



## Pavel A. Cherenkov: Cooperation with the International Scientific Community, Glance from Russia

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The life of almost all persons is a part of history of its country and of its time. A person is affected by events occurring within the country and, in certain sense, by external events. The biography of Pavel A. Cherenkov, of the future academician and Nobel-prize winner, undoubtedly, reflects the history of the XXth century. Of course, history was the background of the events. The life of P.A.Cherenkov, as usually, was accompanied by various episodes interesting for his colleagues. In this paper, I make an attempt to concentrate myself on scientific-organization events related to P.A.Cherenkov, which I have heard about from him in family's conversations and from his colleagues in the Lebedev physical institute. A part of the materials were found by me in archives or libraries. Here, I will not deeply immerse in the scientific content of events that lapsed more than half a century. I try only to throw sight on their certain features of time. In particular, I will speak on problems of international cooperation in science in which P.A.Cherenkov was involved and played the active role.

In the childhood of P.A.Cherenkov, information on the heavy Russian-Japanese war hardly attained his native village Novaya (New) Chigla. However, in his youth, after the Russian revolution of 1917, the civil war has arrived at the village and has broken his learning. Therefore, P.A.Cherenkov has graduated his school noticeably later, namely at the age of 20. That time, in the post-revolution Russia, the social origin of students played the important role. There existed certain selection rules. Members of the Communist Union of the Youth (Komsomol) had significant advantages. Contrary to P.A.Cherenkov did not belong

to this organization, but he originated simply from peasants, he joined the Voronezh state university. This step was promoted by the special document called "komsomol's pass". In 1928, P.A.Cherenkov graduated the university. The revolution has strongly affected his personal life, which is, however, the object of particular consideration.

P.A.Cherenkov, as a post-graduated student, joined the Physicomathematical Institute, Academy of Sciences of the USSR (presently, this institute is transformed into the well-known Lebedev Physical Institute (LPI)) in 1930. At that time, the government of the USSR made efforts to involve in science the youth from various corners of the country and from different social groups. The tendency of Soviet power to strengthen scientific studies was dictated by the course to industrialization and modernization of the Soviet Union. At the LPI, P.A.Cherenkov under the guidance of Academician Sergei Vavilov carried out the experimental study of the phenomenon that now is well known as the Cherenkov effect. This discovery resulted later (1958) in the Nobel prize for discovery and explanation of the "Cherenkov effect" - with I.M.Frank and I.E.Tamm [1-9].

In 1920-1930, there existed contradictions in the development of science in the USSR. From one hand, this was time of fruitful contacts between soviet and foreign research centers. For example, the future famous Russian academicians: physicists P.L.Kapitza, L.D.Landau, and biologist N.I.Vavilov successfully worked abroad. In addition, in our country, papers published in scientific journals were printed simultaneously in

both Russian and foreign languages.

I would like to note a curious episode of that time, which was related to the time (1937) of wide scientific connections of Russia with leading foreign countries and directly associated with the activity of P.A.Cherenkov: the English journal "Nature" has refused to publish the paper devoted to the essence and properties of the phenomenon discovered by P.A.Cherenkov, which became later well-known. At the same time, the American magazine "The Physical Review" has agreed to do this [10,11].

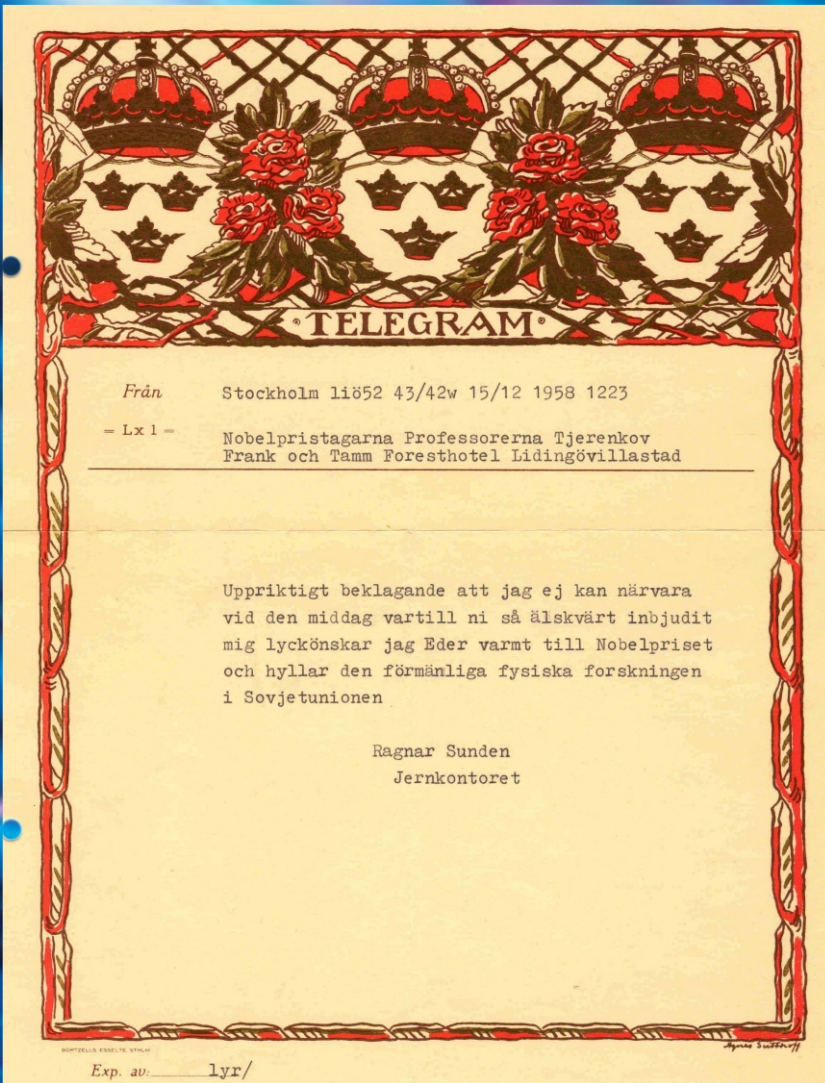
From the other hand, in the same years, the Soviet government made destructive actions with respect to science. International contacts were reduced, and possibilities of visits abroad were restricted for Russian scientists. Aboard German and Italian ships (the so-called "philosophic ships"), a number of philosophers, doctors, writers and other representatives of dissident intellectuals - the most cultural part of the Russian society - were removed from the country.

At the noon of the World war II, during war years (1939-1945), and at the post-war time, studies in military directions became extremely important in the USSR and some research activities became secret.

At the war time a number of LPI physicists, including P.A.Cherenkov, dealt with secret studies. In both Russia and abroad, a number of scientific directions turned out aside of publication in the scientific press. One could seem that many of studies remained incomplete. The foreign scientific community has recognized that the results of scientific studies are not published by virtue of political reasons. I imply, in particular, studies in the fields of nuclear and high-energy physics, as well as of accelerator physics in which P.A.Cherenkov participated in post-war years. The fundamental-particle physics and accelerator physics became the basic spheres of his activity from the middle of 1940s.

With the cold war as a background, after 1945, the scientific relations of Russia with the external world were almost broken. In fact, approximately from the beginning of 1947, almost all scientific journals were stopped for sending abroad in the framework of the scientific exchange. Letters addressed to soviet scientists remained without replies. The book exchange and the private letters have ceased their existence. In Russia, making results of scientific studies secret was strengthened. Even Manne Sigbahn, the member of Sweden Royal Academy of Science, could not receive the popular Russian journal "Nauka i Zhizn" (Science and Life) [13].

In 1948 P.A.Cherenkov was close to the high level of the international scientific-organizing activity. He was considered as a possible candidate for the advisor (from the USSR side) of the Atomic-energy commission (AEC) in the Safety Council of the Organization of United Nations (OUN). However, the decision of the Soviet government was negative. The matter of fact was that in 1938, A.E.Cherenkov, the father of P.A.Cherenkov, was sentence to shot for his anti-revolutionary activity. I am not sure, that



The telegram in the Swedish language about award of the Nobel Prize to P.A.Cherenkov "For opening and explanation of the Cherenkov effect", 1958.

P.A.Cherenkov knew anything on the reasons by virtue of which he had been rejected and on the fate of his father. These facts also belonged to the secrecy zone. It was only known to our family that A.E.Cherenkov was arrested and has disappeared.

It is worth noting that just in these post-war 1950s, after the appearance of first photoelectron multipliers, it became understandable the usefulness of the Cherenkov's discovery in experimental physics. The so-called Cherenkov counters became to be applied in physical laboratories throughout the world. Cherenkov effect theory had been developed and this attracted particular attention to the scientist's name. On the foreign scientists initiative P.A.Cherenkov was nominated for Nobel Prize. However, due to restricted scientific contacts, the concept of detectors called Cherenkov counters, as well as the interest to the author of the discovery were rather abstract. This occurred due to restricted scientific contacts, the closeness of nuclear studies, and the absence of papers of the author among scientific publications.

While 1939-1945 and post war years some interesting episodes were connected with secret scientific research themes. The most secret work was associated with the development of the atomic bomb. In solving this problem, scientists of the USA, of Germany, and of the USSR were involved. The secrecy of this field of science put the country and its scientists in the position of isolation. However, the secret internal policy also had certain advantages: the financial support of the corresponding branches associated with the nuclear physics has increased. Here, I may address to the following example.

In his recollections, Academician N.A.Dobrotin, who was the famous specialist in cosmic-ray physics and the manager of scientific studies in this field, remembered the following facts. (A part of them was published in LPI [12], another part was reported at sessions of the LPI scientific councils but was not published.) As N.A.Dobrotin wrote, S.I.Vavilov, who had been then the president of Academy of Sciences of the USSR has managed to obtain the active financial support for the development of cosmic-ray physics. This occurred because in the conversation with the main secret person of Russia, S.I.Vavilov called these studies of the same importance as the development of the atomic bomb. Thus, cosmic-ray physics has obtained the support for its development.

The soviet government considered the progress of scientific directions adjoining nuclear physics to be necessary. Therefore, scientists were stimulated to prepare a draft of the project for the high-mountain cosmic-ray station on Pamir. In this case, the local position of the station was coordinated even by telegraph immediately before the beginning of the construction, approximately, in the following terms: "The construction should be positioned at the last-year kitchen-garden with the face directed to the broad way". Indeed, sometimes, the development of science is hardly predicted!

The progress in science and technology (including discoveries in the field of the nuclear energy, theoretical and experimental physics) has gradually led to the renewal and the extension of scientific contacts. The exchange of scientists has begun, common



The workshop on high-energy physics, 1959, Kiev. From left to right, front row: W.Enchke, W.Panofsky, P.A.Cherenkov (LPI), M.I.Adamovich (LPI). Behind row: Kharitonov (Erevan Phys.Inst.), A.S.Belousov (LPI), Woker, W.Pauly, Bellemi, Robinson, ?, R.Wilson, D.Salvini, V.I.Goldansky (LPI), E.Amaldy, A.M.Baldin (LPI), J.Pnievski (Univ. Warszava), B.B.Govorkov (LPI).

seminars and conferences, collaborated scientific studies became to be regenerated. In 1954, open publications in the field of particle physics were permitted in the USSR [14].

At the same time scientific connections of Russian scientists were manifested in the form of direct contacts with foreign colleagues. In May, 1959, the conference on high-energy physics had been organized, which became the first international conference in our country for the last decade. This meeting has opened a series of subsequent international conferences devoted to this branch of science. A number of outstanding scientists have arrived at Kiev, among them J.Pnevsky, W.Panofsky, and R.Wilson (USA), W.Pauli and W.Entchke (Germany), E.Amaldi and D.Salvini (Italy), and others. Among scientists from our country there were V.Goldansky and A.Baldin (both from LPI). P.A.Chernkov (this time already the Nobel-prize winner) also took part in this conference. Although the name of Chernkov was well-known for foreign physicists, the preceding international isolation of Russian science made his person as if off time. Therefore, foreign conference participants were deeply surprised seen actual Chernkov presenting among them.

After the renewal in 1955 of Soviet-American scientific contacts, later, in 1974, the interaction of scientists of the USSR and of the USA was confirmed by the agreement on the scientific and technological cooperation. In the framework of this agreement, in 1976, P.A.Chernkov participated in sessions of the Commission on the Soviet-



Session of Soviet-American commission on cooperation, 1974, Dubna. At the right side P.A.Chernkov, third from the right I.V.Chuvilo, fourth - S.S.Gershtein, last in the row A.M.Baldin.

American scientific cooperation. As a result, a series of combined studies have arisen. They were devoted to the problem of proton-proton elastic scattering at energies on the order of hundreds giga-electronvolt. These studies were performed by the Cornell group of physicists, which included scientists from the LPI.

In Russia have begun conditions and political situation changes. In these new conditions of scientific contacts improvement and development Russian scientists participated in international conferences, exhibitions.

As I already said, the preceding poor scientific contacts as if have broken the time continuity. Therefore, interesting episodes occurred at later international conferences. For example, American participants of one of the conferences asked, whether P.A.Chernkov is the son of the scientist, who has discovered the phenomenon called the Chernkov effect? Sometimes, during the visit of P.A.Chernkov to the USA, certain physicists were surprised seeing in their laboratories the author of the discovery and began to show him Chernkov counters by a fingers. Thereby, they imply the urgency and usefulness of these detectors in their measurements. It should be noted that in 1985, P.A.Chernkov was elected as a foreign member of the National Academy of Science in the USA.

In 1977, in Zvenigorod-town near Moscow, an international conference was organized devoted to the kaon-nuclear interaction. It is remarkable that for the first time after World War II, foreign scientists were admitted to Podmoskovie,



Seminar on Kaon-Nuclear Interaction and Hypernuclei, 1977, Zvenigorod. During an excursion to Savvino-Storodzevsky monastery as a part of conference social programme. From left to right: L.B.Okun, Mrs.Bowen, R.H.Dalits, ?, T.Bowen, P.A.Chernkov.



Kuo Mo-jo - the President of the Chinese Academy of sciences welcomes P.A.Cherenkov - the scientific chief of the Soviet scientific and technical exhibition on peace use of an atomic energy, 1956, Peking.

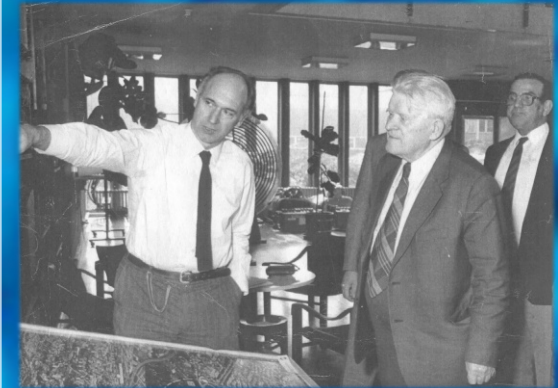
i.e., to the vicinity of Moscow, outside of the capital. This has become possible only owing to the energy and personal scientific connections of P.A.Cherenkov, who has opened the plenary session and was the Chairman of the Organizing committee [15].

At that time, discussions of scientific achievements in physics were not so popular in mass media as nowadays (at least, in our country). That is why, the photographs of participants of both Kiev and Zvenigorod conferences were made by not professional specialists but amateur photographers, therefore, the composition of pictures also is not perfect.

From 1970s, the participation of soviet physicists in international meetings and in common projects being developed abroad and in the USSR became sufficiently regular. In addition, a lot of research studies were performed in the USSR with the participation of foreign physicists. For example, in certain years, partners from the USA worked in the Joint Institute for Nuclear Research (JINR) in Dubna. A large group of Russian and foreign physicists from Czechoslovakia, Hungary, Bulgaria, and East Germany performed common studies in the Institute of High-Energy Physics, Protvino. It was necessary to overcome the state inertia in order to connect science in Russia and in foreign countries. The contribution of P.A.Cherenkov into common studies with East-European physicists was awarded by the gold medal "For the Contribution to Science in the Interests of Mankind" of the Czechoslovakian Academy of Science.

Often, scientific contacts began in the course of international meetings and conferences. One of these events has occurred in 1983 in Sanremo (Italy) and in Vatican, where the jubilee conference devoted to the 150th anniversary of Alfred Nobel and 350th anniversary of the publication of "Dialogue Concerning the Two Chief World Systems" by Galileo Galilei took place. The patronage over the celebrations was realized by the Italian President and by the king of Sweden Carl XVI Gustav. The Pope Ioann Pavel II also was present. Nobel-prize winners were honourable guests of the conference, academician P.A.Cherenkov was among them. German professor Volker Soergel was also one of the conference participants. Recently, he was nominated as a director of the National laboratory called "Deutsches Electronen Synchrotron (DESY)" in Hamburg.

The essence of their discussions was the program for the research work at the collider facility and the possible participation of physicists from the LPI department headed by P.A.Cherenkov in Moscow and in Troitsk (town near Moscow). To this end, the LPI group of



The DEZY director F.Zorgel and P.A.Cherenkov discuss opportunities of scientific cooperation, 1985, Hamburg.



Anniversary celebrations devoted to 350-year of the publication of Galileo Galilei's work "Dialogue Concerning the Two Chief World Systems" and 150-year from Alfred Nobel's birthday, 1983, Rome. P.A.Cherenkov after speech of the chapter of Catholic Church Pope John Paul II was submitted to him.



At the high energy accelerators conference in Frascati, 1965. The Nobel winners: H.M. Macmillan and P.A. Cherenkov.

physicists (as a part of the H1 collaboration) should construct a magnet (of layered-iron design) for the muon detector, simulate and analyse events of particle generation, and develop a measurement system for the determination of the HERA-collider luminosity [16]. I pay attention to this fact, insofar as it was the starting point of the fruitful international cooperation of the LPI and DESY. This event became one of the first examples of the Russian participation in large-scale international projects realized outside of Russia.

In the current 2010 (year of France in Russia and of Russia in France), I would like to remember that, at a certain time, P.A. Cherenkov was invited to join one of the France academies of sciences. Unfortunately, that time, this invitation negatively interfered with the policy of the Soviet government. P.A. Cherenkov was subjected to pressure and had to reject this offer. The opposite step could be considered as contradicting to interests of the state. However, later on, a certain compensation took place. P.A. Cherenkov was awarded by "La Médaille de la Ville de Paris (échelon vermeil)", which was given to him in 1983 by Jacques Chirac.



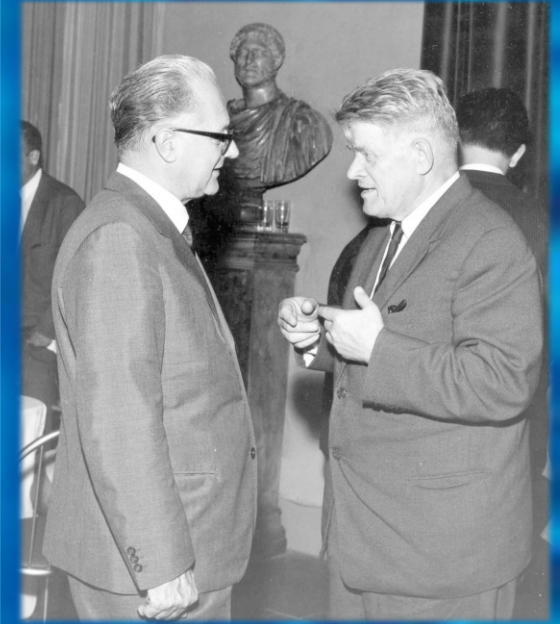
Jacques Chirac presenting P.A. Cherenkov with "La Médaille de la Ville de Paris (échelon vermeil)", 1983, Paris.

P.A. Cherenkov also participated in Pugwash Conferences on Science and World Affairs, which was the international nongovernmental scientific organization awarded in 1995 by the Nobel prize for Peace. The prize was given for long-term efforts to reduce the danger of nuclear war. This important activity was supported by well-known scientific and public figures such as lord Russel, D.V. Skobel'tsyn, fon Weizsekker, P.L. Kapitza, I.M. Frank, I.E. Tamm, N.N. Semenov, A.D. Sakharov, L. Scillard and others. P.A. Cherenkov took part in international committees and commissions on fight for peace.

It is difficult to say, whether the terms Cherenkov radiation, Cherenkov counters, Cherenkov angle relate to the direct effect of the person of P.A. Cherenkov on the world scientific community. These terms entered the international scientific language not only of physics but of adjoining directions, e.g., technology, medicine, and biology. I can remember

that P.A. Cherenkov related calmly and with restraint to his popularity, although sometimes was glad to feel it.

Years passed... As the present level of scientific contacts of Russia is concerned, we can see that many Russian scientists work at different laboratories throughout the world. There exist scientific-exchange programs, and results obtained are freely published in various journals. However, a weak financial support and the imperfectness of the experimental basis in modern Russia strongly restrict the participation of Russian scientists in international conferences. In this connection, it is worth noting the noble activity of those conference organizers, who support Russian participants. Here, I imply, for the first turn, organizers of RICH workshops, who have helped in recent years to Russian physicists.



The participants of the International conference on high energy accelerators P.A. Cherenkov and professor E. Amaldi converse on reception at the mayor of Rome, 1965, Rome.

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