CERN 75-7
Laboratory I
Personnel Division
16 June 1975

ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

A HISTORY OF THE COLLABORATION BETWEEN THE EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH (CERN) AND THE JOINT INSTITUTE FOR NUCLEAR RESEARCH (JINR), AND WITH SOVIET RESEARCH INSTITUTES IN THE USSR 1955-1970

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G E N E V A

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ABSTRACT

The report describes in some detail the origins and development up to 1970 of the collaboration which now exists between the European Organization for Nuclear Research (CERN) and its counterpart the Joint Institute for Nuclear Research (JINR) at Dubna, USSR and also with the Institute for High Energy Physics, Serpukhov, USSR. Part I deals with the relations between JINR and CERN, their beginnings and the subsequent development of exchange of scientists, joint Summer Schools, and the organization of Seminars to discuss perspectives in high energy physics. Part II describes first the steps which led up to the signing of an Agreement between CERN and the State Committee of the USSR for the Utilization of Atomic Energy, governing collaboration between CERN and the Institute for High Energy Physics at Serpukhov. A brief account is then given of the subsequent installation of equipment built at CERN for the Institute's 76-GeV proton accelerator and the carrying out of joint physics experiments by teams from Western Europe and from the Soviet Union. Part III summarizes the origins of collaborative agreements which have been made by CERN with a few other leading Institutes in the Soviet Union. A number of Annexes reproduce some of the relevant documents and letters.

INTRODUCTION

The successful scientific collaboration established between the European Organization for Nuclear Research (CERN) and Institutes in the Soviet Union, in particular with the Joint Institute for Nuclear Research (JINR) at Dubna and with the Institute for High Energy Physics at Serpukhov, is frequently cited as an example of what can be achieved in the field of East-West relations. Indeed one of the purposes of CERN as defined in its Convention is "the organization and sponsoring of international co-operation in nuclear research, including co-operation outside the Laboratory". The question has been frequently asked as to how this collaboration came about at a time when political contacts were minimal, and why it has been so successful. This report is an attempt to answer at least the first part of this question, based on the archives at CERN and on the direct participation of the author in JINR and USSR affairs since 1965. The story as related in this report stops somewhat arbitrarily in 1970, partly to keep the text of reasonable length and partly because it is difficult to place very recent events in their correct historical perspective.

CONTENTS

PART I. COLLABORATION WITH JINR, DUBNA

1. EARLY HISTORY OF THE JOINT INSTITUTE FOR NUCLEAR RESEARCH AT DUBNA

The first exchange of scientists between CERN and Institutes in the USSR was an exchange with the Joint Institute for Nuclear Research (JINR) at Dubna. It may therefore be of value to begin with a short history of the founding of JINR.

The town of Dubna, some 130 km north-west of Moscow on the banks of the Volga, was originally founded as a scientific centre in 1947. In that year, construction of a 680 MeV*) synchro-cyclotron was started and later of a 10 GeV proton synchrotron; these two machines formed the nucleus of the Nuclear Problems Institute and the Electrophysics Laboratory of the USSR Academy of Sciences, respectively. The synchro-cyclotron was built under the leadership of M.G. Meshcheryakov (now head of the Laboratory of Computation and Automation of JINR) and was first commissioned in December 1949. The proton synchrotron, built under the direction of V.I. Veksler, first operated in March 1957.

These two Institutes formed the nucleus of the Joint Institute for Nuclear Research when it was founded in 1956. The Agreement setting up the Institute was signed in Moscow on 26 March of that year, while the Charter was adopted on 23 September. The original members were Albania, Bulgaria, the People's Republic of China, Czechoslovakia, the German Democratic Republic, Hungary, the Korean People's Democratic Republic, Mongolia, Poland, Rumania, and the USSR, while the Democratic Republic of Vietnam joined soon after.

The synchro-cyclotron laboratory became the Laboratory of Nuclear Problems, and the proton synchrotron the Laboratory of High Energies. At the same time, three other laboratories were founded: the Laboratory of Nuclear Reactions, the Laboratory of Neutron Physics, and the Laboratory of Theoretical Physics. The Laboratory of Computation and Automation was created in 1966 and the Department of New Methods of Acceleration in 1968. The Director of the Joint Institute is assisted by two Vice-Directors who come from the Member States (excluding the USSR) of JINR. Amongst other things, one Vice-Director normally looks after relationships with the Member Countries, and the other deals with relationships with non-Member States and institutes and organizations such as CERN.

The Charter of JINR is very similar to the Convention of CERN; the purposes and tasks of the Joint Institute are defined as follows:

> "to provide facilities for joint theoretical and experimental research in the field of nuclear physics by scientists of the Institute's Member States;

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*) Originally 400 MeV, which operated in 1949; reconstructed around 1952 to 680 MeV.

"to further the development of nuclear physics in the Institute's Member States through exchanges of experience and achievements in theoretical and experimental research;

"to maintain contact with interested national and international scientific establishments and other organizations for the purpose of furthering the development of nuclear physics and of seeking new possibilities for the peaceful uses of atomic energy;

"to further the all-round development of the creative abilities of research workers of the Institute's Member States.

"In all its activities the Institute shall promote the utilization of atomic energy solely for peaceful purposes to the benefit of all mankind."

2. FIRST CONTACTS BETWEEN CERN AND INSTITUTES IN THE USSR

The first document in the CERN archives concerning the USSR is a note on a talk given by J.H. Fremlin (of the University of Birmingham, UK) at CERN in August 1955, entitled "Data on Soviet Accelerators". In this talk Fremlin mentioned the plans for building a 20 to 30 GeV accelerator in the Soviet Union.

In September 1955 the first Atoms for Peace Conference was held in Geneva. Several Soviet scientists, including V.I. Veksler of Dubna, visited CERN on this occasion, when the Laboratory was under active construction. The visit was probably the first informal contact between Soviet and CERN scientists.

In May 1956 there was a Conference in Moscow on the physics of high-energy particles, which was attended by the then Director-General of CERN, C.J. Bakker, accompanied by W. Gentner and E. Regenstreif. The following month there was a two-week-long meeting at CERN entitled "CERN Symposium on High-Energy Accelerators and Pion Physics", which was attended by a large number of Soviet physicists, including many of those who subsequently became Directors of the different laboratories of JINR, such as A.M. Baldin, D.I. Blokhintsev, V.P. Dzhelepov, M.G. Meshcheryakov and V.I. Veksler, as well as A.A. Naumov and Yu.D. Prokoshkin, now*) at the Institute for High Energy Physics (IHEP), Serpukhov, I.V. Chuvilo, now*) Director of the Institute for Theoretical and Experimental Physics (ITEP) in Moscow, and G.J. Budker, now*) Director of the Institute of Nuclear Physics of the Siberian Branch of the Academy of Sciences in Novosibirsk. One of the papers given at the Symposium was entitled "Main characteristics of a projected strong-focusing 50-60 GeV proton accelerator" by V.V. Vladimirski, E.G. Komar and A.L. Mints. Many personal contacts were made during the course of the Symposium, and more especially at an excellent reception held by the Soviet delegation at the Hotel Metropole. For example, the archives contain an exchange of correspondence in 1957 between C.J. Bakker and V.P. Dzhelepov, which presumably arose out of their meetings in 1956.

One of the first two Vice-Directors of JINR was M. Danysz of Poland, who visited CERN towards the end of 1957. Danysz suggested to Bakker that it might be useful for CERN and JINR to exchange a few physicists and accelerator experts for short visits. Bakker brought

*) 1974

this suggestion to the attention of the Committee of Council in November 1957, and it was decided that each country should consider the proposal and give an answer to the Director-General in June 1958.

It is of interest to note here that in fact France and JINR agreed to exchange specialists late in 1956 and the first French scientist arrived in Dubna in December 1956. In the following year, the French Ambassador to the Soviet Union visited the Joint Institute together with representatives from Belgium, Italy, the Netherlands and Switzerland. On the occasion of the visit it became known that plans were being made to build a 50 GeV proton synchrotron rather than one of 20 to 30 GeV as reported two years earlier by Fremlin.

It would appear that little progress was made in 1958 in following up the suggestion of Danysz, although a large number of Soviet physicists attended an International Conference on High-Energy Physics which was held at CERN in July 1958. It was in fact N.N. Bogolubov, then Head of the Laboratory of Theoretical Physics at JINR and subsequently Director of JINR, who raised the matter again in a letter to Bakker dated 4 February 1959, in which he asked if a certain number of his research students could visit CERN.

Bakker replied on 5 March 1959 that in principle he agreed with an exchange of scientists between the USSR and CERN, and he further asked "whether the USSR Academy of Sciences would consider having Fellows appointed by CERN to work in physics laboratories in the USSR for periods of the order of one year". Bakker's delay in replying to the letter of Bogolubov was because he consulted the President of the CERN Council (F. de Rose of France) before doing so. Certain sentences of the response of de Rose are of interest in view of the Agreement concerning collaboration with IHEP Serpukhov, which was signed with the State Committee of the USSR for the Utilization of Atomic Energy some eight years later. De Rose wrote (on 13 February 1959):

> "Toutefois les pays membres du CERN seront sans doute désireux de savoir sous quelle forme le Professeur Bogolubov estime qu'une coopération éventuelle pourrait être organisée. Certains pourraient envoyer des chercheurs à Doubna. D'autres pourraient penser avantageux que le CERN ou des centres nationaux envoient des techniciens en URSS lorsque ce pays entreprendra la construction de l'accélérateur de 50 milliards d'électron-volts dont le projet a été rendu public."

De Rose further suggested that the matter should be brought to the attention of the Council of CERN. This was not done directly, as the question was first discussed by the Committee of Council at its meeting of 25 May 1959. The Committee agreed in principle to an exchange of personnel between CERN and Dubna, but felt that each national delegation should be formally consulted before a final decision was taken. In July of 1959 an International Conference on High-Energy Physics was held in Kiev, when Bakker met both Bogolubov and Blokhintsev (then Director of JINR); the latter proposed specifically that two scientists from Dubna should visit CERN for about 6 months, while two CERN staff members could visit the Joint Institute for a similar period. This suggestion was confirmed from the CERN side in a letter of 11 September 1959 from Bakker to Blokhintsev. At about the same time (18 September 1959), Bogolubov wrote to Bakker from Moscow saying, "As to your research workers, I think there would be no objections if two theorists came to work with me at the Physical Department of Moscow University or at the Institute of Mathematics of our Academy".

During the Kiev Conference, the IUPAP High Energy Commission decided to convene a meeting of scientists, to act as members of a Study Committee on questions related to international co-operation in the field of high-energy physics accelerators. The meeting took place as an informal gathering on 15 September 1959 at CERN.

Present were:

Professor C.J. Bakker (Chairman)
Dr. L.J. Haworth
Dr. E. Lofgren
Professor V.I. Veksler
Professor V.P. Dzhelepov
Dr. T.G. Pickavance
Professor G. Salvini
Professor W.K.H. Panofsky
Dr. A. Schoch (Secretary)
Miss E. Bertrand (now Mme E. de Modzelewska) } (Interpreters)
Mr. V.N. Orel }

Reports on the discussions held and a draft proposal are given in Annex I (CERN/327).

In the following week (21 September 1959) Bakker wrote to all the national delegations to CERN, asking them for their views on the proposal made by Bogolubov. He was able to report to Council on 1 December 1959 that "all the delegations ... were in favour of such exchanges provided they were reciprocal". The following day the Council approved a Draft Resolution on International Co-operation, which is given in Annex II (CERN/327*/Add).

Although de Rose had assumed that Dubna would be the main partner in an exchange agreement, at the Kiev Conference S.Ya. Nikitin of ITEP Moscow asked J.B. Adams [then Leader of the Proton Synchrotron (PS) Division at CERN] if two of his staff could work at CERN during the running-in period of the PS. Bakker replied positively to this request in a letter dated 16 November 1959, and again in a letter to the Director of ITEP (A.I. Alikhanov, who died in 1970) dated 17 February 1960.

3. EXCHANGE OF SCIENTISTS 1960-1970

3.1 1960-1962

Thus some two years after the original proposal of Danysz, nearly all the necessary administrative and political steps had been taken to establish an exchange programme between CERN and JINR. The next step was to choose the first scientists to initiate the exchange. Before this was done, there was a further exchange of letters in May 1960 between Blokhintsev and Adams (then Acting Director-General following Bakker's death in an aeroplane accident in the USA in April 1960). Blokhintsev suggested that the first exchange should be of three people from each side for a stay of six months. At the beginning of June, Adams visited Dubna and Moscow and met the three scientists chosen by Dubna, who were V. Meshcheryakov and R. Ryndin, theoreticians, and Yu.A. Shcherbakov, an experimentalist. They arrived in CERN on 15 July 1960 and stayed until the end of the year (Plate 1). Adams also visited ITEP in Moscow, and was informed that the planned 50 GeV Soviet alternating-gradient proton synchrotron had become a 60 to 70 GeV machine owing to a change in the

Plate 1 The first long-term visitors from Dubna at CERN in 1960. From left to right: S.A. ff Dakin, V. Meshcheryakov, Yu.A. Shcherbakov and R. Ryndin (Photograph: CERN Courier, July 1960)

design; he was told that a site had been found near to Serpukhov, some 100 km south of Moscow*), that work had started on the site but that no machine parts had been ordered. As will be described more fully later, this machine came into operation at 76 GeV in October 1967.

In June 1960, Council was informed of the arrangement concluded with Dubna and gave its formal approval.

At CERN it took a little time to find people who wished to spend some months at Dubna. The scientific staff and Fellows and Research Associates were informed of this possibility in September of 1960, and several expressed interest. In November, three were selected: N. Cottingham, a theoretician; E. Fischer, an accelerator expert; and M. Schneeberger, an experimental physicist. They left Geneva for Dubna in February 1961. Cottingham stayed three months, Fischer six months, and Schneeberger eight months. For these first visits each laboratory paid the expenses (salary, travel, and subsistence) for its own scientists, whilst the host laboratory found accommodation. Somewhat later this practice was changed, and the host laboratory paid an appropriate subsistence allowance which was subsequently charged to the other laboratory.

The second group of physicists from JINR arrived in Geneva at the end of November 1961; they were two experimental physicists, A.I. Mukhin and V.A. Nikitin, who stayed for six months, and a theoretician, W. Zoellner (German Democratic Republic) who arrived in December, also for six months. From CERN, P.T. Kirstein (an accelerator expert) and K.M. Vahlbruch (a bubble chamber physicist) spent six months at Dubna in the first half of 1962, and D. Flamm (a theoretician) three months. At the end of 1962, two more physicists from JINR came to CERN for a six-month stay.

3.2 The Travelling Fellowship Scheme 1963-1970

After the initial visits of CERN staff members and Research Fellows to JINR and to ITEP, it proved more difficult within CERN to find people who could spend a substantial period of time at laboratories in the USSR. There was a flourishing experimental programme both at the synchro-cyclotron and at the proton synchrotron, while studies were under way for what later became the Intersecting Storage Rings (ISR) project. This difficulty was

*) In fact the site was already mentioned as being Serpukhov by Vladimirski at the International Conference on High-Energy Accelerators and Instrumentation, which was held at CERN in September 1959.

discussed by the Directorate in January 1963, and M.G.N. Hine suggested that perhaps CERN could sponsor visits to Dubna of scientists not based at CERN but coming from the Member States. This idea was discussed during the year and, by October 1963, V.F. Weisskopf (who had become Director-General in January 1961) was able to propose a name to Blokhintsev, that of Ph. Briandet from Saclay. Blokhintsev agreed to the proposal and Briandet spent nine months at Dubna in 1964. His normal salary continued to be paid to him by his Institute, but CERN paid his travel costs and a subsistence allowance to him whilst he was in the USSR. He was thus the first Travelling Fellow of some 30 who have since visited JINR (and exceptionally ITEP) under this scheme; details for the period 1964-1970 are given in Annex III. Since 1967 the title "Travelling Fellow" has been used only for non-CERN scientists or exceptionally for a CERN Fellow.

By 1963 the routine for exchanging scientists between CERN and JINR had been well established. The number of visitors from JINR to CERN, expressed in man-years, reached a peak in 1967, while for visits in the reverse direction the peak was reached in 1970.

However, as early as 1964, the Directorate of JINR began to search for other ways of intensifying the collaboration with CERN. In January 1965, Bogolubov succeeded Blokhintsev as Director of JINR, and in February the Vice-Director responsible for CERN affairs, E. Fenyves, visited CERN for a few days. In discussions with B.P. Gregory, then Director of Research, Fenyves announced the intention of JINR to organize seminars on different techniques, to which a small number of CERN scientists would be invited.

4. CERN PARTICIPATION IN JINR SEMINARS

The first of the seminars proposed by Fenyves was held on the nuclear emulsion technique, at that time still relatively widely used, especially in the member countries of JINR. The seminar took place in Dubna in June 1965 and was attended by D.H. Davis from London and W.O. Lock from CERN. Lock subsequently visited the Institute of Physics (of the Kazakh Academy of Sciences) in Alma-Ata, where he saw both emulsions and bubble chamber film from CERN being scanned and analysed, and also the Institute of Physics in Tashkent, which had been visited the previous year by Weisskopf.

In October 1965, JINR organized a second seminar, this time on bubble chamber and data-handling techniques, which was attended by M. Ferro-Luzzi, Y. Goldschmidt-Clermont, B. Montague and J.-M. Perreau from CERN, and A. Rousset from Paris. This group visited IHEP Serpukhov after the seminar and were the first group of CERN scientists to do so. (The history of the CERN-Serpukhov Collaboration will be described in Part II.) On his return to CERN, Goldschmidt-Clermont wrote some notes for Gregory, as well as an article for the CERN Courier on his visit to Serpukhov (CERN Courier, April 1966). In his notes he wrote:

> "Les points suivants ont été soulevés lors de conversations avec Fenyves, Ulegla et d'autres dirigeants du laboratoire de Doubna.
>
> Séminaires
>
> a) Etincelles - Un séminaire similaire à celui auquel nous avons assisté sur les chambres à bulles sera organisé à Doubna vers mars-avril sur les chambres à étincelles: résultats physiques et méthodes expérimentales. Une délégation du CERN sera invitée et semble très désirée.

b) Avenir de la physique des hautes énergies - Doubna voudrait avoir, à intervalles plus ou moins réguliers, des échanges de vues avec le CERN et d'autres laboratoires sur les problèmes à longue échéance (disons cinq ans) de la physique des hautes énergies. Un premier séminaire de cette nature pourrait avoir lieu vers octobre prochain (après Berkeley-Stanford). Ils voudraient savoir si le CERN s'y intéresse.

c) Séminaires et réunions au CERN - Doubna voudrait pouvoir envoyer des délégués aux réunions organisées au CERN (exemple: Jamboree chambres à bulles)".

The spark chamber seminar mentioned under (a) duly took place in March 1966 and was attended by W. Baker, F. Krienen, C. Rubbia, F. Schneider and M. Vivargent. The meeting mentioned under (b) eventually took place in Riga in June 1966 and was the first of a series of such meetings, which will be described in Part I, Section 5.

In May 1966, Gregory, who became Director-General of CERN on 1 January 1966, visited Dubna for a day (Plate 2) during a break in discussions with the State Committee of Atomic

Plate 2 A CERN delegation at Dubna in May 1966. Left to right: W.O. Lock, Ch. Peyrou, B.P. Gregory and N.N. Bogolubov. (Photograph: Yu. Tumanov, Dubna)

Energy concerning possible collaboration with IHEP Serpukhov. He was accompanied by A. Citron and Ch. Peyrou, and by W.O. Lock who earlier in the year had been asked by Gregory to be responsible for all administrative matters concerning collaboration with the USSR. Bogolubov paid a return visit to CERN in October 1966, accompanied by V.S. Shvanev, the Head of the International Department at JINR. On this occasion, Bogolubov raised the question of a seminar to discuss the future perspectives of high-energy physics, and Gregory indicated that CERN was very interested in such a meeting and would be prepared to send six or seven people to it. Plate 3 shows Bogolubov lecturing at CERN during the occasion of his visit.

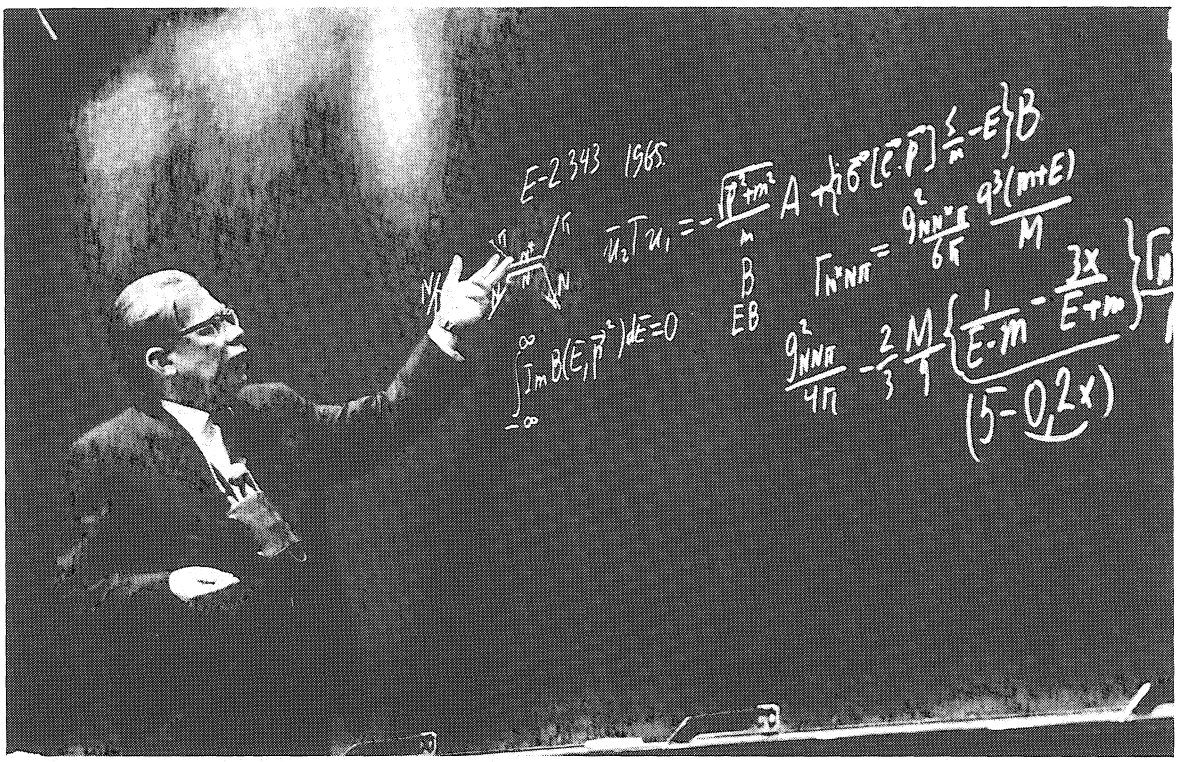

Plate 3 N.N. Bogolubov lecturing at CERN, October 1966. (Photograph: CERN Courier, PI 193.10.66)

5. THE "RIGA-TYPE" SEMINARS

The question of a seminar on future perspectives in high-energy physics was discussed in some detail at CERN during the spring of 1967, previous to a visit made by B.P. Gregory, G.H. Hampton and W.O. Lock to Moscow in April 1967. (This visit to the USSR was in connection with the final negotiations with the State Committee concerning the agreement with IHEP Serpukhov -- see page 14). On this occasion Hampton (Director of Administration at CERN) and Lock visited Dubna and discussed in some detail the arrangements for the seminar. A meeting of CERN and IHEP scientists and engineers had been arranged for June 1967, and it was agreed that the seminar should take place in Riga, in Latvia, almost immediately afterwards; in fact it took place from 26-29 June. Some two days were spent in discussions between 9 representatives from CERN and its Member States, 18 from JINR and its Member States, and 8 from other Soviet Institutes (Plate 4). Annex IV gives a list of the participants at this and the two subsequent seminars. The programme also included a reception in the Red Hall of the Supreme Soviet of Latvia, when the Western participants encountered a very powerful drink known as Riga Balsam (not unlike Fernet Branca!), took a trip on a hydrofoil boat in the Bay of Riga, and listened to a concert of organ music in the Dom Cathedral of Riga. On the last day there was a coach tour along the coast ending with a picnic lunch in the sand dunes and pine forest on the edge of the sea.

The success of the seminar was such that CERN suggested that a similar meeting should be organized the following year (1968) after the International High-Energy Conference which was to be held in Vienna. This possibility was further discussed between N.N. Bogolubov

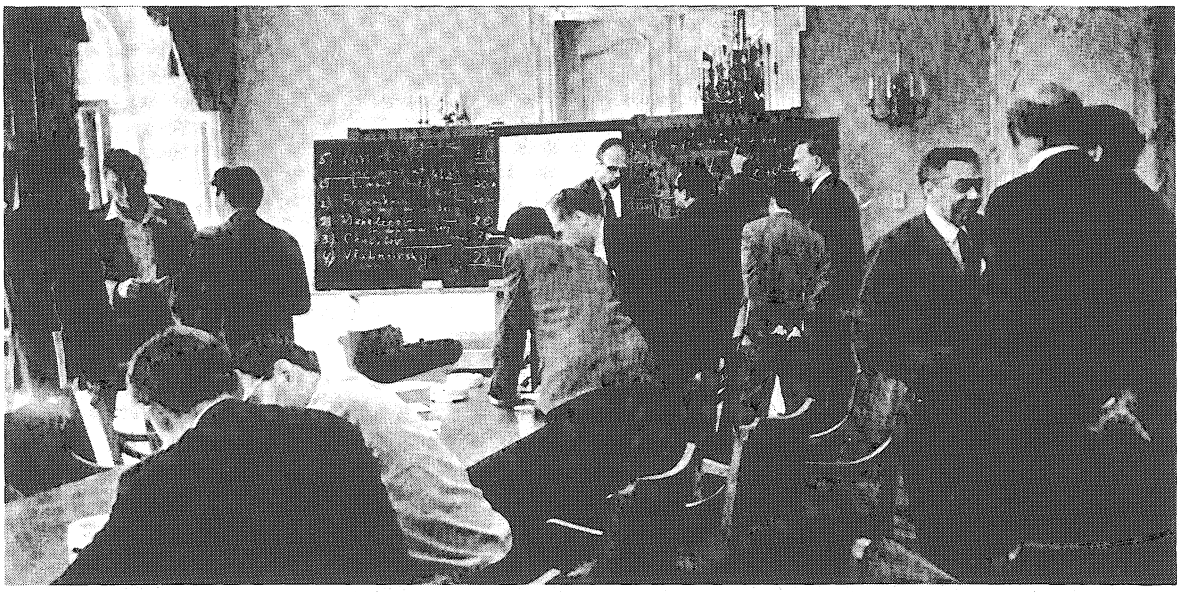

Plate 4 After-lecture discussions at the Riga Seminar in June 1967. Facing camera from left to right: B.P. Gregory (talking to Yu.A. Shcherbakov and Yu.D. Prokoshkin), L. Van Hove in discussion with C.A. Ramm, and M.A. Markov listening; V.P. Dzhelepov. (Photograph: Yu. Tumanov, Dubna)

and L. Van Hove when they met in Zakopane in February 1968 (see page 10), and they agreed in principle to hold such a meeting. Van Hove assumed the responsibility for organizing the meeting, together with W. Kummer from Vienna. The seminar took place on 8 and 9 September 1968 at Semmering, a small mountain resort some 90 km south-west of Vienna. There were 15 representatives from JINR and its Member States, 10 from CERN and its Member States, and Weisskopf from the USA. As at Riga, the various laboratory directors gave brief reports on the research programmes of their institutes and outlined their future plans for new facilities.

Again it was felt that such meetings served a useful purpose, and it was tentatively agreed to hold a similar seminar in 1969. S. Mukhin, Yu.A. Shcherbakov (one of the first three Dubna scientists to visit CERN -- see page 4) and A.N. Tavkhelidze were at CERN in May 1969, and they discussed plans for a meeting in Tbilisi in Georgia in September 1969, following on from the Accelerator Conference to be held at Erevan. At the suggestion of Bogolubov it was agreed to invite laboratory directors and senior physicists from the USA in order to make the discussions more representative of the world effort in elementary particle physics.

The Seminar took place on 5 and 6 September 1969 at Tbilisi (Plate 5). There were 12 participants from CERN and its Member States, 19 from JINR and its Member States, and 7 from the USA. On Sunday 7 September there was a fascinating excursion along the Georgian Military Highway (which leads to Ordonikidze) to Pasanauri-Kazbegi, which is a small village high up in the Caucasus with a view on the famous Kazbek mountain which is 5043 metres high.

After three such seminars it was felt that a meeting every year was probably too frequent and that an interval of two or three years between them would probably be appropriate. As the next International Accelerator Conference was planned for 1971 in Geneva, CERN

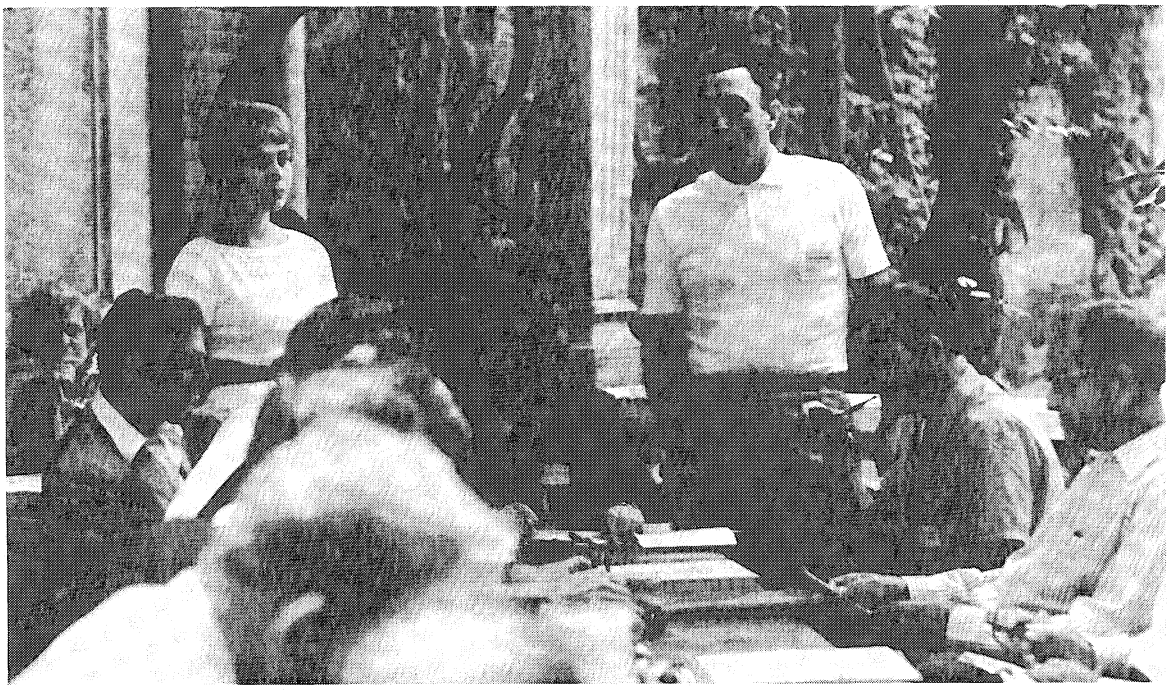

Plate 5 The Tbilisi Seminar, September 1969. From left to right: B.P. Gregory, Mrs. L. Kulikova (Dubna, standing), N.N. Bogolubov, A.N. Tavkhelidze (standing), J.B. Adams, V.F. Weisskopf. (Photograph: Yu. Tumanov, Dubna)

offered to organize the fourth seminar in the series, to be held in Switzerland in September of 1971. This took place at Morges, near Lausanne, and will be described in a subsequent report.

6. THE JOINT CERN-JINR SCHOOLS OF PHYSICS

The idea of a joint CERN-JINR summer school was first raised by Gregory at the Riga meeting in July 1967 and was favourably received by Bogolubov. More detailed discussions took place in Dubna in October 1967, when it was agreed between N. Sodnom (Vice-Director of JINR) and Lock to hold a special meeting in 1968 to discuss the detailed organization. This took place at Zakopane in Poland in February 1968, where Van Hove and Lock met Bogolubov and Danysz (from Warsaw); they provisionally agreed to hold a joint School in Zakopane in the summer of 1969. Unfortunately the development of the political situation in Europe in 1968 was such that it was eventually decided to postpone such a joint School until 1970, and to hold it in a country which was neither a member of CERN nor of JINR. Discussions with K.V. Laurikainen of the University of Helsinki took place in the summer of 1969, and he became very enthusiastic about the idea of holding the School in Finland. Gregory and Lock had a formal meeting with Bogolubov and his colleagues in Tbilisi in September 1969, when it was agreed that CERN would be responsible for the organization of the School in 1970 and that JINR would organize a similar School in 1971. (The minutes of this meeting are given in Annex V.) Lock visited Finland in October and, together with Laurikainen, flew to Joensuu in North Karelia to look at possible sites for the School. They chose Loma-Koli, an isolated holiday hotel on the shores of a small lake some 80 km north of

Joensuu. The first meeting of the Organizing Committee took place there in November 1969, with Kh. Khristov representing JINR and O. Kofoed-Hansen and W.O. Lock, CERN.

The School finally took place from 21 June to 5 July 1970 and was generally agreed to have been a great success. It was attended by 86 young physicists, 28 of whom came from JINR and its member countries. The weather was fine for the complete two weeks, whilst the almost continual daylight was an extra experience for many of the participants. Both Gregory and Bogolubov spent some days in Loma-Koli and took the opportunity to discuss various aspects of the collaboration between their two institutes, including preliminary plans for the 1971 School.

PART II. COLLABORATION WITH THE INSTITUTE FOR HIGH-ENERGY PHYSICS (IHEP) SERPUKHOV

1. EARLY HISTORY OF THE SERPUKHOV COLLABORATION AND OF THE STEPS WHICH LED UP TO THE SIGNING OF THE AGREEMENT WITH THE STATE COMMITTEE FOR ATOMIC ENERGY IN 1967

It has been mentioned earlier that it had been known at CERN for some time that a 60 to 70 GeV proton synchrotron was under construction at a site near Serpukhov. Although construction started in 1959 or 1960, it would appear that little progress was made during the first few years of the project. In the autumn of 1963, however, the work was given greater priority and the Institute for High Energy Physics, Serpukhov, was set up as a new Institute of the State Committee for Atomic Energy. In fact, the Institute is located some 15 km west of Serpukhov, near to the Protva river (a tributary of the Oka), and the town which has grown up there is known as Protvino. A.A. Logunov, a theoretician at JINR, was appointed as the first Director. In the summer of 1964, Weisskopf met Logunov at a conference in Dubna, and during an excursion on the Volga river they discussed possible collaboration between CERN and IHEP. In January 1965, R.M. Sulyaev, Scientific Vice-Director of IHEP, was at CERN for an "Informal Conference on Experimental Neutrino Physics". During this time he discussed with Weisskopf the specific ways in which a collaboration could be realized, and in particular talked about the construction of a separated particle beam.

Weisskopf followed up the discussions with a letter (22 June 1965) to A.M. Petrosyants, Chairman of the State Committee of the USSR for the Utilization of Atomic Energy, in which he said, "We hope we can establish an exchange of people and also of instrumentation with the new laboratory in Serpukhov, the completion of which is awaited by physicists all over the world ... ", and with a more detailed letter to Logunov dated 17 August 1965 (Annex VI). In this letter he mentioned that he had heard that Logunov was planning to be in Paris later in the year for discussions with the French authorities on what later turned out to be the Mirabelle Bubble Chamber project, and he invited Logunov to visit CERN. The latter replied positively, but before this visit took place, Goldschmidt-Clermont and his colleagues visited IHEP, as mentioned in Part I, Section 4 (Plate 6). B. Montague wrote a report for Weisskopf on what he had seen and discussed, and considered in some detail the possibility of building a radio-frequency separated particle beam for the Serpukhov accelerator.

Logunov, accompanied by Prokoshkin and two other colleagues, came to CERN from 29 November to 4 December 1965. The outcome of the discussions was such that Weisskopf was able to write a letter (dated 9 December 1965) to Petrosyants making specific proposals for collaboration between the two Institutes (see Annex VII). He reported to the Scientific Policy Committee on 14 December 1965, saying that CERN could build RF separators for Serpukhov on condition that a certain number of CERN physicists were given facilities for experimental work with the 70 GeV accelerator. The minutes record that "the Committee

Plate 6 The first CERN delegation to visit IHEP Serpukhov in November 1965. From left to right: B. Montague (CERN), A.A. Filippov (Dubna), A. Rousset (Ecole Polytechnique and CERN), A.A. Logunov (Serpukhov), M. Ferro-Luzzi (CERN), J.M. Perreau (CERN), Yu.D. Prokoshkin (Serpukhov) and R.M. Sulyaev (Serpukhov). (Photograph: CERN Courier, April 1966, PI 300.3.66)

approved the arrangements proposed by the Director-General", referring presumably to Weisskopf's proposal of 9 December 1965 to Petrosyants that a delegation from CERN should visit Serpukhov and Moscow to discuss in a more detailed way the form which such a collaboration might take.

The First Deputy Chairman of the State Committee, I. Morokhov, replied to Gregory on 19 February 1966, proposing a meeting of experts in April. On 4 April Gregory wrote at some length to Logunov to prepare the ground for the Moscow talks, which he suggested should take place in May. In particular he said, "I would appreciate very much your views on the next steps to be taken on a) our collaboration for the design and construction of the RF beam (both the extraction and the RF separator parts); b) the possibilities to carry out electronic experiments by a mixed team in the first year or two of the operation of the accelerator (say 1968-1969?)". Logunov replied both by letter and by telex, essentially agreeing with the proposals made by Gregory, and in particular saying that the planning and construction of the RF beam should also be done by a mixed group, and proposing to send to CERN three or four experts to work on the extraction of the proton beam and four or five to work on the RF separator.

The next step was to begin negotiations with the State Committee for Atomic Energy. The CERN delegation left Geneva on 24 May 1966; it consisted of Gregory, Peyrou, Citron, and Lock; the latter acted as secretary for CERN for all of the discussions. They went first to Protvino for preliminary talks with Logunov and his colleagues as well as to see the progress being made with the construction of the accelerator.

On 26 May 1966 the discussions opened in Moscow with the State Committee delegation headed by Professor Petrosyants; the people who were present are listed in Annex VIII. The discussion immediately became quite detailed, and there was a proposal from the State Committee for CERN to take complete responsibility for the beam, i.e. extraction, RF separators, and conventional magnets and quadrupoles. Petrosyants, for example, said, "I feel that the participation of CERN in Serpukhov should be extended more than the scale already discussed in the correspondence".

The day of 27 May 1966 was spent at Dubna, and during this time the CERN delegation discussed the various points raised at the meeting held the previous day. The second meeting took place on 28 May, at which the chief Soviet representatives were G.S. Afonin, K.N. Meshcheryakov and A.A. Logunov. Gregory insisted that first priority should be given to a study of extraction problems rather than to the RF separators, and he also stressed that CERN believed that standard beam elements such as magnets and quadrupoles should be provided by IHEP. It was decided that the proposed agreement should cover four main areas, namely:

i) general expression of joint desire for a collaboration which could open up many possibilities over a broad range;

ii) scientific and technical details on extraction and on the beam with RF separators;

iii) an expression of the physics return for CERN, including the mixed team concept, and covering both electronics experiments and the analysis of bubble chamber pictures;

iv) financial and administrative details.

On his return to CERN, Gregory reported to the Committee of Council in June 1966 on the negotiations which had taken place. As a result of their comments and those of the Board of Directors, a lengthy letter was sent to Petrosyants on 5 July 1966 in which the main stress was laid on the building of the extraction system. The letter made it clear that CERN would not be prepared to supply conventional equipment such as bending magnets, and left open the possibility of discussing later the building of radio-frequency separators. No reply was received from the State Committee until 15 October 1966 (Annex IX). In the meantime many discussions took place at CERN, and P. Germain set up a small working group composed of people from different divisions, which eventually became the CERN-Serpukhov Committee. Further, more specific studies were begun of the various possible fast ejection systems which would be appropriate for the Serpukhov accelerator. Following the reply of Petrosyants, a small group of CERN specialists visited IHEP in late October 1966 (including B. Kuiper who subsequently became responsible for the fast ejection work), while a corresponding group from IHEP came to CERN in November 1966.

Discussions took place in the Scientific Policy Committee (SPC) in September and November 1966; and at the November meeting, the SPC supported the idea of continuing negotiations within certain financial limits. The Committee of Council and Council also gave their support at their meetings in December 1966.

Petrosyants had also asked that CERN should prepare a draft agreement for discussion at a second meeting in Moscow. Many different versions were produced during the winter of 1966-1967, and eventually a draft was sent to Petrosyants on 17 February 1967. In April 1967, Gregory, Hampton and Lock spent five days in Moscow in discussion with the State

Committee and reached agreement on almost all items; the official Protocol signed at the end of these negotiations is given in Annex X. Only some complex questions on the status of CERN personnel, on insurance and on responsibility for damages were left open for further discussions.

The draft agreement was discussed by the Committee of Council in May 1967 and a slightly revised version was sent to Petrosyants on 24 May 1967. This was accepted, apart from two points, and numerous telegrams were exchanged between Geneva and Moscow in order to decide on a date for the signing of the agreement. The situation was somewhat complicated by the decision to hold a meeting of experts at IHEP in late June (including Gregory); some of them subsequently visited the Electrophysics Institute in Leningrad, which had played a major role in the construction of the Serpukhov accelerator. Most of the CERN specialists returned to Geneva on 1 July 1967, while Gregory remained in the USSR where he was joined by Dr. G. Funke, the then President of the CERN Council, and by G.H. Hampton. The actual signing of the agreement took place in Moscow on 4 July 1967 (see Plate 7).

Plate 7 Signature in Moscow of the Agreement for collaboration with the Serpukhov laboratory by B.P. Gregory and A.M. Petrosyants, July 1967. (Photograph: CERN Courier, July 1967)

2. THE IMPLEMENTATION OF THE AGREEMENT 1967-1970

2.1 1967. The first operation of the 76 GeV accelerator at IHEP

The signing of the Agreement led to an intensification of the work of the various specialist groups already studying the technical problems of fast ejection and of RF separators, as well as first discussions on possible joint electronics experiments, on the analysis of bubble chamber pictures, and on computing problems. Article 10 of the Agreement established a Scientific Committee, composed of up to six members from CERN and up to six from IHEP (now known as the Joint Scientific Committee)

"2.1 to work out scientific, technical, and organizational programmes and to coordinate works to be carried out;

2.2 to advise the contracting parties on the status of the joint experiments, in particular, by submitting annual reports on the work carried out;

2.3 to consider problems concerning data processing and to make recommendations on publication of the results of the joint experiments;

2.4 to submit proposals considered necessary as a result of the development of the joint programmes".

The first meeting of the Joint Scientific Committee took place at IHEP on 13 and 14 October 1967, the CERN delegation being led by Gregory. The accelerator first reached 70 GeV in the early hours of 15 October and many of the CERN group were called to the control room to witness this historic occasion.

It has already been mentioned that a few outstanding questions had not been solved by the time the agreement was signed in July 1967. In order to attempt to resolve these questions, Hampton and Lock spent five days in Moscow at the end of December 1967. In particular they discussed the status of CERN personnel in the USSR (Article 5 of the Agreement) and responsibility for damages (Article 7). Much information was exchanged although some questions were not resolved, particularly those concerning responsibility for damages.

2.2 1968-1969

In the meantime work progressed at CERN on the technical aspects of the Agreement. The group to build the fast ejection equipment was formally set up within the PS Department at the beginning of 1968 with B. Kuiper in charge, while work on the RF separators started in Track Chambers (TC) Division under H. Lengeler. A meeting between the experts, led by P. Germain, took place at IHEP from 18 to 23 March 1968, and reached agreement on the main parameters of the ejection system and of the pulsed beam transport equipment [which became the responsibility of B. Langeseth of the then Nuclear Physics Apparatus (NPA) Division]. It was also agreed to send IHEP specialists to CERN to join the groups of Kuiper, Langeseth and Lengeler, although a few Soviet engineers had already spent some time at CERN in 1965 and in 1966.

Returning to administrative problems, Hampton and Lock went to Moscow for discussions with the State Committee at the end of April 1968, and they were able to witness the traditional May Day celebrations in Red Square. Hampton was able to report to the Committee of Council on 16 May 1968 that some progress had been made concerning

a) multiple entry visas,

b) special identity cards for CERN staff,

c) rules and regulations for visitors at IHEP, and

d) responsibility for damages.

At the meeting of the Joint Scientific Committee in October 1967 there was already preliminary agreement that the first joint electronics experiment could be a study of particle production total cross-sections in the momentum range 40-60 GeV/c. This proposal was later approved by the Scientific and Technical Council of IHEP, and J.V. Allaby and A.N. Diddens visited IHEP in March 1968 to discuss practical details. Final arrangements were made at the second meeting of the Joint Scientific Committee which took place at CERN from 12 to 17 June 1968, and in July 1968 a chartered DC4 transport aeroplane of Martinair left Geneva airport carrying 10 tons of electronic equipment and a CERN technician (Plate 8). A number of CERN physicists and technicians formed the CERN component of the mixed team to carry out the experiment, including J.V. Allaby, F. Binon, A. Diddens, P. Duteil, G. Giacomelli, R. Meunier, J.P. Peigneux, K. Schlüpmann, C.A. Stahlbrandt, J.-P. Stroot, and A.M. Wetherell (group leader), all of whom worked at IHEP for various periods from July 1968 up to the end of 1969. To assist this pioneering group, a young interpreter, N. Koulberg,

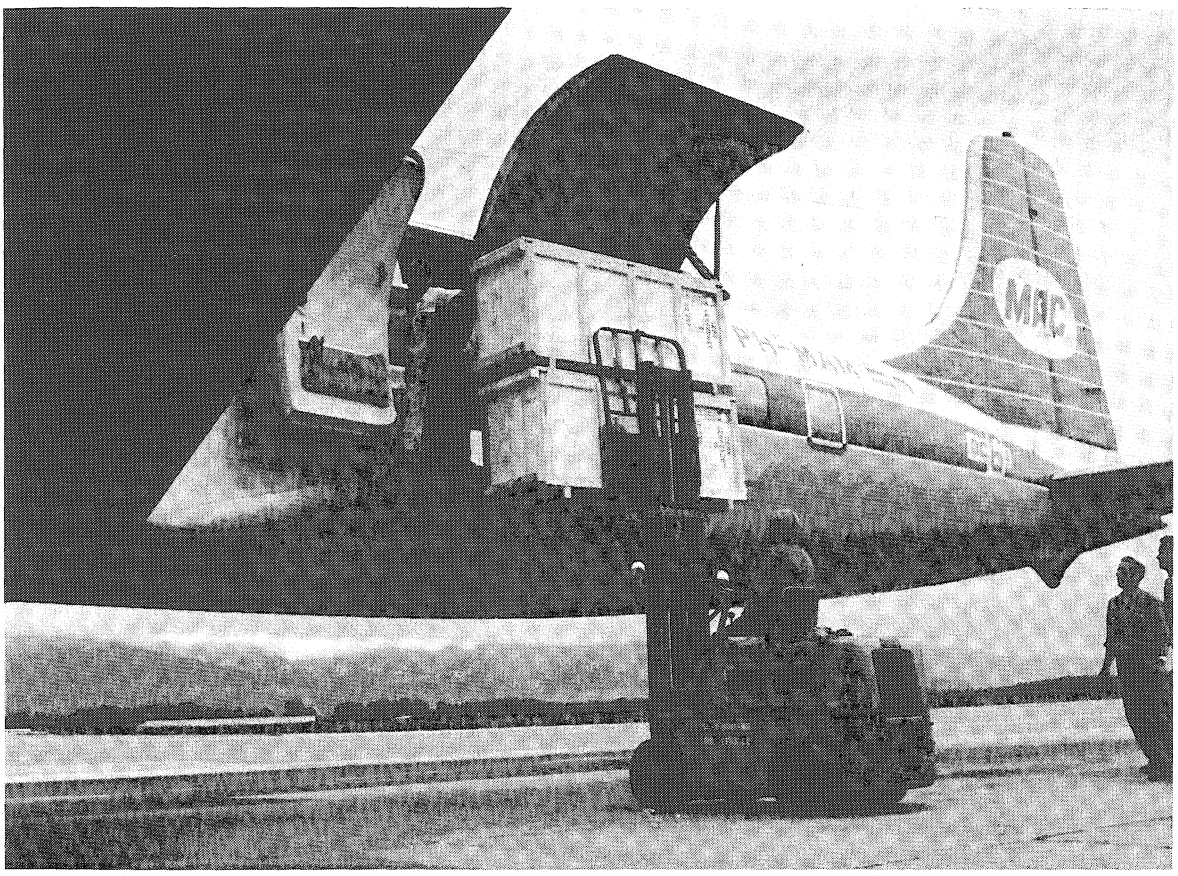

Plate 8 Loading of a Martinair DC4 at Cointrin airport with material for the first joint electronics experiment, July 1968. (Photograph: CERN Courier, July 1968)

was hired by CERN, and for the next three years he divided his time between working at Protvino and being in Geneva to help the Soviet specialists there. The IHEP part of the mixed team was the group of Yu.D. Prokoshkin.

The primary phase of the first joint electronics experiment, the measurement of the yield of π^-, K^-, and $\bar{p}$ in the momentum range 40-70 GeV/c, was completed at the end of 1968 and the results were published in Physics Letters 29B, 48 (1969) (Plate 9). The second phase of the experiment, the measurements of particle cross-sections and also an extension of the yield measurements to the 25-40 GeV/c momentum range, began in the spring of 1969 and continued until July of that year. Most of the equipment came back to Geneva in an Antonov 12 of Aeroflot on 23 July 1969. The next day the aeroplane returned to Moscow carrying the first load of equipment (in particular a wide-gap spark chamber) for the second joint electronics experiment which was to search for negative bosons using the missing-mass technique.

In parallel with the beginning of joint experiments at IHEP, Hampton and Lock continued their efforts to settle all the administrative problems. They visited Dubna, Serpukhov, and Moscow again in July 1968, while Gregory and Lock attended the third meeting of the Joint Scientific Committee at IHEP in October 1968, and subsequently had a discussion with Petrosyants in Moscow on 24 October 1968. I.I. Smolin was present at this meeting, and

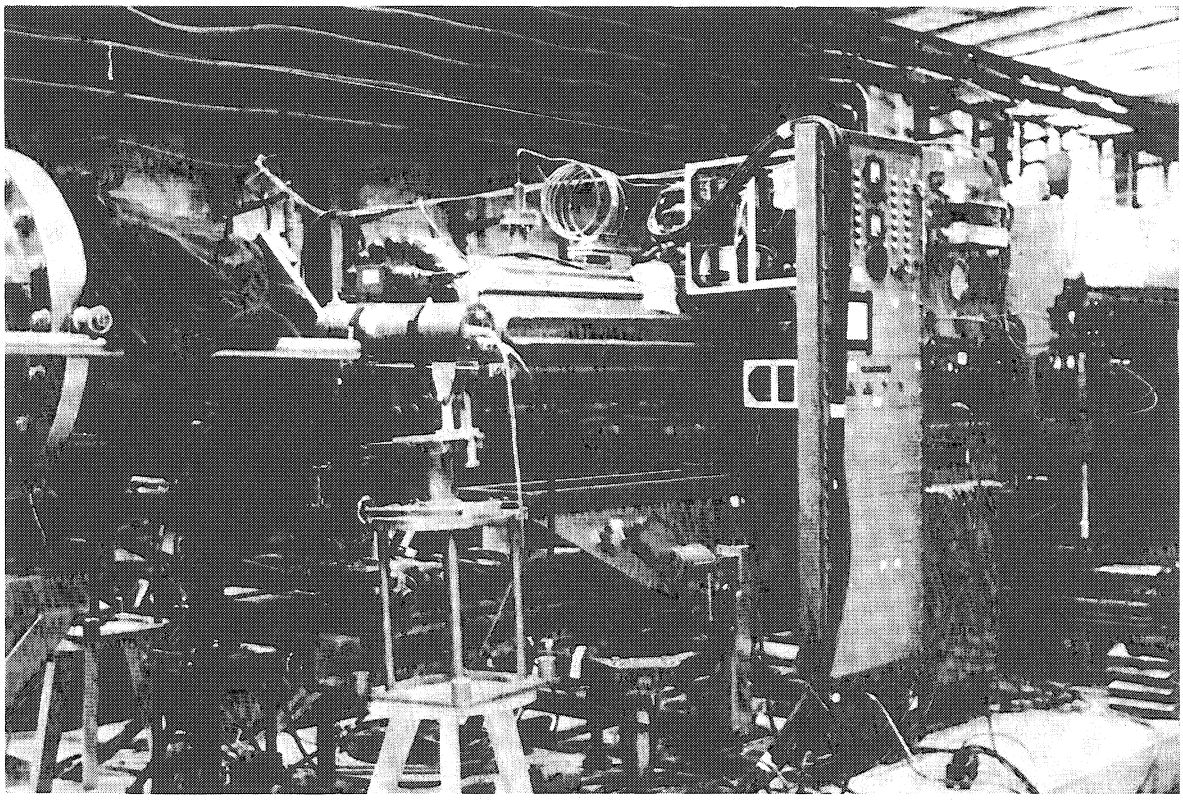

Plate 9 Equipment from CERN installed in the experimental hall at Serpukhov. On the left the large horizontal cylinder of a DISC Čerenkov counter can be distinguished; in the centre are racks of associated electronics. The secondary particle beam comes in from the right. (Photograph: F. Binon, CERN)

from that time up until February 1973 was directly responsible for relations between CERN and the State Committee. Hampton and Lock followed up these discussions by a further meeting with Smolin and his colleagues in Moscow at the end of November 1968. The major item on the agenda was Additional Protocol No. 1 to the July 1967 agreement, covering the responsibilities of the two parties for damages of all kinds. This was further discussed by the appropriate legal experts of CERN and the State Committee in Moscow in December 1968, and subsequently by the Committee of Council of CERN in January 1969.

At the beginning of 1969 the visit of a delegation from the State Committee was announced for the following March. The delegation was to visit Saclay first, for discussions concerning the group of 15-20 French specialists and their families who were to leave for Protvino later that year. They were the first French group to be sent, and consequently felt themselves to be pioneers, much as the CERN physicists of the first joint electronics experiment had felt the previous year. The CERN physicists had by this time returned, having completed the first phase of the experiment, and, as well as publishing the first physics paper dealing with the experiment, were able to draw up reports on their experiences and impressions of Protvino. Saclay had already informed CERN that, as their staff would be staying at Protvino for an average of two years and would therefore have their families living with them for this time, a French School was to be set up in Protvino, using correspondence courses, and which it would be possible for the children of CERN personnel to attend.

Enquiries had been addressed to the State Committee by both CERN and Saclay concerning the installation of a telex apparatus, as this means of communication was both quicker than the post and cheaper than the telephone, and by June 1969 the French group were able to announce to CERN that a telex had been installed in their secretariat. CERN could use the telex, provided that priority was given to Saclay, and the details concerning payment and the sharing of costs were to be discussed later between Th. Tatischeff, the administrative representative of Saclay at Protvino, and N. Koulberg.

After their visit to Saclay, the Soviet delegation, headed by I.I. Smolin of the State Committee and E.A. Aleev, Administrative Director of IHEP, came to CERN on 17 March 1969. The object of the visit was to hold talks on various administrative problems relating to the CERN-IHEP Collaboration. After much discussion over particular points, the definitive text of Additional Protocol No. 1 was signed, defining the responsibilities of both parties for damages of all kinds. The question of a telex for CERN was discussed, and agreement was reached on transport arrangements, and on the status of CERN staff in Protvino and of Soviet visitors in Geneva; in the latter case, the question of finding cheap apartments was already a problem, and was to become more serious as more visitors arrived.

During 1969 there were, in fact, 14 long-term USSR visitors at CERN (long-term being more than three months), as well as a large number of short-term visitors from JINR Dubna, IHEP Serpukhov, ITEP Moscow, the Radio-Technical Institute, Moscow, the A.F. Joffe Institute, Leningrad, and from institutes in Novosibirsk, Tbilisi and Erevan. Even so, some concern was being felt over the shortage of engineers and technicians from IHEP to work on the design and construction of the fast ejection RF separator and pulsed beam transport systems which were being built for shipment to and installation in IHEP.

2.3 The second joint electronics experiment

It was also felt on both sides that the time had come to begin serious discussions concerning the second joint electronics experiment. In April 1969, therefore, while the group of A.M. Wetherell was returning to IHEP to carry out the second phase of their experiment (the measurements of total cross-sections and extensions of the yield experiment), W. Kienzle of CERN and M. Martin of the University of Geneva went to Protvino to put their proposal for the next experiment to representatives of IHEP. This was to be a continuation of work already done at CERN at lower energies, and was a systematic search for heavy boson resonances in the unexplored mass region 4-8 GeV in the reaction $\pi^- + p \rightarrow p + X^-$, using a high-energy unseparated secondary beam.

The proposal was accepted, but it was not until the meeting of the Joint Scientific Committee at CERN in June 1969 that the official agreement of IHEP was announced. The Soviet side of the collaboration was to be carried out by the group of L.G. Landsberg. Preparations for the experiment were to begin immediately on both sides, and the equipment and material was to be sent to IHEP in spring 1970, so that the experiment could begin in May and continue until December 1971. In view of the lack of Soviet specialists at CERN to work on this experiment, it was proposed that V. Roinishvili, of Tbilisi, who was then working with the Boson Spectrometer Group, be seconded to IHEP as from 1 March 1970.

During the summer of 1969, various short visits were made in connection with the forthcoming experiment and the installation at IHEP of the equipment being built at CERN. It was decided to send all the Boson Spectrometer equipment by air, except the 110-ton magnet which would travel by rail and would be installed last. On the CERN side, E. Leya was in charge of the transport and installation, working in collaboration with V.B. Sidorov of IHEP. The question of the aircraft proved to be rather a difficult one, as the plane requested in a letter to Smolin sent in September was an Antonov 22, a very large transport aircraft, needed to accommodate the three experimental huts containing much electronic equipment.

In December 1969, Leya went to Protvino and Moscow for further talks, and the Soviet authorities agreed to provide an Antonov 22, the cost of the transport to be shared between the two parties. Preparations for the expedition of the material were then started in earnest, and lists for the Customs were drawn up in French and then translated into Russian. In some cases, such as that of the IBM 1800 computer, permission had to be requested from the US Department of Commerce to re-export the material.

In fact the spring of 1970 was a very busy one for Serpukhov affairs. Mr. and Mrs. Koulberg went to Protvino in February for a three-month stay, during which time they supervised the preparation of the CERN apartments, as well as the transport arrangements, and generally ensured that living conditions for the physicists were as comfortable as possible.

Tension mounted on both sides during this critical period as the final preparations were made for the transport of the equipment. The Antonov 22 arrived at Geneva airport on 1 April 1970, a week later that originally planned (Plate 10). The Soviet authorities had previously requested CERN to give as little publicity as possible to the event, so as not to attract crowds of sightseers, and so well did CERN take them up on this that when visas

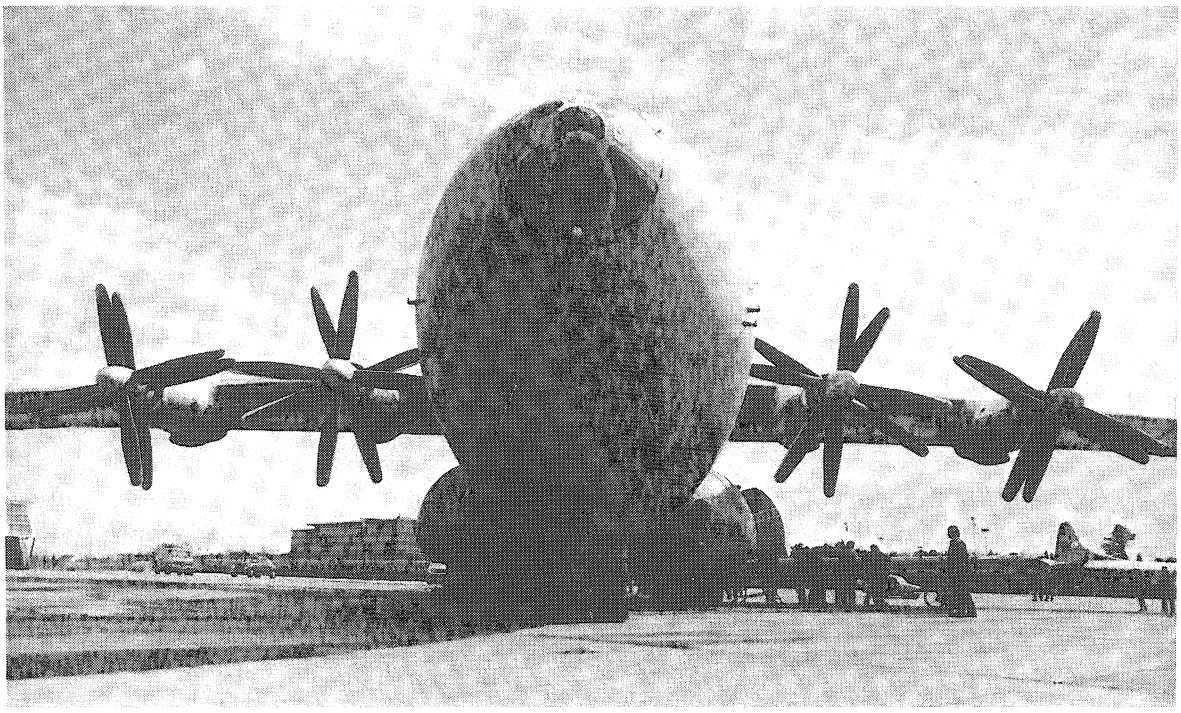

Plate 10 An Antonov 22 at Cointrin airport in April 1970 taking more material to Moscow for the second joint electronics experiment. (Photograph: CERN Courier, April 1970)

were requested for the crew of the plane to stay the week-end in Geneva, the Département Politique Fédéral in Berne declared that they were unable to issue any such visas, since they knew nothing of this plane nor the reasons for its coming to Geneva. The matter was eventually settled by the personal intervention of P. Preiswerk, then leader of Nuclear Physics (NP) Division and the most senior Swiss staff member at CERN. The loading of the Antonov 22 was a well-coordinated and smoothly run affair, but several false alarms were given as to when the plane would actually leave; it finally took off a day later than scheduled, and was delayed a further 20 hours in Kiev because of fog, so that despite frequent and rapid telex communications, lorries from IHEP were sent to meet the plane far too early, and were waiting for it at Vnukovo Airport for three days. The magnet left by train at the end of March 1970, but soon Leya, who had travelled to the USSR in the Antonov, was obliged to go to Tchop on the border between Hungary and the USSR, as the magnet had caught fire; fortunately no serious damage was done.

PART III. COLLABORATION WITH OTHER INSTITUTES IN THE USSR

1. MOSCOW INSTITUTES OF THE STATE COMMITTEE FOR ATOMIC ENERGY AND OF THE ACADEMY OF SCIENCES

As already mentioned on page 4, discussions with the Institute for Theoretical and Experimental Physics (ITEP), an Institute of the State Committee for Atomic Energy, proceeded in parallel with those with Dubna in 1959. When replying to a telegram of thanks from Alikhanov on the occasion of the official inauguration of the CERN Proton Synchrotron (PS) in February 1960, Bakker invited him to send some experts to see the running-in of the PS. Alikhanov replied positively in October 1960, and at the end of January 1961, B.M. Jakovlev from ITEP and B.I. Poliakov from the Radio-Technical Institute, Moscow (an Institute of the Academy of Sciences) joined the PS Division at CERN for a two-month stay. From the CERN side, two physicists were chosen in November 1960 (P. Dennery and R. Meunier), both of whom spent two months at ITEP from mid-April to mid-June of 1961.

Further, many of the early contacts with Soviet physicists were made via the CERN Nuclear Emulsion Group. I.V. Chuvilo (then at JINR, Dubna) attended a meeting held at CERN in January 1959 to discuss emulsion work at the Proton Synchrotron. In 1961 B.A. Nikolsky of the Atomic Energy Institute in Moscow (Academy of Sciences) visited CERN to request exposures of nuclear emulsions at the PS, and similar requests followed from the Lebedev Institute in Moscow and from scientists in Alma-Ata (Kazakh Academy of Sciences), Dubna, Erevan (at that time Physical Institute of the Armenian Academy of Sciences), Leningrad (Radium Institute of the Academy of Sciences), and Tashkent (Physico-Technic Institute). Many such exposures were made for them over a number of years and good contacts were established with the different institutes. As early as 1962, G. Zhdanov of the Lebedev Institute was co-opted onto the Emulsion Experiments Committee and he attended the second CERN School of Physics which was held at St. Cergue, Switzerland, in the spring of 1963.

The relationships with ITEP were further strengthened in 1963 when one of their senior physicists, V. Kaftanov, came to CERN for an initial stay of one and a half years. He returned again in 1966 for a further two years. Also in 1966 Gregory, together with his colleagues at the Moscow talks on collaboration with Serpukhov, visited ITEP for discussion with A. Alikhanov, the then Director. He also saw the 7 GeV proton accelerator which served as a model for the 70 GeV accelerator built at Serpukhov.

2. OTHER INSTITUTES

2.1 The Leningrad Institute of Nuclear Physics, Gatchina

An article published in Pravda in the autumn of 1967 gave the news that a 1000 MeV synchro-cyclotron had been brought into operation at Gatchina, near to Leningrad. When

Lock was in Moscow in April-May 1968 he asked the State Committee for Atomic Energy the name of the appropriate person to contact for further details. He was told that the new accelerator had been built in an Institute of the Academy of Sciences, and that one should write to B.P. Constantinov, a Vice-President of the Academy. Accordingly Gregory wrote to Constantinov in June 1968 asking if one or two of the senior staff of the Synchro-cyclotron Machine (MSC) Division could visit Gatchina. No formal answer was received to this letter, but in December 1968 A.A. Vorobyov from Gatchina came to CERN for a short visit and discussed with W.O. Lock and E.G. Michaelis (MSC Division Leader) regarding further collaboration and an exchange of visitors. In particular it was agreed that in each case the host laboratory would pay living expenses and travel expenses inside the host country, while the parent laboratory would pay the remaining travel expenses.

In June 1969 an official letter was received from Ya.V. Pejve, Chief Scientific Secretary of the Academy of Sciences, inviting H. Beger and E.G. Michaelis to visit Gatchina. (At that time the accelerator was part of the A.F. Joffe Physico-Technical Institute of Leningrad.) Pejve also asked if CERN would accept, for a short visit, two specialists from Gatchina, under the conditions discussed with Vorobyov. Gregory replied positively in June, and Beger and Michaelis visited Gatchina in August. Two more specialists from MSC Division spent a few days there in October 1969 following a visit to Dubna. Two Soviet experts, N.N. Chernov and A.V. Kulikov came to CERN for 10 days in November 1969. After their visit, Gregory wrote a formal letter (on 20 November) to D.M. Kaminker, the Director of the Joffe Institute, confirming the terms of the exchange agreement in operation since the previous year. As in the case of Novosibirsk, this letter is the formal basis of the exchange agreement between CERN and the Joffe Institute (now the Leningrad Institute of Nuclear Physics, Gatchina).

In practice it has worked well, and every year one or two CERN scientists have visited Gatchina for a few days, while a few Gatchina scientists have come to CERN usually for a week or two.

2.2 The Institute of Nuclear Physics, Novosibirsk

The Institute of Nuclear Physics in Novosibirsk is an Institute of the Siberian Division of the Academy of Sciences of the USSR. Its present Director is G.J. Budker. Although for many years CERN scientists had met their counterparts from Novosibirsk at various conferences, it was not until 1967 that close contacts were established. Weisskopf had written to Budker in 1965 inviting him to visit CERN, and in October 1966 Gregory repeated the invitation and also extended an invitation to three of Budker's colleagues.

Budker, his wife, and two other colleagues came to CERN in April 1967 and stayed for about three weeks. In the reverse direction, Y. Goldschmidt-Clermont and K. Winter took advantage of being in the USSR for a meeting at Serpukhov (of the Joint Scientific Committee) to spend two days in Novosibirsk in June 1967.

In 1968 V.A. Sidorov, a senior scientist in Novosibirsk who had accompanied Budker on his 1967 visit, attended the first ISR users' meeting in CERN, and one of his young colleagues, A.P. Onuchin, came to spend three months in NP Division. These visits led Gregory to propose to Budker that the exchange of visitors should be put on a more formal basis, and on 15 July 1968 he wrote to Budker mentioning in particular that "... we would be

prepared to pay the subsistence expenses of your scientists who come here, either for long or short stays ..." and, "If you think that the above procedure is a reasonable one, could we also use it for arranging the visits of our scientists to your Institute?".

This letter was taken personally to Budker by Hampton who, like Goldschmidt-Clermont and Winter, took the opportunity of being in Moscow for discussions about Serpukhov to spend a few days in Novosibirsk. Budker gave Hampton his verbal agreement to the proposals of Gregory and confirmed this in writing in a letter dated 3 September 1968. These two letters are therefore the basis of the exchange agreement between CERN and Novosibirsk, and in practice it has worked very well. Almost every year since that time a few scientists from Novosibirsk have come to CERN, usually for short stays, while one CERN scientist has spent two months in Novosibirsk, in addition to short visits by other scientists, usually after attending conferences or meetings held in the USSR.

2.3 The Institute of Physics of the Georgian Academy of Sciences, Tbilisi, and the University of Tbilisi

P. Preiswerk, then Leader of the NP Division, visited Dubna in 1964 and there met G.E. Chikovani, an internationally known expert on streamer chambers, who worked at the Institute of Physics of the Georgian Academy of Sciences in Tbilisi. Preiswerk suggested to the CERN Visiting Scientists Committee that Chikovani should be offered a one-year appointment to develop the technique of streamer chambers and wide-gap spark chambers at CERN. This proposal was accepted, and Chikovani came to CERN in August 1965 and stayed until February 1967. He came back to CERN for four months at the end of 1967 and beginning of 1968. Unfortunately he died of a brain haemorrhage only a few weeks after his return to Tbilisi.

When Hampton and Lock were in Moscow in October 1968 they met E.L. Andronikashvili, Director of the Tbilisi Institute, who asked if he could send another young Georgian scientist to CERN to work in the NP Division. Gregory replied positively, and V. Roinishvili, who had been a student of Chikovani, arrived at the end of April 1969. He joined the group of Kienzle and subsequently worked at IHEP, Serpukhov, on the second joint electronics experiment (see page 20).

The occasion of the Seminar on Perspectives in High-Energy Physics, held in Tbilisi in September 1969, made it possible to establish contacts with the University of Tbilisi. In particular, the Dean of the Faculty of Physics, I.Sh. Vashakidze, was closely involved in the organization of the Seminar.

Since that time a number of visits have been made to Tbilisi by CERN scientists, and especially during the period when the second joint electronics experiment was being carried out at Serpukhov.

2.4 The Research Institute for Electro-Physical Apparatus, Leningrad

This Institute, which comes under the State Committee for Atomic Energy, was largely responsible for the construction of the 70 GeV Serpukhov accelerator. Contacts were first established in 1967 shortly before the signing of the Serpukhov agreement in July 1967, and Gregory and other colleagues visited it in June of that year. Subsequently, several scientists from the Institute participated at CERN in the construction of the fast ejection equipment for Serpukhov.

Acknowledgements

In writing this report I have had access to the archives of successive Directors-General, and I am grateful to Professor W. Jentschke, the present Director-General of CERN Laboratory I, for permission to consult them, and to Mme. B. Laurent and Mme. E. de Modzelewska for supplying me with the necessary files. Many people have given me the benefit of their recollections of the very early days of the collaboration, in particular Professor V.F. Weisskopf, Dr. I. Savin, Professor R. Sulyaev and Dr. V. Yarba who have also given me useful comments on the manuscript. For the more recent history I am indebted to Miss C. Armstrong, Miss D.A. Caton and Mrs. E.A. Pasche who have worked with me at different times. Dr. Y. Goldschmidt-Clermont has read the complete manuscript and has contributed much to the story of our collaboration with IHEP, Serpukhov. I am also indebted to Mr. G.H. Hampton, Mr. B. Southworth and Mr. G. Ullmann for their critical comments and for their suggestions. Lastly, I would like to thank the staff of the CERN Scientific Reports Typing Service and the Document Reproduction Section for their usual careful work.

ANNEX I

CERN/327*
18 November, 1959
Original : English

FOURTEENTH SESSION OF THE COUNCIL

Geneva - 2 December, 1959

INTERNATIONAL COOPERATION IN THE FIELD OF HIGH ENERGY PHYSICS ACCELERATORS

At its meetings held at Kiev on 18 and 24 July, 1959, the IUPAP High Energy Commission decided to convene a meeting of scientists, to act as members of a Study Committee on questions related to international cooperation in the field of high energy physics accelerators.

The meeting took place as an informal gathering on 15 September, 1959, at CERN.

Attached are a report on the discussions held and a draft proposal.

These papers were discussed by the Scientific Policy Committee at its Thirteenth Meeting on 16 October, 1959. The Committee had, in principle, no objection to the suggested line of action and recommended that the Director-General should seek the opinion of the Member States on the proposed cooperation.

The matter had also been discussed on the Committee of Council, who decided to recommend to the Council that they should approve the draft proposal in the annex and authorize the Director-General to sign an agreement with the U.S.A. and U.S.S.R. academies of sciences in these terms so long as it was made clear that the agreement as such was binding only as regards the work done at CERN and the CERN staff. They recommended that at the same time the Director-General should be authorized to state that the Council of CERN had resolved that the Member States should recommend to their universities and research institutes the proposal for cooperation and to suggest to them that, so far as Western Europe was concerned, CERN might be a convenient channel of cooperation.

CERN/327

INTERNATIONAL COOPERATION IN THE FIELD OF HIGH ENERGY PHYSICS ACCELERATORS

On 17 May the White House in USA issued a press release containing:

"An explanatory statement on elementary particle physics"

and:

"A proposed federal programme in support of high energy accelerator physics"

this being a report of a Special Panel appointed by the President's Science Advisory Committee and the General Advisory Committee to the Atomic Energy Commission. Members of this Special Panel were:-

Dr. Jesse W. Beams, Chairman, Department of Physics, University of Virginia.
Dr. Hans A. Bethe, Professor of Physics, Cornell University.
Dr. Leland J. Haworth, Director, Brookhaven National Laboratory.
Dr. Edwin M. McMillan, Director, Lawrence Radiation Laboratory, University of California.
Dr. Emanuel R. Piore, Chairman, Director of Research, International Business Machines Corp.

The report contains the following conclusions:-

" (h) International Collaboration

The world-wide significance of research in high energy physics, the extensive, high quality of scientific activity abroad in this field, and the limited number and costliness of high energy accelerators present a unique opportunity for a high degree of international collaboration and cooperation in the planning for and design of future accelerators and in the increased use of facilities. As a first step in the direction of international collaboration looking toward the development of new high energy accelerators, representative scientific groups from other countries, including the USSR, should be encouraged to meet with us in order to lay plans for cooperative research on new accelerators concepts. The National Academy of Sciences should be requested to advise on the best means for accomplishing this objective."

The report also contains the following specific recommendations to the Federal Government:-

" (m) Encourage international collaboration and cooperation in the planning for and design of future machines and the increased use of facilities.

(n) Request the National Academy of Sciences to study and advise the Government on the best method for proceeding with international cooperative research on new accelerator concepts, such cooperative activity including the Soviet Union."

At the request of the National Academy of Sciences, the USA representatives on the IUPAP High Energy Commission (members: Marshak (Secretary) and Panofsky for USA, Tamm and Veksler for USSR, Bakker (Chairman) and Peierls for Western Europe) proposed at a meeting in July, 1959 during the Kiev Conference, that the commission study the problem of international cooperation in the field of high energy physics. The Commission accepted unanimously this proposal and decided to ask a study-committee to study the question and to report to the Commission. The Study-Committee was to consist of three members from the USA, three members from the USSR, and three members from Western Europe. Professors Veksler, Panofsky and Bakker were asked to find these people and to arrange a first meeting of the Sub-Committee during the September 1959 International Conference on high energy accelerators and instrumentation at CERN. Since the lapse of time between July and September was so short, and also because of the holiday season, it was not possible to approach the appropriate authorities in CERN about the appointment of the three European members of the Sub-Committee. After consultation with Professor E. Amaldi, Chairman of the CERN Scientific Policy Committee, who as the President of IUPAP attended, as an observer, the meetings of the High Energy Commission in Kiev, it was decided to invite:

Dr. Pickavance, Director, Rutherford Laboratory (UK), and
Prof. Salvini, Director, Frascati Laboratory (Italy),

to act as members of the Study-Committee together with Bakker.

A meeting was convened on 15 September, 1959, at which were present:-

Professor C.J. Bakker	Chairman
Dr. L.J. Haworth	
Dr. E. Lofgren	
Professor V.I. Veksler	
Professor V.P. Dzhelepov	
Dr. T.G. Pickavance	
Professor G. Salvini	
Professor W.H. Panofsky	
Dr. A. Schoch	Secretary
Miss E. Bertrand)	Interpreters
Mr. V.N. Orel)	

At the start of the meeting however, the USSR scientists stressed that they had not obtained from the USSR Academy of Sciences the authority to be members of the Study-Committee. They then proposed that the meeting should be treated as an informal gathering of scientists interested in the promotion of international cooperation in the field of high energy physics. After careful consideration and since neither the USA nor the European representatives had been formally appointed to speak for their authorities, it was decided that the meeting should be completely informal.

At this informal meeting draft proposals were discussed which might serve as a basis for an increase of international co-operation in the fields related to high energy accelerators. As a result of a second meeting between Haworth, Panofsky, Amaldi, Lofgren and Bakker, a revised draft proposal was formulated (see Annex). It was agreed that the USA scientists would discuss this draft proposal with the appropriate authorities in USA and suggest that the USA National Academy of Sciences should get in touch with CERN in order to reach agreement on the proposals before any further approach was made to USSR. It was also suggested that after this, and by mutual agreement, letters mentioning definite proposals might be sent simultaneously by the USA National Academy of Sciences and CERN to the USSR Academy of Sciences.

Your attention should be drawn to the fact that in such a procedure CERN would act as the opposite number in the field of high energy physics to the USA and the USSR Academies of Science. As such, CERN would be committing its Member States to agreeing about the cooperation proposed not only for the CERN laboratory in Geneva but also, in a certain sense, for the high energy laboratories in the Member States. It is clear that this raises questions which will require careful consideration by the Council and the various authorities in the Member States, but at this stage the opinion of the Scientific Policy Committee would be highly appreciated.

CERN/327
Annex

DRAFT PROPOSAL

In the interest of the advancement of science, it is proposed to increase the international cooperation in the fields related to high energy accelerators.

In particular:

1. Exchange of technical information on all particle accelerators above an energy of 100 MeV in use or under construction. Typical information might include operating characteristics of each machine, performance data on primary and secondary beams, information on specific technical practices applying to accelerators and particle detectors.

2. Exchange of information on the functional characteristics of accelerators in the planning stage. Typical information should include the type of accelerators, its nominal performance in terms of energy, intensity and type of particle and performance of models.

3. Cooperation in the exploration of new ideas for future accelerators designed for purely scientific purposes and of new ideas for equipment to be used with such accelerators. In addition to exchange information, such cooperation might include the formation of international study groups convened to explore a particular new approach, such as plasma accelerators.

4. Cooperation in scientific research using high energy accelerators; such cooperation might start with exposure of nuclear emulsions and collaborative analysis of nuclear emulsion and track chamber records. Such cooperation should also include discussions on the theoretical basis of the experimental programme of the various laboratories.

The cooperation outlined in items 1 to 4 should be achieved through:

a) exchange of documentary information
b) attendance of scientific meetings
c) exchange visits of scientists
d) establishment of ad hoc study groups.

The above proposals are intended to improve the productivity in high energy science of the participants in this agreement and not to restrict in any way their plans and programmes.

ANNEX II

CERN/327*/Add.
1 December, 1959
Original : English

FOURTEENTH SESSION OF THE COUNCIL

Geneva - 2 December, 1959

DRAFT PROPOSAL FOR INTERNATIONAL COOPERATION

DRAFT RESOLUTION

The Council,

- having received the report of the informal conferences which took place in the course of the year 1959 on proposals for international cooperation in the field of high energy physics (CERN/327*)

- approves the action taken by the Director-General,

- approves the principles which are set out in the said document as indicating the lines on which such cooperation could develop,

- requests the President of the Council and the Director-General to make the necessary contacts, so that they can report to the next session of the Council on the action which they think Council and Member States should take in order to promote international cooperation and best serve the interests of the development of European science in this field.

ANNEX III

NUMBER OF TRAVELLING FELLOWSHIPS AWARDED EACH YEAR
AND EFFECTIVE NUMBER OF MAN YEARS SPENT AT JINR DUBNA

YEAR	Travelling Fellowships awarded	Institute of Fellows appointed	Man-years spent at JINR, Dubna
1964	3	CERN (Fellow) Saclay and Bergen	1.0
1965	5	CERN (2; 1 Fellow 1 Staff member) Rome (2) Paris	2.2
1966	1	CERN (Fellow)	0.25
1967	3*	Orsay, Groningen and Rome	1.1*
1968	1*	Rome	0.15*
1969	2	CERN (Fellow) Birmingham	0.5
1970	5	Karlsruhe (2) Rome (2) Frankfurt, Naples	2.9
TOTAL	20		8.1

* Includes a Travelling Fellowship held at ITEP, Moscow

ANNEX IV

PARTICIPANTS FROM WESTERN EUROPE AND THE USA
AT THE "RIGA-TYPE" SEMINARS IN 1967, 1968 AND 1969

RIGA JUNE 1967

A. BERTHELOT
A. CITRON
Y. GOLDSCHMIDT-CLERMONT
B.P. GREGORY
V. KAFTANOV (then at CERN)
B. DE RAAD
C.A. RAMM
L. VAN HOVE
K. WINTER
W.O. LOCK (Scientific Secretary)

SEMMERING SEPTEMBER 1968

From Member States:

A.G. EKSPONG
W. JENTSCHKE
W. KUMMER
J.H. MULVEY
G. SALVINI
G.H. STAFFORD

From CERN:

B.P. GREGORY
P. GERMAIN
V.F. WEISSKOPF
K. WINTER
W.O. LOCK (Scientific Secretary)

TBILISI SEPTEMBER 1969

From Member States:

E. AMALDI
J.B. ADAMS
F. AMMAN
A. CITRON
B.H. FLOWERS
W. JENTSCHKE
J.D. LAWSON
R. LEVY-MANDEL
H. SCHOPPER
H.O. WÜSTER

From CERN:

B.P. GREGORY
K. JOHNSEN
W.O. LOCK (Scientific Secretary)

From the USA:

B. CORK
G.K. GREEN
R. NEAL
W.K.H. PANOFSKY
K. STRAUCH
V.F. WEISSKOPF
R.R. WILSON

ANNEX V

MINUTES OF A DISCUSSION BETWEEN REPRESENTATIVES OF CERN AND JINR HELD AT TBILISI ON 5 SEPTEMBER 1969

Present

from CERN: Prof. B.P. Gregory
Dr. W.O. Lock

from JINR: Prof. N.N. Bogolubov
Prof. Kh. Khristov
Mr. V.L. Karpovsky
Dr. Yu.A. Shcherbakov
Dr. A.N. Tavkhelidze

The main topic discussed was the possible joint JINR-CERN School of Physics, previously agreed in principle at earlier meetings in Dubna and in Vienna. After a careful evaluation of all the problems involved it appeared that there were some practical difficulties in organizing a joint School. It was pointed out that it would be wise to have a clear definition of responsibility for the School and this could best be achieved by following the same procedure as for the Seminar on Perspectives in High Energy Physics. It was agreed, therefore, that in 1970 CERN would be responsible for organizing a School of Physics, in a place chosen by them, but there would be a substantial participation by JINR both in terms of lecturers and of students. In 1971 JINR would organize a School of Physics, in a place chosen by them, but there would be a substantial participation by CERN. The language used at both Schools would be English, except for special cases when translation would be provided.

To simplify the financial matters it was also agreed that for the 1970 School CERN would pay the subsistence expenses for all the participants from JINR and its Member Countries. In 1971 JINR agreed that in turn it would pay the subsistence expenses for all the participants from JINR and its Member States. Transport costs of JINR and CERN participants in both Schools should be paid by JINR and CERN, respectively. Subsequently any outstanding debts from one Institute to the other resulting from the

organization of the two Schools would be discussed and settled by the competent authorities of JINR and CERN.

In order to achieve a close coordination of the scientific programme of the 1970 School JINR was invited to send two representatives to the meetings of the Organizing Committee. Prof. Ch. Khristov and Dr. A.N. Tavkhelidze were nominated as these representatives. Similarly in 1971 CERN would be invited to provide two members of the JINR Organizing Committee.

It was further agreed that Professor Bogolubov and Professor Gregory would send a joint letter to the appropriate Polish authorities asking them if their offer to provide facilities for a School in 1970 could be postponed until a later date.

Professor Gregory mentioned that CERN would propose to organize the 1970 School at a suitable location in Finland, either in June or July. The first meeting of the Organizing Committee would take place in Helsinki in early November. After the first two Schools organized in the way described above there would be discussions between CERN and JINR to decide the form and frequency of future Schools.

B.P. Gregory N.N. Bogolubov

Tbilisi, 6 September 1969

ANNEX VI

cc. Professor A. Petrosyants

Professor A.A. Logunov
Institute of High-Energy Physics
SERPUKHOV

CERN/10.217 17 August, 1965

Dear Professor Logunov,

As you know, we are very much interested at CERN in having close collaboration with the Soviet institutions of high-energy research, and in particular with the institute under your directorship at Serpukhov.

In the talks I had with you and your collaborators about possible forms of collaboration, we discussed the possibility of participating in experiments when the Serpukhov machine is completed, and also that of installing a radio-frequency separator.

I have now heard that some of your collaborators will be visiting Paris in the near future in order to discuss collaboration with the French bubble chamber builders. I would like to invite you and your collaborators to come to Geneva, before or after your trip to France, so that we can also talk about further measures in view of organizing our collaboration. It would be useful to have personal talks with you and your collaborators in order to make more definite plans and proposals with respect to our possible participation in the research at Serpukhov.

At the end of October, we plan to send a few of our senior people to a joint seminar on bubble chamber physics in Dubna. Would it be possible for some of them to visit Serpukhov and see the installations in order to plan future work in collaboration with you?

With best regards,

Yours sincerely,

Victor F. Weisskopf
Director-General

ANNEX VII

Professor A. Petrosyants
Chairman of the State's Committee
on the Use of Atomic Energy of
the USSR

Moscow

CERN/10.473 9 December, 1965

Dear Professor Petrosyants,

We were very glad to have the visit of Professor Logunov, Mrs. Samokhvalova, Dr. Prokoshkin and Dr. Selivanov at CERN, as this gave us an opportunity to discuss the possibility of future collaboration with your new Institute at Serpukhov. We were all greatly impressed by the progress of the construction and by the programme for future research. We are gratified to see the emergence of a new important centre of high-energy physics with the highest energy in the world.

At the same time, we are also very much interested in participating in the physics research work at the new accelerator, not only in view of the great scientific value of experimenting with protons of 70 GeV, but also because of the great human value of a collaboration between our scientists and the scientists of the Soviet Union. For these reasons we would like to take part in some of the experiments which will be done at Serpukhov, after the machine and its beams have been constructed.

It is clear to us that a participation in the experiments can only be fruitful if we join at an early stage in the preparation of the experiments and in the construction of the necessary beams. Our participation should therefore begin very soon.

I would like to make a few suggestions as to the way in which this could be done. It seems from our conversation with Professor Logunov and his collaborators that we could be of some help in the construction of an ejected proton beam with radiofrequency separation. One way which has been suggested is the setting up of a mixed group of Soviet and CERN physicists for the construction and later on for use of this beam. This group should plan the details of the beam and the way to realize it.

Professor A. Petrosyants

It could take advantage of the experience which we have gathered here at CERN in respect of the construction of RF separators and beam ejection mechanisms. Some parts of the beam, in particular the parts concerning the RF separator, could be produced here at CERN, and later on set up at Serpukhov.

We expect that the work of such a group would develop later, when the beam is in operation, into actual experimental investigations in physics, using various techniques, including for example electronic experiments and the evaluation of bubble chamber pictures.

Our collaboration need not be restricted to work on this one beam only. We would be very glad to participate also in other research activities at Serpukhov and are ready to help in any way we can. As you know, your people are always welcome here if they are interested in studying some of our installations.

If you agree on these general terms of policy, you may desire to consider the next six months as a study period to examine in common the possibilities of such a collaboration. We would propose to have during that time a number of meetings of interested people, some to be held here at CERN and some at Serpukhov, with the aim of a more precise definition of the scientific and technical tasks of the mixed group. At the same time, the text of a formal agreement could be prepared to define the framework into which the future collaboration would develop.

Here at CERN we can easily arrange such meetings, and there will be no difficulties in respect of visas into Switzerland and travel. We expect that you will be able to make similar arrangements in the Soviet Union so the meetings can be held frequently here and at Serpukhov without bureaucratic difficulties.

I very much hope that these suggestions will be accepted by your department so that preparations for a common CERN-Soviet enterprise can start without delay.

Yours sincerely,

Victor F. Weisskopf
Director-General

ANNEX VIII

PEOPLE PRESENT AT THE MOSCOW TALKS, MAY 1966

B.P. GREGORY	Director-General, CERN
Ch. PEYROU	CERN
A. CITRON	CERN/Karlsruhe
W.O. LOCK	CERN
A.M. PETROSYANTS	Chairman, State Committee of the USSR for the Utilization of Atomic Energy
I.D. MOROKHOV	First Deputy Chairman, State Committee of the USSR for the Utilization of Atomic Energy
G.S. AFONIN	Chief, Foreign Department, State Committee for the Utilization of Atomic Energy
K.N. MESHCHERYAKOV	Chief, Department, State Committee of the USSR for the Utilization of Atomic Energy
A.A. LOGUNOV	Director, High Energy Physics Institute
Yu.D. PROKOSHKIN	Head, Section of the High Energy Physics Institute
V.I. KOTOV	Head, Laboratory of the High Energy Physics Institute
K.M. SAMOKHVALOVA	Deputy Head, Section of a Department, State Committee of the USSR for the Utilization of Atomic Energy
M.V. MAIDENOV	Interpreter
D.P. FILIPPOV	Head, Section of a Department, State Committee of the USSR for the Utilization of Atomic Energy, Foreign Department
Z.S. SIDORENKO	Engineer, Department for Foreign Relations, State Committee of the USSR for Utilization of Atomic Energy

ANNEX IX

TRANSLATION

Professor A. Petrosyants
Chairman of the State Committee
of the USSR for the Utilization
of Atomic Energy

Professor B.P. Gregory

15 October, 1966

Dear Professor Gregory,

In connection with your letter of 5 July 1966, I should like to inform you that I also very much hope that our discussions in Moscow will serve as a basis for a fruitful collaboration between CERN and the Institute of High Energy Physics of Serpukhov.

During our Moscow meeting, we considered together the various aspects of this collaboration: CERN scientists would have the possibility to carry out, in co-operation with our own physicists, experiments on beams by means of various physics devices, according to a programme of experiments elaborated in common. In order to do so, we think it advisable that CERN takes upon itself to design, construct and put into operation, by middle 1969, the proton ejection system and the RF separated beam channel.

The principal aspects of this scientific collaboration should be set up in the agreement between CERN and Serpukhov. The details of the working programme would be settled as this collaboration develops.

I share your views about the necessity of a further growth of CERN's scientific and technical contribution to the work on the Serpukhov accelerator in proportion with the growth of the common scientific experiments programme, and I think that this should also be mentioned in the agreement.

Since I have the feeling that we have come to the same understanding on the basic principles of the first stage of our collaboration, we could therefore start putting into shape the draft agreement.

I should be glad to learn from you that you are willing to prepare your version of the draft agreement along these lines and send it to Moscow for further consideration at the next meeting of the two parties.

Yours sincerely,

(signed) A. Petrosyants

ANNEX X

P R O T O C O L

of negotiations between the State Committee for the Utilization of Atomic Energy of the USSR (the State Committee) and the European Organization for Nuclear Research (CERN) on scientific and technical cooperation in the field of high energy physics at the Serpukhov accelerator

During the period from April 10th to April 15th negotiations have taken place between representatives of the State Committee for the Utilization of Atomic Energy of the USSR headed by Professor A.M. Petrosyants, the Chairman of the State Committee, and of the European Organization for Nuclear Research headed by Professor B.P. Gregory, the Director General of CERN on scientific and technical cooperation in the field of high energy physics at the Serpukhov accelerator.

During these negotiations the parties discussed a draft Convention and expressed their wish to establish a close co-operation in carrying out joint research projects at the accelerator of the Institute of High Energy Physics and have come to a common agreement on the possibility of concluding a Convention covering the following items:

1. CERN shall design, construct and supply, at its own expense, the equipment for the fast ejection of the proton beam of the accelerator of the Institute of High Energy Physics, which will be supplied to this Institute free of charge.

2. Both parties shall take all possible steps to reduce to the minimum the time of construction of the separated beam subject to the technical requirements and safety standards of the project, keeping in mind the wish that it should be put

into operation in 1969 and not later than the date when the separated beam is required for bubble chamber experiments.

3. The parties have agreed that CERN shall construct a radio-frequency separator and its auxiliary equipment for the separation of high energy particles, which shall be put into operation in time with the proton beam ejection system. The separator will remain at the Institute of High Energy Physics for a period of not less than 10 years from the date of the first operation of the separated particle beam.

4. For the duration of the present Convention CERN will provide at its expense the ejection system and separator with spare parts and materials, which are not available in the USSR. The replaced parts will be returned to CERN.

5. Both parties have agreed on conducting an experiment using the electronic equipment, developed and tested at CERN. This experiment shall be started in the first year of the operation of the accelerator for physics experiments. Subsequently similar joint experiments may be carried out successively, but not more than one experiment at the same time. Proposals for joint experiments are to be submitted to the Scientific and Technical Council of the Institute of High Energy Physics.

6. Both parties have agreed on the participation of CERN scientists in the work of mixed teams to analyse some pictures taken with bubble chambers operated at the Institute of High Energy Physics. The results of the experiments shall be published jointly in the name of Soviet Institutes and CERN, or in the name of Soviet Institutes, CERN and a third party, having an Agreement with the State Committee.

7. The parties have recommended that the Convention should be signed in June or July, 1967. It shall enter into force on

3.

the date of its signature and shall continue in force for a period of five years, from the date of the satisfactory operation of the fast ejection system and separated particle beam.

8. The parties deem it desirable to find acceptable ways for the development and construction of apparatus for the analysis of photographs taken with large bubble chambers in order to carry out joint research work.

9. The parties, before signing the Convention undertake to carry on intensive work for the fulfilment of the obligations mentioned in this Protocol.

During its stay in the USSR the CERN delegation visited the Institute of High Energy Physics and saw the state of construction of the 70 GeV proton accelerator and it also visited the Institute of Theoretical and Experimental Physics of the State Committee and the Lebedev Physical Institute of the Academy of Sciences of the USSR, to see the research work being carried out at these two Institutes.

At meeting took part:

on behalf of the State Committee for the Utilization of Atomic Energy: Mr. I.D. Morokhov, Mr. K.N. Meshcheriakov, Professor A.A. Logunov, Mr. G.S. Afonin, Mr. O.S. Lupandin;

on behalf of CERN: Mr. G.H. Hampton and Dr. W.O. Lock.

The present Protocol is done in duplicate in the Russian and English languages, both texts being equally authentic.

A. Petrosyants Chairman	B.P. Gregory Director General
State Committee for the Utilization of Atomic Energy of the USSR.	European Organization for Nuclear Research

Moscow, April 13 1967