INTER-UNIVERSITY INSTITUTE FOR HIGH ENERGIES

ULB-VUB, BRUSSELS - ANNUAL REPORT 1980.

J. Lemonne and J. Sacton,
January 1981.

I. INTRODUCTION.

The physicists whose names are listed below have contributed to the different activities of the Laboratory during the year 1980.

U.L.B.

M. Barth (Maître de recherche FNRS)
D. Bertrand (chercheur qualifié FNRS)
G. Bertrand-Coremans (Chef de travaux associé)
M. Dewit (aspirant FNRS up to Octobre 1980 - then chercheur agréé IISN)
J.J. Dumont (chercheur agréé IISN - at SLAC up to June 1980)
M. Marage (boursier IRSIA since October 1980)
H. Mulkens (chercheur agréé IISN - CERN fellow since May 1980 - UA5 experiment)
J. Sacton (Professeur associé)
P. Van Binst (chercheur IISN)
P. Vilain (chercheur qualifié FNRS)
J. Wickens (chercheur IISN)
G. Wilquet (chercheur qualifié FNRS - at CERN since September 1980 - UA5 experiment)
C. Wilquet-Vander Velde (Chef de travaux associé - CERN fellow since September 1980 - R607 experiment).

V.U.B.

C. De Clercq-Vincent (vorser IIKW)
M. Gysen (vorser IIKW)
D. Johnson (vorser IIKW)

J. Lemonne (Gewoon hoogleraar)
J. Meijnaerts (vorser IIKW untill September 1980)
J. Moreels (vorser IIKW)
P. Peeters (werkleider)
R. Roosen (vorser IIKW - returned from CERN since October 1980)
S. Tavernier (bevoegdverklaard navorser NFWO - at CERN during 1980)
W. Van Doninck (bevoegdverklaard navorser NFWO)
G. Vanhomwegen (vorser IIKW)

F. Verbeure, E. De Wolf and M. Van Immerseel from the UIA are working in close collaboration with the Institute.
Since September 1979 J. Gaudaen (UIA) is working at CERN on the experiment UA5.

Note : M. Goossens has been on leave of absence at CERN since February 1979.

II. RESEARCH.

II.1. Neutrino physics.

II.1.1. Gargamelle (WA 15 experiment).

(D. Bertrand, G. Bertrand-Coremans, M. Dewit and P. Vilain - Aachen, Bergen, CERN, Milano, Strasbourg and University College London Collaboration).

3800 charged-current $\bar{\nu}$ interactions with $p_{\mu^+} > 5$ GeV/c and total energy between 15 and 150 GeV have been measured in Gargamelle filled with a freon-propane mixture ($\lambda_r = 61$ cm; $\lambda_i = 110$ cm) and equipped with an EMI. These data are presently analyzed together with those obtained by the WA 14 Collaboration working with neutrinos in similar experimental conditions (3000 CC events with $p_{\mu^-} > 2$ GeV/c).

The first results can be summarized as follows.

i. The slopes of the total cross sections are found to be (best values fitted over the whole energy range)

$$\frac{\sigma_{\bar{\nu}}}{E} = 0.29 \pm 0.04\ 10^{-38}\ \text{cm}^2/\text{GeV nucleon}$$

$$\frac{\sigma_{\nu}}{E} = 0.61 \pm 0.08\ 10^{-38}\ \text{cm}^2/\text{GeV nucleon}$$

ii. The ratio of the antineutrino to neutrino total cross sections has a constant fitted value

$$R = 0.47 \pm 0.02$$

iii. Adding or subtracting the observed x, Q^2 event matrices for ν and $\bar{\nu}$, the nucleon structure functions $F_2(x)$ and $x F_3(x)$ have been determined (assuming $2 x F_1(x)/F_2(x) = 0.9$) and found to exhibit a clear Q^2-dependence.

A detailed comparison of the structure functions $x F_3(x)$ and the non-singlet part of $F_2(x)$ is now being made to the first (Altarelli-Parisi equations) and second order QCD predictions (Bialas and Buras). An attempt to separate QCD effects from higher twist contributions due to the transverse momentum of the quarks within the nucleon, multiquark scattering and resonance production is in progress.

II.1.2. ν and $\bar{\nu}$ interactions in BEBC equipped with an H_2 filled track sensitive target and an EMI (WA 24 experiment).

(D. Bertrand, P. Marage, J. Moreels, J. Sacton, W. Van Doninck, G. Wilquet and C. Wilquet-Vander Velde - Bari, Birmingham, Ecole Polytechnique-Palaiseau, Rutherford, Saclay and University College-London Collaboration).

The 500000 pictures taken in the ν and $\bar{\nu}$ CERN SPS wide band beam have now been scanned and rescanned. All events occurring inside the H_2 TST have been measured and a final GST is being prepared. The available statistics are : $\sim$ 1800 CC ν interactions and 700 CC $\bar{\nu}$ interactions.

Using the ν data a search has been made for new modes of charmed particle decays which has led to the discovery of the Σ_c^+ charmed baryon with mass 2457 ± 4 MeV/c^2. The ν interaction has a unique 3-constraint kinematic fit to the channel $\nu + p \rightarrow \mu^- + p_{stop} + K^- + \pi^+ + \pi^+ + \pi^\circ$ with both gammas from the π° decay detected. The Σ_c^+ decay chain is $\Sigma_c^+ \rightarrow \Lambda_c^+ + \pi^\circ$; $\Lambda_c^+ \rightarrow p + K^- + \pi^+$. The mass difference $M(\Sigma_c^+) - M(\Lambda_c^+)$ is found to be 168 ± 3 MeV/c^2. Including other published data one finds $M(\Sigma_c^{++}) - M(\Sigma_c^+) = 0 \pm 4$ MeV/c^2.

A systematic study of exclusive channels involving π° mesons relies on a good understanding of the gamma detection efficiency. A careful analysis of all systematics affecting the gamma detection is presently underway in the $\bar{\nu}$ film where the background is significantly smaller than in the ν film.

In the course of a study of dimuon events produced in $\bar{\nu}$ interactions occurring both in the H_2 and in the H_2/Ne mixture some indication has been found for the quasi elastic production of the "beautiful baryon" but the statistical significance of the signal is too weak to draw definitive conclusions.

A determination of the ratios of total cross sections on neutrons and protons for both ν and $\bar{\nu}$ charged-current and neutral current interactions is under way, using a method which is almost independent of the neutrino flux and the nuclear interaction corrections. For neutrino charged current interactions, this ratio was found to be $R = \frac{\sigma_n}{\sigma_p} = 1.98 \pm 0.19$. This is to be compared with a recently published result obtained in deuterium : $R = 2.03 \pm 0.28$.

II.1.3. High statistics experiment to measure the nucleon structure functions using ν and $\bar{\nu}$ interactions in BEBC filled with heavy neon (WA 59 experiment).

(D. Bertrand, Gh. Bertrand-Coremans, P. Marage, J. Moreels, J. Sacton and W. Van Doninck - Athens, Bari, Birmingham, CERN, Ecole Polytechnique-Palaiseau, Imperial College London, University College-London, Munich, Oxford, Rutherford, Saclay Collaboration).

The first aim of the experiment is to measure the nucleon structure functions $F_2(x)$ and $x F_3(x)$ in the intermediate Q^2 region ($1 < Q^2 < 10$ GeV^2) using ν and $\bar{\nu}$ data accumulated within almost identical experimental conditions. The results will be used to test first and second order QCD predictions and to separate the QCD effects from possible non perturbative phenomena.

The pictures were taken in spring 1980 with BEBC filled with a 75 mole % H_2/Ne mixture and equipped with an EMI. The statistics will consist of 20000 $\bar{\nu}$ and 15000 ν interactions with $p_\mu > 3$ GeV/c and $E_{\nu,\bar{\nu}} > 10$ GeV. About one third of the $\bar{\nu}$ events have presently been measured. Preliminary data on both ν and $\bar{\nu}$ interactions should be available for mid-1981.

The $\bar{\nu}$ data will be used to test the hypothesis of the beautiful baryon among both $\mu^+ \mu^-$ and $\mu^+ e^-$ events.

II.2. Hadron physics.

II.2.1. K^+p and $\bar{p}p$ interactions at 32 GeV/c in MIRABELLE.

(M. Barth, E. De Wolf, J.J. Dumont, M. Gijsen, M. Van Immerseel, F. Verbeure, IIHE, Mons, Saclay and Serpukhov Collaboration).

The scanning, measuring and data handling continued on the extension of the K^+p experiment, and should be finished by April 1981. Data analysis for the $\bar{p}p$ experiment is already terminated.

The analysis of the total available sample of K^+p interactions yielded evidence for narrow structures in the mass distributions of the $(K^\circ_s K^\circ_s \pi^+ \pi^-)$ system at 1.97 GeV and of the $(\phi \pi^+)$ system at 2.145 GeV.

Most of the analyses were done on single particle inclusive distributions and two-particle correlations in the fragmentation regions :

- charged pion production
- inclusive ρ° and ϕ production
- inclusive K^{*+} and $K^{*o}(892)$ production
- inclusive $\Delta^{++}(1232)$ and $\Sigma^+(1385)$
- inclusive hadronic fragmentation and quark counting rules

- two-particle production and tests of quark parton models.

The inclusive distributions were mainly interpreted in terms of quark-recombination model ideas, e.g. the ratio of π^+ to π^- production without and with triggers such as $\pi^\pm$, K°_s, Λ, $\bar{\Lambda}$ and $K^*(892)$.

II.2.2. The K^+p experiment at 70 GeV/c (WA 27 experiment).

(M. Barth, C. De Clercq, E. De Wolf, J.J. Dumont, M. Gijsen, D.P. Johnson, J. Lemonne and P. Peeters - IIHE, CERN, Mons, Nijmegen and IHEP (USSR) Collaboration).

The experimental analysis (scanning and measurement) of the first (40000 frames - no EPI) and second part (120000 frames with EPI) of this experiment should be completed in the spring of 1981. The number of events available on GST should then approach 80000.

Papers on inclusive p, Δ^{++} and $\pi^\pm$-production have been accepted for publication. In addition preliminary results concerning inclusive jet-like properties of the observed interactions and K°, K^{*+}-production have been presented at conferences. Work on inclusive γ, π°, ρ, Λ and $\bar{\Lambda}$ production is in progress. These data are analysed in the frame-work of both the Regge exchange and quark models.

II.2.3. The study of prompt lepton production and ordinary hadronic interactions in antiproton-proton interactions at 70 GeV/c in BEBC equipped with a track sensitive target (WA 31 experiment).

(J. Lemonne, G. Van Homwegen, F. Verbeure, J.H. Wickens - IIHE, Helsinki, Liverpool, Mons and Stockholm Collaboration).

The scanning and checking for this experiment has been completed in the course of 1980 and measurements should finish early in 1981. A total of 197 rolls ($\sim$ 60000 events) has been scanned by the collaboration for direct e^+e^- and single $e^\pm$-production.

Preliminary results on single $e^\pm$-production based on the analysis of 39000 primary interactions were presented at conferences. No single $e^\pm$-candidates of momentum greater than 500 MeV/c

were found. This result places an upper limit of 4.6 μb on single $e^{\pm}$-production at the 90 % confidence limits. The corresponding estimate of the upper limit for the charm production cross section is 24 μb.

Approximately 2000 Dalitz pairs (of which a few of high mass) have been observed. Their analysis is in progress and will allow an estimate of the π° multiplicity as a function of the charged multiplicity of the primary events. A direct estimate of the $\bar{p}p$ annihilation cross section from a special scan for secondary interactions is also performed. An attempt is also made to determine the η°/π° cross section ratio from the analysis of inclusive γ-production in a subsample of events.
Inclusive Λ° and K°_{s} production will be studied in addition. It has been agreed that the IHEP of Serpukhov (USSR) will join the present collaboration in 1981 to finalize the inclusive γ, Λ° and K°_{s} studies.

II.2.4. Search for associated charm production in 340 GeV/c π^{-}p interactions (NA 13 experiment).

(J. Lemonne, J. Sacton, S. Tavernier, P. Vilain and J.H. Wickens - Brussels, CERN, Oxford, Padova, Rome, Rutherford and Trieste Collaboration).

The high resolution rapid cycling bubble chamber LEBC of 20 cm diameter has been exposed at CERN to a beam of 340 GeV/c π^{-}-mesons in a first attempt to search for direct topological evidence of charmed particle production. In this set-up the bubble chamber was only equipped with one camera, so that only projected lengths could be measured. Clear evidence for the associated production of charmed particles identified by their short decay lengths, was observed for the first time. The analysis of the data, 110000 frames with 48000 events corresponding to 2.5 events/μb, was completed in the spring of 1980. A significant excess of 12 events, interpreted as charm pairs corresponding to a total cross section of $\sim$ 40 μb was seen above the expected strange particle background. In addition, 8 charged 3 prong events consistent with $D^{\pm}$ decay were observed with an expected background of $\sim$ 2 events.

II.2.5. Study of the hadronic production and of the properties of new particles with a life-time 10^{-13} s $< \tau < 10^{-10}$ s using LEBC-EHS (NA 16 experiment).

(G. Bertrand-Coremans, J. Lemonne, S. Tavernier, M. Van Immerseel, P. Vilain and J.H. Wickens - Amsterdam, Brussels, CERN, Madrid, Mons, Nijmegen, Oxford, Padova, Paris VI, Rome, Rutherford Laboratory, Serpukhov, Stockholm, Trieste and Vienna Collaboration).

In the first semestre of 1980, LEBC in conjuction with the EHS spectrometer, equipped with gamma detectors and a prototype of the charged particle identifier ISIS, was exposed to beams of 340 GeV/c π^- (650000 pictures) and protons ($\sim$ 650000 pictures). Contrary to the NA13-experiment (see II.2.4.) LEBC was viewed by two cameras allowing for stereoscopic track reconstruction. At present, a total of 309000 frames have been scanned and partly rescanned (240000). A preliminary NA 13 type of analysis performed on 67000 frames (mostly π^-) suggests similar results. The aim of this experiment is not only to confirm and improve the total cross section estimate resulting from the NA 13 experiment, but also to compare differential cross sections for π^- and proton induced charmed particle production.

Moreover, some charmed particle identification by this preliminary EHS-version should be possible.

II.2.6. Search for $B\bar{B}$ production in 370 GeV/c π^- meson interactions in nuclear emulsion (NA 19 experiment).

(M. Barth, D. Bertrand, G. Bertrand-Coremans, R. Roosen, J. Sacton and J.H. Wickens - Bari, CERN, U.C. Dublin, U.C. London, Open University, Rome and Turin Collaboration).

The lifetime of B particles is generally expected to be small (10^{-14} s $< \tau < 10^{-13}$ s) and, therefore, the emulsion technique is well suited to directly detect B particle decays.

In the present experiment the B particles are produced in pairs in the interactions of 370 GeV/c π^- mesons

$$\pi^- + N \rightarrow B + \bar{B} + X$$

and detected via their semi leptonic decays into charmed particles which in turn can decay semi leptonically.

In 2 runs occurring in May 1980, some 10^9 π^- mesons were sent into 65 emulsion stacks ($\sim$ 50 l in total) which were located in front of a muon detector consisting of a 2 m long tungsten and Iron shield followed by a scintillator hodoscope and planes of multiwire proportional chambers interspersed with iron sheets. The irradiation of the emulsion was made uniform ($\lesssim$ 1000 π^-/mm^2) by moving the stacks across the beam in steps of magnitude depending of the beam intensity. Upstream of the emulsion, a set of centroïd chambers was used to locate the position of the incoming π^- mesons within 100 μm. A small vertex detector was placed between the emulsion and the dump to help in the location and identification of the interactions.

Scintillation counters were used to trigger the whole system. The on-line trigger was made on the detection of 2 muons in the most downstream hodoscopes.

The emulsion processing was made in CERN and Rome from June to September 1980.

The tapes containing the different counter information are now being processed in order to select good tri-muon candidates which will then be searched in the emulsion using both the centroïds and vertex detector predictions.

II.2.7. Preparation of the first study of very high energy ($\sqrt{s}$ = 540 GeV) $p\bar{p}$ interactions at the CERN-collider (UA5 experiment).

(D. Bertrand, J. Gaudaen, D. Johnson, H. Mulkens, S. Tavernier and G. Wilquet - Bonn, Brussels, Cambridge, CERN and Stockholm Collaboration).

This experiment aims at a rapid visual survey of the highly complex events likely to be encountered at the SPS collider. In particular the experiment might allow to discover the "Centauro" events whose existense is suggested by cosmic-ray studies. The detector consists essentially of two 6 m long streamer chambers viewed by six cameras via image intensifiers. It will be installed in the LSS4 area at the SPS, alternating with UA2.

The first streamer chamber, partially equipped with lead glass for photon conversion, was successfully tested and optimized early this year. Its uniformity proved to be good. In June/July this chamber, together with its gas supply and most major parts of the optical system was installed at the ISR for a test run. The test confirmed the feasibility of reasonably small streamers allowing a spatial resolution of about 1 to 2 mm. After this test run, the second chamber was completed with all its lead glass absorbers. Tests of this chamber have been made recently.

All the image intensifiers have been delivered and tested.

The cameras are presently under test. Two sets of Marx and Blumlein generators have been built and used as high-voltage suppliers for the two chambers.

For the calibration of the streamer chamber photographic system, a special illumination system has been developed, consisting of a novel type of high efficiency mercury arc lamp and a special 100 branch quartz fibre distributor, which illuminates the calibration wire grid uniformly with ultra-violet light.

II.3. Participation to EHS.

The construction of the Silica Aerogel Detector (SAD) has proceeded as planned. All components, except for the external calibration system, are now at CERN, and several essential tests on these components have been performed.

An automatic, computer controlled system was designed and used to test each individual module. The average light yield per module was 10.8 photoelectrons, and the worst module had 8.0 photoelectrons. These values are comfortably above the design values of six photoelectrons.

The magnetic shielding was also tested with the complete, final set-up. No photomultiplier suffers a signal loss of more than 2.5 % due to the stray field of the main magnet. Such a loss is completely negligible.

The detector will be finished and available for use in physics experiments from June 1981 onwards.

III. SEMINARS AND LECTURES.

- The practical work for students attending the lecture of J. Lemonne and J. Sacton (3rd and 4th year in physics) has been organized by the staff of the Institute as well as some optional practical work for students of the 3rd year in physics.

- P. Van Binst has given the following lectures at the ULB :
  -Notions pratiques d'informatique (Faculté des Sciences)
  - Introduction à l'informatique (Licence en informatique et sciences humaines, Nivelles).

- H. Mulkens has obtained his Ph.D (Etude expérimentale de certains aspects de la physique du neutrino à haute énergie - ULB).

- Two students of the ULB have performed their "mémoire" at the IIHE :
  - Pierre Marage : "Contribution à l'étude de la production de particules charmées par interactions de neutrinos"
  - M. Latouche : "Contrôle et gestion d'interruptions provenant de deux lignes de communication et de deux tâches d'application sur un DECsystem10".

- J. Lemonne was invited by the University of Warsaw to give a talk on "Single $e^{\pm}$ production in $\bar{p}p$ interactions at 70 GeV/c".

- S. Tavernier has given the following talks :
  - Some recent results on hadronic charm production, Nijmegen
  - The results of the NA 13 experiment, Mons
  - Some recent results on hadronic charm production, Brugge
  - Search for charm with high resolution visual technics, SLAC (USA).

- E. De Wolf has given a mini-rapporteur talk at the "XI International Symposium on Multiparticle Dynamics", Brugge on "Inclusive production of meson resonances".

- E. De Wolf has given a contributed talk on "Experimental study of low p_T inclusive production and comparison with quark parton models" at the XV Rencontre de Moriond, Les Arcs.

- P. Van Binst has presented a paper at the Europhysics Conference on Computing in High Energy and Nuclear Physics, Bologna : "Evolution of the Brussels On-Line System since 1970".

- The following talks were presented at the Annual Scientific Meeting of the Belgian Physical Society, Liège, 29-30 May, 1980
  - R. Vandenbroucke : "BROLNET - Development of a communication facility between two PDP-11's and a DECsystem10"
  - D. Bertrand : "Dimuon events produced in high energy antineutrino interactions observed in BEBC"
  - M. Goossens : "High Energy Muon interactions on carbon"
  - M. Dewit : "Experimental study of inclusive ν and $\bar{\nu}$ interactions in Gargamelle"
  - J. Moreels : "Observation of the decay $\Sigma_c^+ \rightarrow \Lambda_c^+ + \pi^0$"
  - G. Vanhomwegen : "Coherent production of the $K^- \; ^+ \; ^-$ system in K^-d interactions at 4.5 GeV/c".
- In the framework of the seminars on Elementary Particles at the IIHE :
  - E. De Wolf : "The role of valence quarks in soft hadron collisions"
  - G. Wilquet : "Recent WA24 results"
  - J. Lemonne : "Report on the Madison Conference"
  - J.J. Dumont : "Experiments at the SLAC Hybrid Facility"
  - G. Vanhomwegen and S. Tavernier : "Holographic tests in BIBC"
  - M. Sokoloff : "Evidence for Hard Gluon Bremsstrahlung in a Deep Inelastic Neutrino Scattering Experiment"
  - W. Kozanecki : "Recent Results for the CHARM Neutrino experiment

IV. COMPUTERS AND DATA PROCESSING.

The persons involved in software development and computer systems management are G. Depiesse, G. Rousseau, P. Van Binst and R. Vandenbroucke.

Some computers belong to the IIHE and are installed in the laboratory; use is also made of the resources of the ULB-VUB Computer Center.

The IIHE computers are a DECsystem10, two PDP-11/40's and a PDP-8/e. They are used essentially for the on-line data acquisition and guidance of a set of twelve film measuring machines, as well as for the on-line geometrical reconstruction of some of the measured events. The measuring devices are a Polly film reader and four Gargamelle/Mirabelle talbes on the DEC-10, a SWEEPNIK film reader on the PDP-11 "SWEEPNIK", five BEBC tables on the PDP-11 "BEBC" and a PROSAM table on the PDP-8, linked

to the PDP-11 "BEBC". The two PDP-11's are linked to the DEC-10 through "BROLNET", a small network architecture which was devepolled at the IIHE (essentially by R. Vandenbroucke) and allows the real-time transfer of data between the computers.

The IIHE computers are under the management of P. Van Binst; they are used in open shop, 24 hours/day and 7 days/week. Their availability is very high, the unscheduled down-time being of the order of 1 %. The DECsystem10 is heavily used for off-line computational and data handling tasks; its mean CPU activity is consistently close to 40 % troughout the 168 hours week.

Configuration changes during 1980 include the addition of a disk drive and 16 communication lines on the DEC-10, this hardware having been bought second-hand at a very low price. Some graphics equipment has also been purchased from Tektronix, namely a 4010 terminal and a 4662 plotter. On the PDP-11 "BEBC", an RL01 disk drive has been added to the configuration. System and application software has been implemented to support this new hardware, and new versions of executive, system and utility software have been regularly installed on all computers.

Some of the IIHE jobs are run at the ULB-VUB Computer Centre, typically the more demanding in processing time or in mag tapes handling, since only the lower density tapes can be processed on the laboratory computers. A second interactive terminal linked to the Computer Center has been installed at the IIHE.

Major software and hardware modifications took place at the Computer Center in 1980. The NOS operating system was upgraded at the beginning of the year and the main computers were replaced in August by a CDC CYBER 170-750.

V. TECHNICAL AND ADMINISTRATIVE WORK.

- The following work has been accomplished by the technical staff of the workshop (J.P. Dewulf, L. Etienne, R. Gindroz, R. Goorens, E. Lievens, J. Muller, R. Ruidant, G. Van Beek, J. Van Begin, R. Vanderhaegen, L. Van Lancker, G. Vincent, Ch. Wastiels) :

1. Maintenance of the scanning and measurement tables of the IIHE.
2. Study of the construction and realisation of a scanning table for 50 mm non-perforated film (LEBC) with up to 4 film transports, two magnifications (10 to 20 and 40 to 60) and XY stage.
3. Installation and test of the aerogel Cerenkov counters (SAD-EHS project).
4. Installation and test of fast cycling cameras for 70 mm perforated films (UA5 experiment). G. Van Beek and L. Van Lancker have made extended stays at CERN to perform this task.
5. Realisation of a film copying machine using the "diazos" technique.
6. Study of a scanning and measurement device for picture coming from holographic bubble chambers.
7. Study of a superposition of graphic and TV images in view of helping measurement of very complicated events in visual track chambers.
8. Study of an improvement of the optical projection of the Sweepnik device.
9. Connection of the PDP-11/40's used for the on-line control of the BEBC tables and SWEEPNIK to the DEC-10 computer in view of running large geometry programs.
10. Realisation of a precise (2 µm) manual measurement facility on the Polly automatic device.

    C. Donis has participated to the preparation of the emulsion stacks for the NA 19 experiment; both she and M. Pins have taken part in the emulsion processing at CERN.

In performing the experiments which are summarized in the present report, the physicists have benefited from the efficient work of the scanning and measuring teams of the laboratory.

- The scanning and measurement team of the Institute consisted of : C. Carlier, J. De Bruyne, A. De Coster-Van Cauwenberge, L. De Langhe, M. Delasorte, M. De Mey, J. De Schutter-Gevers, M. De Schutter, Cl. Donis, M. Dumont, J. Du Mortier-Liesen, M.P. Galloy-Kips, Ch. Garnier-Stoffen, M. Goeman, R. Kelders, D. Legrand-Mahaux, D. Luypaert-Peymans, P. Marage, M. Pins, R. Pins, D. Pirnay-Pauwels, M.L. Ronsmans, J. Sandfurth-Colinet, J. Thys-Raynaerd, M.L. Van Dale-Ollier, A. Van De Gucht-Calistri,

M. Van Mechelen-Paulus, L. Vermeersch-Polderman, A. Vermijlen-Pels, Cl. Vorstermans-Hennebert.

- The secretarial work was accomplished by R. Lecluse-Alluyn and M. Van Doninck-Garnier.

VI. REPRESENTATION IN COUNCILS AND COMMITTEES.

J. Lemonne has been one of the Belgian representatives in the CERN Council. J. Lemonne, J. Sacton and F. Verbeure were members of the Scientific Committee "High Energies" of the IIKW-IISN and of the Belgian Selection Committee of CERN-Fellows. P. Van Binst has been elected member of the board of the Computational Physics Group of the European Physical Society.

VII. ATTENDANCE TO CONFERENCES AND SCHOOLS.

- E. De Wolf and F. Verbeure organized the "XI International Symposium on Multi-Particle Dynamics" in Bruges, June 22-27, 1980, attended by 87 participants from Europe, the USA, Japan, India and China. Invited talks were given by P.V. Chliapnikov, R. Hwa, R. Reschanski, D. Burton, J. Gunion, K. Konishi, G. Wolf, M. Albrow, C. Bromberg, D. Sachrajda, S. Brodsky, N. Schmitz, K.H. Becks, A. Mueller, C. Rubbia and S. Glashow. The Organizing Committee consisted of F. Cerulus (Chairman), E. De Wolf, F. Grard, J. Lemonne, J. Sacton, F. Verbeure (Convener) and J. Weyers. Several physicists of the laboratory were actively involved in the running of the conference : C. De Clercq, J.J. Dumont, J. Gaudaen, S. Tavernier, G. Vanhomwegen, M. Van Immerseel. Secretarial help was given by M. Goeman.
- D. Johnson, J. Lemonne, S. Tavernier and G. Wilquet have attended the XXth International Conference on High Energy Physics - Madison (USA).
- E. De Wolf and H. Mulkens attended the XV Rencontre de Moriond - Les Arcs.
- D. Bertrand and R. Roosen attended the International Conference on Experimentation at LEP - Uppsala, June 1980.
- G. Vanhomwegen and P. Vilain attended the VIII International Winter meeting on Fundamental Physics - Ronda, March 1980.
- R. Roosen attended the Meeting on miniaturization of high energy physics detectors - Pisa, September 18-20, 1980.

- W. Van Doninck and M. Dewit attended the "Neutrino 80" Conference - Erice, June 23-27, 1980.
- G. Wilquet attended the IV Baryon Resonance Conference, Toronto.
- J. Wickens attended the "European Symposium on Nucleon Anti-Nucleon Interactions, Bressanone, June 23-28, 1980.
- P. Van Binst and R. Vandenbroucke attended the Decus Europe Symposium, Amsterdam, September 15-19, 1980.
- R. Vandenbroucke attended the IFIP Congress '80 - Tokyo, October 5-10, 1980.
- P. Van Binst attended the DECUS France Symposium - Paris, March 1980; Europhysics - Conference on Computing in high energy and Nuclear Physics - Bologna, September 1980; IFIP Congress '80 - Tokyo and Melbourne, October 1980.
- J. Moreels attended the CERN Summer School 1980, Malente, June 8-21, 1980.

VIII. LIST OF PUBLICATIONS AND CONTRIBUTIONS TO CONFERENCES.

- "Direct Evidence for Associated Charm Production in 340 GeV π^-p Interactions"
J. Lemonne, J. Sacton, S. Tavernier, P. Vilain, J.H. Wickens ...
Physics Letters 93B - 509 - 1980.

- "First Observation of the Production and Decay of the Σ_c^+"
D. Bertrand, P. Marage, J. Moreels, J. Sacton, C. Vander Velde-Wiquet, W. Van Doninck, G. Wilquet ...
Physics Letters 93B - 521 - 1980.

- "Study of the Inclusive Reaction $K^+p \to \Delta^{++}(1232) + X^\circ$ at 32 GeV/c"
M. Barth, E.A. De Wolf, F. Verbeure...
Nuclear Physics B164 - 189 - 1980.

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