

To the centenary of the National Academy of Sciences of Ukraine and the 90th anniversary of the foundation of the NSC KIPT

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**TITANS OF UKRAINE.
UPTI–LABORATORY No. 1–KIPT¹**

On the basis of archival sources and the recollections of the employees of the Ukrainian Physical-Technical Institute, Laboratory No. 1, and Kharkiv Physical-Technical Institute, some episodes from the history of the National Science Center “Kharkov Institute of Physics and Technology” are described.

Keywords: UPTI, KIPT, laboratory No. 1, NSC KIPT.

It was nowhere else in the USSR.

Academician I.V. OBRIMOV,
one of the founders and the director of the UPTI

Our institute is one of the most important ones in Europe. Perhaps, there is no institution even in Europe that is so well-equipped and has so many various laboratories as ours.

O. WEISSBERG,
a foreign employee of the UPTI

The Ukrainian Physical-Technical Institute (hereafter UPTI): this is a title that was given 90 years ago to the National Science Center “Kharkov Institute of Physics and Technology” (hereinafter, NSC KIPT). The official date of the UPTI foundation is October 30, 1928, when the Council of People’s Commissars of the Ukrainian SSR adopted a resolution on the creation of the Physical-Technical Institute in Kharkiv, the capital of Ukraine at that time:

“...Reported: On the organization of the Physical-Technical Institute in Ukraine. A report by Academician A.F. Ioffe.

Resolved:

1. To recognize the organization of the Physical-Technical Institute in Ukraine as necessary.

2. Bearing in mind that the Physical-Technical Institute should be connected by its work with the scientific and engineering capacities of Ukraine and establish a cooperation with the plant laboratories and the research institutions of the SCNE (the Supreme Council of National Economy – A.T.’s remark) and the People’s Commissariat of Education, to consider it expedient to organize the institute exactly in Kharkiv...

7. To thank officially Academician A.F. Ioffe for his initiative with respect to the development of scientific and research work in Ukraine; in particular, to note with gratitude the nomination of a group of highly skilled scientists by the Leningrad Physical-Technical Institute for working at the Ukrainian Physical-Technical Institute...”[1, p. 112].

In nine months, the UPTI began functioning. In F. Kandyba’s article “Snipers of Atomic Nucleus” in the *Izvestiya* newspaper (on November 11, 1932), it was emphasized that “the Kharkiv institute was really erected at the pace of five-year plan, and it was built within nine months. The director of the Institute, Prof. Obreimov traveled over Europe in order to purchase and order the best novel equipment for the laboratories...”

¹ On the basis of doctoral dissertation materials (the scientific supervisor is Academician Viktor Grygorovych Bar’yakhtar).



Academician A.F. Ioffe, the initiator of the UPTI foundation

The rapid pace of UPTI building was induced by the state slogan at that time “To catch up and overtake the economically developed countries of the world”. So, the state did not spare money for science. In order to build unique laboratory premises, the government even allowed the dreadnought “Empress Maria”, which was sunk in the Sevastopol bay in 1916, to be cut into pieces of metal.

The fateful scientific and organizational facts from the period of institute establishment were reconstructed on the pages of memoirs of the founder and director of the UPTI Ivan Vasilyevich. Obreimov:

“...The group of physicists who left to Kharkiv were sent off pompously: an orchestra played at the station, one could hear the drumming, the flags fluttered.

This group included K.D. Sinelnikov, A.K. Valter, N.A. Diamantov, A.F. Prikhodko, V.S. Gorskyi, V. Gei, G.D. Latyshev, V. Voleiko, P.I. Strelkov, O.I. Leipunskii (my deputy), L.V. Rozenkevich (theorist), G. Gorovits (theorist).

V.O. Fock and L.D. Landau, although they did not intend to live in Kharkiv, also participated in the formation of the Institute, which was named the Ukrainian Physical-Technical Institute (UPTI), as well as P.S. Ehrenfest, who seriously intended to move to Kharkiv. The latter visited twice...

A.F. Ioffe was appointed the chairman of the UPTI scientific council. Although his role was insignificant, but his importance was substantial. Actually, we did not need to conform the general principles, because they were the same. Nevertheless, during the hard times, Abram Fedorovich, with all his tact, supported us in every way in the governmental authorities of Ukraine or in academic circles.

Somebody in the Ukrainian SSR government – and even in Moscow – suspected that A.F. Ioffe got rid of unwanted persons by creating new institutions or that the “refugees” to Ukraine were those, who were not satisfied with Abram Fedorovich. But the visits of A.F. Ioffe to Kharkiv, his friendly letters, and his unselfish support in all issues that I invoked dispelled all suspicions.

After 1933, when I was appointed the chairman of the scientific council of the UPTI, Abram Fedorovich sometimes came as a guest for a few days. Perhaps, he was pleased with the scientific life of the institute, as well as to meet his friends. He did not make reports, but he had long conversations with various people.

I cannot help mentioning a good attitude of the governmental authorities of Ukraine – in particular, V.Ya. Chubar and the chairman of the SCNE of the UkrSSR B.K. Sukhomlin – and the Kharkiv intelligentsia – the scientists at all faculties of the Kharkiv University, the Electromechanical Institute, the Mathematical Institute headed by S.M. Bernshtein and N.I. Akhiezer, as well as the directors of the factories (KhEMZ, KhPZ) – to our institute. They substantially helped the UPTI, willingly hiring our students who defended their diploma, as well as some employees of the UPTI.

The engineers of the KhEMZ and the Turbine factory participated in the scientific meetings of the UPTI and made reports...” [2, p. 52–53].

Besides that, on the initiative of I.V. Obreimov and with his promotion, the fundamental researches became the cornerstone of the scientific strategy of UPTI at that time. Many years later, this fact was specially marked by the first director of the UPTI in his memoir notes:

“...I consider the cultivation of theoretical physics in Kharkiv (and, hence, in the Soviet Union) to be my sound merit for the country...”

There emerged a center of theoretical physical thought in Kharkiv; Soviet and foreign scientists visited very often there...

It is important that all theorists arrived not as guests, but they worked for several weeks...” [3, p. 23–24].

It is this UPTI phenomenon that was marked in about half a century on the pages of the academic journal Herald of the Russian Academy of Sciences:

“...The fact of invitation of leading foreign scientists to Kharkiv can be understood only if one takes into account that, because of usual currency limitations, this invitation was competing with an alternative of purchasing a new spectrograph or any other device.

Of course, the visits of Western scientists affected the entire Russian science of that time, because researchers from other towns of the Soviet Union met in Kharkiv in the summer.

The physicists can also note that Ivan Vasilyevich invited specialists who were working the most actively and fruitfully at that time; in other words, he invited those ‘who were indispensable’...” [4, p. 259].

Already on October 10, 1932, K.D. Sinelnikov, O.I. Leipunsky, A.K. Valter, and G.D. Latyshev split the lithium nucleus with artificially accelerated protons for the first time in the USSR. On the experimental basis of the newly-built institute, they reproduced the fundamental experiment of the Cavendish Laboratory.

The UPTI administration immediately reported about this result to the government. Here is the text of this historic telegram, which was published on the first page of the *Pravda* newspaper (on October 22, 1932):

“The nucleus of lithium atom is destroyed.

The great achievement of Soviet scientists.

Moscow; to comrades Stalin, Molotov, Ordzhonikidze; to Pravda.

The Ukrainian Physical-Technical Institute in Kharkiv, as a result of its shock work devoted to the 15th anniversary of October, achieved first successes in the destruction of atomic nucleus.

On October 10, the high-voltage brigade destroyed the lithium nucleus; the work is continued.

Director of the UPTI Obreimov

Secretary of the Party Committee Shepelev

Secretary of the Local Committee Fedoritenko”.

The UPTI telegram to the government – it has no analogs throughout the whole history of the USSR – favored the state support of nuclear researches at the institute. Since then, nuclear physics and engineering

have been comprising one of the leading scientific directions of the UPTI–KIPT–NSC KIPT.

A member of the high-voltage brigade of the atomic nucleus fission Sergiy Mykolayovych Vodolazkyi recalls,

“the obtained success at once allowed the institute to gain popularity and recognition throughout the country and abroad. The institute was intensively visited by Soviet and foreign scientists and correspondents.

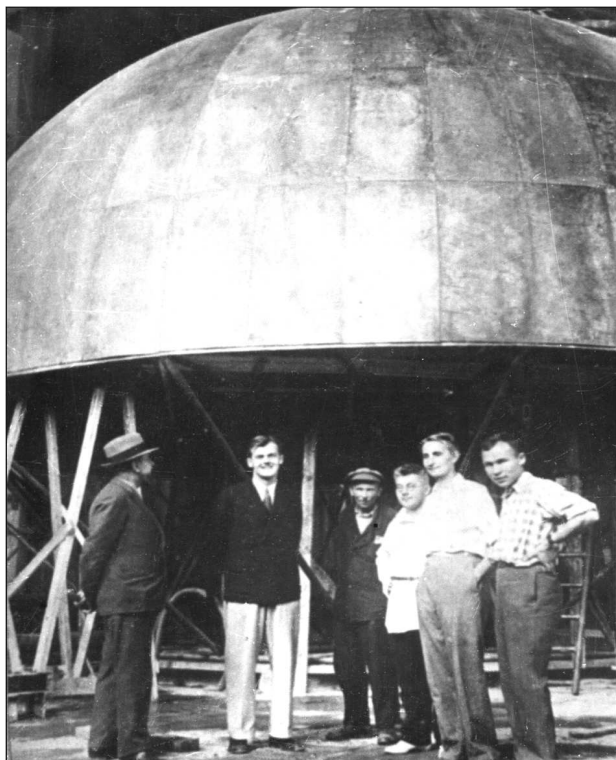
In November 1932, P.L. Kapitza, who worked with Rutherford in Cambridge at that time, visited the institute. He brought greetings with first successes from Ernest Rutherford, John Cockroft, and Ernest Walton to Sinelnikov.

The recognition of the success by those scientists was a real triumph for K.D. Sinelnikov. We understood well that Kapitza not only brought greetings from Crocodile (E. Rutherford – A.T.). He had to make sure that the experiment was trustworthy. This circumstance was the most honorable for Sinelnikov.

After the first success, the government approved our plans. Researches of the atomic nucleus were significantly extended. We obtained the additional funding. A new scientific building was designed specifically for those works...” [5, p. 116].

In June 1935, French scientists visited the UPTI; in particular, these were the Professor of theoretical physics Francis Perrin and the Full Member of the French and Ukrainian Academies of Sciences Jean Perrin. Here is their comment concerning the UPTI scientific strategy at that time:

“We are very happy that we can tell about a strong impression associated with our visit to the Ukrainian Physical-Technical Institute in Kharkiv. The problems that are researched there concern the most important topics of pure physics, and they are considered from the most advanced viewpoint. We are glad to see that the Soviet Union is spending such huge expenses for unprofitable quests, which sooner or later will be reflected in practical life and transformed into the results of inventions that are useful to mankind. We would like to especially mark installations related to low temperatures (superconductivity, the phenomenon of magnetocaloric effect, adsorption) and installations related to nuclear physics (installations to destroy atoms).



Поблизу спорудження в УФТІ електростатичного генератора. Другий ліворуч – Роберт Ван де Грааф, другий праворуч – К.Д. Синельников



I.V. Obreimov. After returning from the evacuation, 1946

But even more than experimental devices, we were glad to see young employees, cheerful and buoyant, who apply their work to where theorists and experimenters combine their efforts, because when it is important to have devices, it is much more important –

and it occurs rarely – to have heads that know how to use them.

With best regards from French physicists to Kharkiv comrades” [6].

Hence, the second director of the UPTI, Academician O.I. Leipunskii, had every reason to emphasize that

“the close interaction of theoretical and experimental works is one of the more important features in the scientific image of the Institute” [7, p. 111–114].

In 1936, a Van de Graaff electrostatic generator was built at the UPTI, the first in Europe for that time. The story goes that even Robert Jemison Van de Graaff himself came to Kharkiv, and he allegedly confessed that he was really jealous of the UPTI collaborators.

We have also every reason to mention that the prominent theoretical physicist of the twentieth century, the Nobel Prize winner P.A.M. Dirac was elected the honorary member of the scientific council of the institute, whereas P.L. Kapitza, G.A. Gamov, and P.S. Ehrenfest agreed to be scientific advisers.

An eloquent fact is that the physical group of the Academy of Sciences of the USSR held its first visiting meeting just on the basis of the UPTI (January 23–24, 1937, Kharkiv).

Many years later, on the pages of his memoirs, the Director and organizer of the institute Ivan Vasilyevich Obreimov distinctly indicated the principal factors of the UFTI phenomenon at that time:

“...the Physical-Technical Institute in Kharkiv initiated the development of the scientific direction “physics of atomic nucleus” in our country. This problem was not of interest for other institutes, and they did not intend to study it, evidently considering it to be a matter of the far future for the national economy.

Within a period of at least three years, I.V. Kurchatov with his collaborators came to the Institute a few times per year, each time for two or three months. Later he used this acquired experience in his new nuclear laboratory at the Physical-Technical Institute in Leningrad.

Our laboratory was the first and the only one in the USSR, and the fourth one in the world, where the work with liquid hydrogen – and, from 1933, with liquid helium as well – was mastered...



L.D. Landau (second row, fifth from the right), G.A. Gamov (second row, fourth from the right), and I.V. Obreimov (third row, second from the left) among the participants of the First Conference on Theoretical Physics (Kharkiv, 1929)

We did not strive to “catch up and overcome”. We simply tried to carry out researches which we believed to be challenging for physics as much better and accurately as possible.

One cannot help mentioning L.V. Shubnikov, who introduced a style of critical and thorough work at the institute, as well as V.S. Gorskii, whose works (the discovery of ordered and partially-ordered solid solutions) are a source of pride of the Institute...

I consider the cultivation of theoretical physics in Kharkiv (and, hence, in the Soviet Union) to be my sound merit for the country. The first and still the only conference on theoretical physics, which was held in our country in July 1929, was a sort of declaration from the UPTI side. The conference was attended by all physics-theorists of the USSR, without any exception...

In Kharkiv, there arose a center of theoretical physical thought. Soviet and foreign scientists visited there very often...

Academician P.L. Kapitza, who was living abroad at the time, was invited to the UPTI as an adviser, and he worked on this position from 1930 to 1935. Every year he came to the institute at least for



First row from left to right: L.V. Shubnikov, A.I. Leipunskii, L.D. Landau, and P.L. Kapitza; second row from left to right: B.Ya. Finkelshtein, O.M. Trapeznikova, K.D. Sinelnikov, and Yu.M. Ryabinin. Kharkiv, UFTI, 1934

a month and gave a number of extremely valuable instructions...” [3, p. 22–24].

Furthermore, foreign specialists gladly agreed to join their life with the UPTI at that time. In particular, in his memoirs, the foreign employee of the UPTI Victor Frederick Weisskopf (later, in 1961–1965, he

was the General Director of CERN) clearly described the reasons that prompted him to move to the UPTI at that time:

“...I had no opportunity to obtain a job, neither in England nor in France... Almost for a year, I went to Russia, to Kharkiv, where I could get a job...” [8, p. 78].

It should also be noted that the Leiden Laboratory gave the most valuable help to the cryogenic laboratory of the UPTI. According to O.M. Trapeznikova's memoirs,

“E. Wiersma rendered a very large assistance to the laboratory. Every year, till 1935, he came to Kharkiv and brought a heap of various things, without which we would not be able to work. When in Leiden, he came to know about a new helium machine designed by F. Simon and immediately sent us its drafts, ahead of P. Ehrenfest who had an idea to do the same.

We had nothing for ultralow temperature measurements; for this purpose, special platinum thermometers were required. In order to fabricate them, a platinum wire had to be wound onto a porcelain cylinder; all that had to be annealed at high temperatures and calibrated. We had no platinum with a required purity grade. Porcelain was also dirty, so that various impurities were evaporated from it at annealing and contaminated the platinum. However, for calibration, we used a platinum thermometer Pt-38 donated by W. Keesom. E. Wiersma brought us a pure platinum wire and special porcelain cylinders from Leiden, so that we could manufacture thermometers ourselves.

Dewar vessels were required to store liquids. Metallic dewars were tin-soldered. Our tin cracked at low temperatures, and the dewars became out of action. E. Wiersma supplied a special soldering in a large amount, which could withstand low temperatures.

He brought everything that we could not get in the Union. For instance, he brought a cycle counter for transformer winding. We had bad weights for the analytical balance, and he brought the weights. We had no adhesive plaster, and he provided the adhesive plaster. He brought everything that we did not have, but he could buy. Of course, all that he brought was approved by W.J. de Haas...

E. Wiersma greatly helped the cryogenic laboratory, although only a few know about it” [9, p. 280–281].

Furthermore, E. Wiersma intended to move to Kharkiv. He even sold all his property. Unfortunately, he did not obtain a visa.

The hard times did not avoid the UPTI. In the late 1930s, the repressions began. In the memoirs of the foreign employee of the UPTI O. Weissberg, we read: “...Our institute is one of the most significant in Europe. Perhaps even in Europe there is no so well-equipped institute and with so many different laboratories as ours.

The government spared no expense for science. The leading scientists were partially trained abroad. During a long time, they were sent at state expense to the most famous physicists in the world to continue their training. At our institute, there were 8 departments that were headed by 8 scientific supervisors. How does it look like now?

The crystal laboratory... The header Obreimov is arrested.

The 1st cryogenic laboratory... The header Shubnikov is arrested.

The 2nd cryogenic laboratory... The header Ruemann is deported from the country.

The nuclear laboratory... The header Leipunskii is arrested.

The X-ray department... The header Gorskii is arrested.

The department of theoretical physics... The header Landau is arrested.

The experimental station of deep cooling... The header Weissberg is arrested.

The laboratory of ultrashort waves... The header Slutskin is still working.

Among the arrested persons, there are Professor Obreimov, the founder and the first Director of the institute; Professor Leipunskii, Academician of the Academy of Sciences and the Director of the institute; Professor Lev Davidovich Landau, the most famous theoretical physicist in the country and one of the most talented scientists in the world. Earlier, because of the attacks from the NKVD, Landau was forced to leave the institute and move to Moscow, to Professor Kapitza.

I had built a low-temperature research station. Just before its launch, I was arrested. Komarov became my successor. He was also arrested. So who will work?...” [7, p. 277].

The year of 1941... At the end of October, the institute was evacuated to Kazakhstan...

In the spring of 1944, the UPTI was returned back to Kharkiv. At that time, the Director was Kirill Dmitrievich Sinelnikov.

The development of those fateful events can be traced from the report made by Kirill Dmitrievich on April 6, 1964 and devoted to the 20th anniversary of the post-war institution reconstruction:

“...Kharkiv was liberated in August 1943...

...In October 1943, my then the closest student Golovin, Anton Karlovich Valter, and I came to Moscow. Academician Bogomolets (Oleksandr Oleksandrovych Bogomolets was the president of the Academy of Sciences of the UkrSSR at that time – A.T.) summoned me and said that, according to the available information, the city was so destroyed that the reconstruction of our institute was out of the question, and the Presidium adopted a resolution to unite our institute with the Institute of Physics in Kyiv, i.e. to liquidate the UPTI...

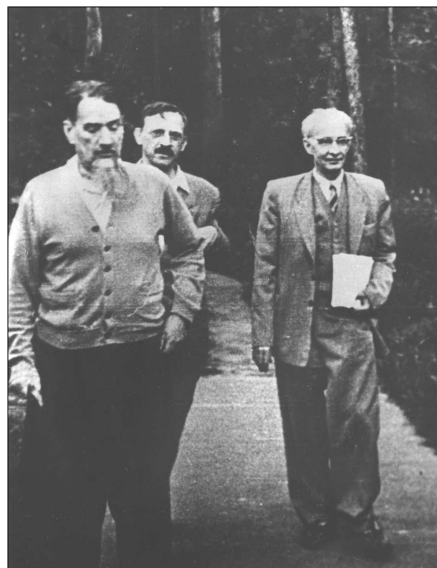
I asked Oleksandr Oleksandrovych Bogomolets to let me go to Kharkiv for two weeks in order to look and make sure that our institute was so damaged. I obtained this permission. After a three-day trip, on November 8, I arrived to Kharkiv and saw with my own eyes the enormous damage that the entire city suffered. However, our institute did not look so bad against this background. Only the central part of the main building was exploded, whereas the laboratory building, the mathematical institute, and the residential buildings survived...

...I returned back to Moscow and reported Academician Bohomolets on the situation: in our opinion, it would require only 8 or, maybe, 12 months to restore the institute, so that the research work could be started, at least partially...

Hence, on a sunny day of April 8, 1944, when the institute staff came back to Kharkiv from Alma-Ata, warm rooms already waited for the employees. In most cases, these were the apartments that the people occupied before the war...

But who could restore our institute? ...Only those organizations could help us which were deeply interested in our work...

Our institute should not change the direction of researches. Our tactics consisted in that every scientist could work in his domain, but he/she should find problems that would be of interest to the First General Directorate (later, the Atomic Energy Committee)... It was the time period when the so-called Lab-



Scientific supervisor of the Atomic Project of the USSR I.V. Kurchatov (left), his deputy I.M. Golovin (behind him), and the head of the Laboratory No. 1 K.D. Sinelnikov (right)

oratory No. 1 was organized...” [5, p. 88] (an audio edited by V.M. Stolyarov).

It is worth mentioning that it was with the assistance of Academician Igor Vasilyevich Kurchatov, the scientific leader of the Atomic Project in the USSR, that an institution with the official title “Laboratory No. 1” was organized on the basis of the Ukrainian (Kharkiv) Physical-Technical Institute.

Today, some governmental documents concerning the Laboratory No. 1 have been declassified. As an example, the resolution of the Council of People’s Commissars of the USSR No. 493-202ts on the Laboratory No. 1 can be quoted:

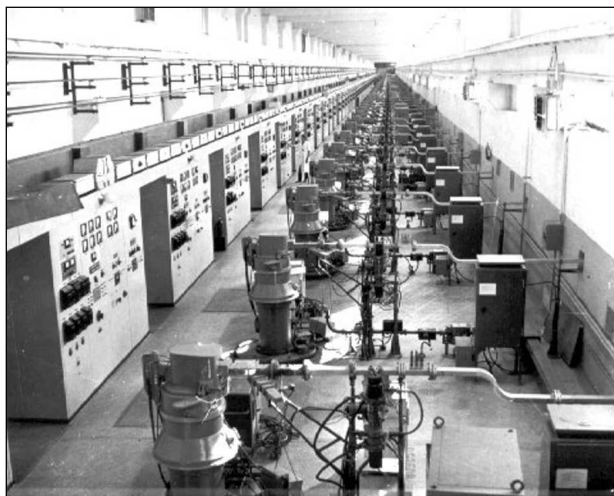
“March 2, 1946, Moscow, the Kremlin

Top secret (Special folder)

In order to provide the fulfillment of special tasks commissioned to the Kharkiv Physical-Technical Institute of the Academy of Sciences of the Ukrainian SSR, the Council of People’s Commissars of the USSR RESOLVES:

1. To organize Laboratory No. 1 at the Kharkiv Physical-Technical Institute of the Academy of Sciences of the Ukrainian SSR on the basis of the Branch of the physics of atomic nucleus at the indicated institute.

2. To appoint Prof. K.D. Sinelnikov the head of Laboratory No. 1 of the Kharkiv Physical-Technical



Linear electron accelerator at 2 GeV

Institute of the Academy of Sciences of the Ukrainian SSR...

9. To establish the total staff number of the indicated Laboratory to equal 150 in 1946...

11. To oblige the People's Commissariat of Foreign Trade ... to purchase laboratory equipment for one hundred thousand dollars in the United States and England, and deliver it to the Laboratory No. 1 in 1946; and also to purchase foreign literature for this Laboratory for 25 thousand rubles in foreign currency in 1946...

19. To oblige the People's Commissariat of Armed Forces of the USSR (Comrade Bulganin) to demobilize scientific, engineering, and technical workers, as well as skilled workers – 22 persons according to the list compiled at the laboratory – from the Red Army and Navy, and send them within the 1st quarter of 1946 to work at the Laboratory No. 1 of the KIPT of the Academy of Sciences of the UkrSSR...

26. To commission the Council of People's Commissars of the Ukrainian SSR (Comrade Khrushchev) to provide necessary assistance to the Laboratory No. 1 of the KIPT of the Academy of Sciences of the UkrSSR in order to ensure the fulfillment of special tasks commissioned to it, and to provide an assistance to the People's Commissariat of Heavy Industry with respect to providing the building of the Laboratory No. 1 with labor power and local building materials.

27. To commission the monitoring over the fulfillment of this resolution, as well as the implementation

of the funds directed to the Laboratory No. 1 of the KIPT of the Academy of Sciences of the UkrSSR, to the First Chief Directorate of the Council of People's Commissars of the USSR.

Head of the Council of People's Commissars of the USSR J. Stalin

Manager of the affairs of the CPC of the USSR Ya. Chadayev" [10, p. 130].

The following fact is also very illustrative. Here is a mandatory confidentiality statement:

"I, the undersigned Shpetnyi Oleksandr Yosypovych, have been warned today that all information concerning the work of the Laboratory No. 1 of the PTI of the AS of the UkrSSR (the structure, staff, work and research content, equipment, processing materials, and other information) constitute a state secret of special importance, and its disclosure in any form to uninvolved persons and organizations is prohibited.

I have been warned that, for the disclosure of this information or the loss of documents containing it, I will be prosecuted in accordance with the Decree of the Presidium of the Supreme Soviet of the USSR of November 15, 1943.

October 23, 1946.

I have been acquainted with the instruction on handling and keeping classified documents. Spetnyi" [11, p. 461-462].

Academician Alexander Ilyich Akhiezer recalled that even an institute typist, when typing the reports in special subjects, had to make blanks in the sentence, which were filled only by the head of the special project.

It was due to the creative collaboration between theorists and experimenters that a powerful experimental base of the institute had been created, which is now recognized as a national property of Ukraine; in particular, these were

- a linear proton accelerator, the largest in the USSR, with a 20-MeV drift tube (1951),
- a linear electron accelerator at 0.7 MeV (1952),
- a linear electron accelerator at 3.5 MeV (1954),
- a linear electron accelerator at 5 MeV (1955),
- a linear electron accelerator at 40 MeV (1956),
- a linear electron accelerator at 90 MeV (1957),
- a linear electron accelerator at 300 MeV (1964),
- a linear electron accelerator, the largest in Europe, at 2 GeV (1965).

In the late 1990s, a delegation of leading scientists from CERN visited the NSC KIPT in order to establish the scientific and technical cooperation. According to the results of this visit, M. Delf Negra, one of the leading scientists of CERN, made a following conclusion, “If there is science in Ukraine in the domain of high-energy physics, then this is the KIPT”.

Moreover, according to the proposal of Academician I.V. Kurchatov, the Kharkiv Physical-Technical Institute was engaged in researches dealing with the controlled thermonuclear fusion. In this framework, let us quote Kurchatov’s article “The Development of Atomic Physics in Ukraine”, which was published in the *Pravda* newspaper (on February 7, 1960):

“...Today, owing to the works of the Physical-Technical Institute of the Academy of Sciences of the UkrSSR in Kharkiv and the Institute of Physics of the AS UkrSSR in Kyiv, Ukraine took the first place among fraternal republics in the field of researches concerning the nuclear reactions with the energies of colliding particles from one to one hundred million electronvolts...

At the same time, the Kharkiv Physical-Technical Institute started works dealing with the advanced problem of modern science, controlled thermonuclear reactions. A successful fulfillment of this task will open really unheard-of prospects.

At the Kharkiv Physical-Technical Institute, a research on controlled thermonuclear reactions under the general scientific supervision of K.D. Sinelnikov was begun only one and a half or two years ago. But during this short time period, important theoretical and experimental studies of the properties of ionized plasma have been carried out...

All that allows Ukraine to proceed even today to the designing and building of powerful devices for studies in thermonuclear reactions...”.

Unique closed traps of the stellarator type – “Sirius”, “Uragan-1”, “Uragan-2”, and “Uragan-2M” – were created at the Kharkiv Physical-Technical Institute, as well as the first-in-world improved modifications of the stellarator, which had no analogs in the world – the torsatrons “Saturn”, “Vint” and “Uragan-3”.

For the illustrative purpose, it is worth quoting a news item published in the *Pravda* newspaper (on August 29, 1982):

“The Kharkiv scientists made a new step toward the creation of controlled thermonuclear fusion. One



Near the “Uragan-3” stellarator. From left to right: V.G. Bar'yakhtar (Vice President of the Academy of Sciences of the UkrSSR), V.O. Vishnyakov, V.T. Tolok (KIPT), A.P. Aleksandrov (President of the Academy of Sciences of the USSR), B.E. Paton (President of the Academy of Sciences of the UkrSSR), V.P. Mysnychenko, and V.F. Zelenskiy (Director of KIPT)



International cooperation in controlled thermonuclear fusion. From left to right: B.B. Kadomtsev (IAE, second from the left), V.T. Tolok (KhPT, fourth from the left), USA, 1964

of world’s largest stellarator installations, “Uragan-3”, began to operate at the Physical-Technical Institute of the Academy of Sciences of the UkrSSR.

A broad research program involves the study of regularities in the behavior of plasma heated up to several tens of millions of degrees...

The first stellarator of this type was created on the basis of our institute in 1970. Since then, in the framework of the All-Union thermonuclear program, a few analogous systems have been constructed in Kharkiv. They attract scientists by their ability to operate in a continuous regime, which is necessary for the functioning of future industrial reactors.

The “Uragan-3” is a basic device, which is supposed to be permanently improved by increasing its power”.

During the Cold War years, some of scientific researches at the Kharkiv Physical-Technical Institute were carried out in isolation from international cooperation, but at a high world level. In particular, according to the memoirs of Academician Victor Fedorovych Zelenskyi, the Director of KIPT during 1981–1997,

“at the end of the 1960s, the contribution of the Institute to defense industries – nuclear, missile, space *etc.* – grew drastically.

The character of defensive researches also changed qualitatively. Earlier, the institute was engaged only to solve tasks aimed at providing the Kurchatov Program. Now, it began to cooperate with the Chief constructors and manufacturers on the development, production, and testing of new models of military equipment. As a result, the level of work confidentiality and, accordingly, the level of security requirements to their fulfillment increased drastically” [12, p. 501].

At the same time, the sound scientific traditions of the UPTI–Laboratory No. 1–KIPT were substantially developed in other academic institutions of Ukraine.

In particular, on the initiative and with the active participation of the leading scientists from the Kharkiv UPTI–KIPT, the Institute for Radiophysics and Electronics (in 1955) and the Institute for Low Temperature Physics and Engineering (in 1960) were organized. At the beginning of 1964, the President of the Academy of Sciences of the USSR, Academician Mstislav Vsevolodovich Keldysh had ground to state:

“All three physical institutes of the Academy of Sciences of the UkrSSR in Kharkiv are the institutions of the highest international class. At each of them, a series of results were obtained that exceed the world level of achievements in the corresponding domains of modern science” [6].

But when the USSR was collapsing, there emerged urgent problems dealing with the selection of the direction for the scientific strategy of KIPT and the preservation of the unique scientific potential of the institute. Thus, according to the memoirs of the General Director of the NSC KIPT, Academician Mykola Fedorovych Shulga,

“...after the collapse of the USSR, there arose a very difficult situation at the NSC KIPT, which was associated with the insufficient financing of scientific works. Researches on large physical installa-

tions, such as the world-known electron accelerator at 2000 MeV, were practically stopped. As a result, the “need” of experimenters to cooperate with theorists dramatically reduced.

The institute library almost did not obtain scientific literature, especially foreign journals. In the winter, it was impossible to work in workrooms even if putting on a warm overcoat. The activity of scientific seminars was significantly reduced. The salary became extremely low; sometimes, it does not exceed five dollars a month. Even with such a salary, the scientists had to take an unpaid vacation.

Young specialists were not hired. Of course, the situation was extremely difficult for theorists, because they had no opportunity of additional earnings. All that factors resulted in that some employees left the institute, whereas some others emigrated from Ukraine. But the worst thing was that the relations between people became strongly worsened. Thus, urgent measures were needed to preserve highly skilled scientific personnel” [13, p. 53–58].

A necessity to resolve a wide scope of new socio-economic tasks led to a structural reformation: in 1993, on the basis of KIPT, the National Science Center “Kharkov Institute of Physics and Technology” was organized.

However, the scientific subjects of the KIPT were not only preserved, but they were developed further. According to the memoirs of Viktor Fedorovych Zelenskyi, then Director of the institute,

“with the collapse of the USSR, the KIPT turned out in an extremely hard situation, because its scientific subjects were always connected with the Ministry of Medium Machine Building. The KIPT administration was faced with two interrelated, extremely important, and urgent tasks. First of all, in order to stop the collapse of the institute and preserve it as a large center of physical science, it was urgently necessary to find a place (a ‘niche’) for it in science and in the national economic complex of Ukraine...

During 1992–1996, four Presidential Decrees were issued, and two Resolutions and three Decrees of the Cabinet of Ministers of Ukraine were adopted concerning the Kharkiv Physical-Technical Institute. The Presidential Decree about a special support of six institutions, including the KIPT, which were of scientific value for Ukraine, was the first.

On July 23, 1993, L.M. Kravchuk signed the Presidential Decree about the organization of the Na-

tional Science Center “Kharkov Institute of Physics and Technology”. According to the decree, the NSC KIPT included the following institutions:

- Institute for theoretical physics;
- Institute for solid state physics, materials science, and technology;
- Institute for plasma physics;
- Institute for high-energy physics and nuclear physics;
- Institute for plasma electronics and new acceleration methods;
- Scientific and research complex ‘Accelerator’;
- Scientific and technological complex ‘Nuclear Fuel Cycle’.

The NSC KIPT had to be funded separately from the state budget of Ukraine.

The assignment of the status of the National Science Center – the status of the first and the only National laboratory in Ukraine – to the Kharkiv Physical-Technical Institute was a recognition of the outstanding value of this large center of physical science for the present and the future of Ukraine” [12, p. 36–40].

Thus, on the occasion of the 90th anniversary of the National Science Center “Kharkov Institute of Physics and Technology” of the National Academy of Sciences of Ukraine, one cannot help mentioning the very appropriate (even today) words from the congratulation of the Ukrainian government with the 70th anniversary of the atomic nucleus splitting:

“Owing to the achievements of Ukrainian physicists, our country retains the rank of a scientific state at the European level, and Kharkiv keeps the image of the world center of theoretical physics and the home of plenty of scientific discoveries that become a reference point for the further development of science and technology”.

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ВЕЛЕТІ УКРАЇНИ.

УФТІ–ЛАБОРАТОРІЯ №1–ХФТІ

Резюме

Виокремлено епохальні сторінки літопису ННЦ “ХФТІ” як за архівними першоджерелами, так й за спогадами співробітників УФТІ, Лабораторії №1 та ХФТІ.