusse, P., Lutz, A.M.,
 Pascaud, C.
 Pisa Univ./INFN
 Bertanza, L., Bigli, A., Carosi, R., Casali, R.,
 Cerri, C., Massa, E., Pierazzini, G.M.,
 Serigiampietri, F.
 Siegen GHS
 Heyland, D., Holder, M., Rost, M., Zech, E.

APPROVED SPS EXPERIMENTS

----- PARTICIPANTS ----- REFERENCES -----

CODE BEAM

EXPERIMENT

NA32

Investigation of Charm
production in hadronic
interactions using
high-resolution silicon
Preparation detectors

Amsterdam NIKHEF
Bristol Univ.
CERN
Cracow Inst. Nucl. Phys.
Munich MPI
Rutherford Lab.

DATE APPROVAL SPOKESMAN

18/NOV/1982 Kianner, R.

CONTACTMAN

Tiecke, H.

Amsterdam NIKHEF
Daum, C., derijk, G., Hardwick, J.
Hoogland, W., Tiecke, H., Wiggers, L.
Bristol Univ.
Glimore, R., Kwan, W., Malos, J., McArthur, I.
Melot, J. P., Tapper, R.
CERN
Bailey, R., Boehrlinger, T., Bosman, M.
Chabaud, V., Hvams, B. D., Wellhammer, P.
Cracow Inst. Nucl. Phys.
Palka, H., Polok, G., Rybicki, K., Turala, M.
Turnau, J., Zeludziwicz, T.
Munich MPI
Blum, W., Hajduk, Z., Kianner, R., Lutjens, G.
Lutz, G., Manner, W., Neugebauer, E.
Richter, R., Seebrunner, H., Stierlin, U.
Wyllie, A.
Rutherford Lab.
Damarell, C., Gill, S., Gillman, A., Pope, M.
Richardson, J., Watts, S., Wickers, F. J.

SPSC/82-57/P180

----- PARTICIPANTS -----
----- EXPERIMENT -----
----- REFERENCES -----

UA1 L555 A 4 pi solid angle detector
for the SPS used as a proton
antiproton collider at a
centre of mass energy of
540 GeV

SPSC/78-6/P 92
78-141/M 142
78-158/M 146
80-101/M 260
SPSC/81-58/P 92/Add. 1
SPSC/82-19/M320
SPSC/82-51/P92/Add. 2
SPSC/83-43/M359
SPSC/83-48/P92/Add. 3

DATE APPROVAL 29/JUN/1978
16/JUN/1983
15/SEP/1983

SPOKESMAN Rubbia, C./Astbury, A.
CONTACTMAN Maurin, G.

- Aachen TH Eggert, K., Erhard, P., Falssner, H.
- Amsterdam NIKHEF Hansl-Kozanecka, T., Hoffmann, D., Lehmann, H.
- Annecy L.A.P.P. Leuchs, R., Radermacher, E., Reithler, H.
- Birmingham Univ. Tscheslog, E.
- CERN Hertzberger, R., Hofthuisen, D., Tao, C.
- Harvard Univ. Van Eljk, B.
- Helsinki Univ. Aubert, B., Catz, P., Colas, J., Culleray, R.
- London, Queen Mary College Della Negra, M., Ghez, P., Gonidec, A.
- Padova Univ. Lees, J.P., Linglin, D., Minard, M.N.
- Paris College de France Vielle, J.P., Yvert, M.
- U.C. Riverside Rome Univ. Corden, M.J., Dowell, J.D., Garvey, J.
- Rutherford Lab. Homer, R.J., Kenyon, I.R., McMahon, T.
- Saclay CEN DPhPE Streets, J., Watkins, P., Wilson, J.
- Vienna, Inst. H. En. Phys. (HEPHY) CERN Bezaguet, A., Bock, R.K., Calvetti, M.
- Aachen TH Cennini, P., Clitoin, S., Demoulin, M.
- Eggert, K., Erhard, P., Falssner, H., Hoffmann, D., Lehmann, H., Leuchs, R., Radermacher, E., Reithler, H., Tscheslog, E.
- Hertzberger, R., Hofthuisen, D., Tao, C.
- Van Eljk, B.
- Aubert, B., Catz, P., Colas, J., Culleray, R.
- Della Negra, M., Ghez, P., Gonidec, A.
- Lees, J.P., Linglin, D., Minard, M.N.
- Vielle, J.P., Yvert, M.
- Corden, M.J., Dowell, J.D., Garvey, J.
- Homer, R.J., Kenyon, I.R., McMahon, T.
- Streets, J., Watkins, P., Wilson, J.
- Bezaguet, A., Bock, R.K., Calvetti, M.
- Cennini, P., Clitoin, S., Demoulin, M.
- Clitoin, S., Demoulin, M., Hoffmann, H.F.
- Jank, W., Jorat, G., Kryn, D., Leveque, A.
- Maurin, G., Muller, G., Neumann, L.
- Norton, A., Pauss, F., Placchi, A., Porte, J.P.
- Revol, J.P., Rijssenbeek, M., Rossi, P.
- Rubbia, C., Sadoulet, B., Schinzel, D.
- Sumorok, K.C.T.O., Timmer, J., Vulliamin, V.
- Xie, G.Y., Zurfluh, E.
- Harvard Univ. Rohlf, J., Wilson, R.
- Helsinki Univ. Karimaki, V., Kinnunen, R., Pietarinen, E.
- Piela, M., Tuomihelmi, J.
- London, Queen Mary College Bowcock, T., Eisenhandler, E., Gibson, W.R.
- Honma, A., Kaimus, P., Keeler, R., Kyberg, P.
- Salvi, E., Thompson, G.
- Padova Univ. Bettini, A., Busetto, G., Centro, S.
- De Giorgi, M., Meneguzzo, A., Pascoli, D.
- Paris College de France Dobrzynski, L., Fontaine, G., Geer, S.
- Gesquiere, C., Giraud-Heraud, Y.
- Mendiburu, J.P., Orkin-Lecourtols, A.
- Sajot, G., Vrana, J.
- U.C. Riverside Frey, R., Gutierrez, P., Hodges, C.
- Kernan, A., Kozanecki, W., Morgan, K.
- Ransdell, J., Smith, D.
- Rome Univ.

APPROVED SPS EXPERIMENTS

CERN/SPSC/84-6
SPSC/C 39

(DD/SW/DB-85)

REFERENCES

PARTICIPANTS

SPSC/80-63/SPSC/P 148
SPSC/81-9/M 278

CODE BEAM

EXPERIMENT

UAG

An internal hydrogen jet target in the SPS to study inclusive electromagnetic final states and lambda production in anti-proton-proton and proton-proton interactions at 22.5 GeV c.m.

CERN
Lausanne Univ.
Michigan Univ.
Rockefeller Univ.

DATE APPROVAL SPOKESMAN

23/APR/1981 Dick, L.

CONTACTMAN

Dick, L.

CERN
Dick, L., Gallie, F., Jeanneret, J. B.
Kubischta, W.
Lausanne Univ.
Antille, J., Baumann, S., Bernasconi, A.
Berney, J. C., Gablond, B., Joseph, C.
Loude, J. F., Steiner, D., Tran, M. T.
Michigan Univ.
Dukes, C., Overseith, D. E., Valenti, G.
Rockefeller Univ.
Chaplin, T., Cool, R. L., Rusack, R., Snow, G. A.
Vacchi, A., White, S.