

To the 90th anniversary of the foundation of the NSC “KIPT” of the NASU, the 100th anniversary of the NASU, and the 110th anniversary of the birthday of L.D. Landau

doi: 10.15407/ujpe63.01.0081

A. TAN'SHYNA

LEV LANDAU. UKRAINE, KHARKIV, UIPT

It was Lev Davidovich Landau who founded the Kharkiv scientific school of theoretical physics in 1932–1937.

Keywords: Landau scientific schools, theoretical physics.

1. 24-year-old Head of the Theoretical Department at UPTI

After Landau had moved to Kharkiv, the UPTI became one of the best physical centers in the world.

Academician A.I. AKHIEZER,
a student of L.D. Landau in Kharkiv

When moving to Kharkiv – to the UPTI¹ – Lev Landau was already a well-known person in the world's scientific community. As an illustrative example, let us cite a reference, signed by V. Fock, to Landau's scientific masterpiece at that time: “The works by L.D. Landau are very popular both in the Union (the Soviet Union – transl.) and abroad. For instance, in volume XXIV (part 1), devoted to quantum mechanics, of the known German Encyclopedia of Physics “Handbuch der Physik”, the surname Landau has 11 references. It is worth noting that this volume was published in 1933, whereas the majority of Landau's works were published after 1933” [1, p. 415].

For the sake of illustration, here is a list of corresponding Landau's works:

1. To the theory of spectra of diatomic molecules. *Z. Phys.* **40**, 621 (1926).

2. The attenuation problem in wave mechanics. *Z. Phys.* **45**, 430 (1927).

3. Quantum electrodynamics in the configurational space. *Z. Phys.* **62**, 188 (1930) (in co-authorship with R. Peierls).

4. Diamagnetism of metals. *Z. Phys.* **64**, 629 (1930).

5. Extension of the uncertainty principle on the relativistic quantum theory. *Z. Phys.* **69**, 5621 (1931) (in co-authorship with R. Peierls).

Furthermore, already in 1929, Lev Landau started his scientific contacts with leading physicists-theorists of the world. Here is how L.D. Landau himself noted this fact in his “Report about the scientific mission to Denmark, Switzerland, and Germany in 1929–1931”:

“From October 1929 to April 1930, I was on a mission abroad at the expense of the PCE (People's Commissariat for Education – A.T.) and, later – to March 1931 – at the expense of the Rockefeller scholarship. During that period, I had an opportunity to work with the most prominent contemporary theoreticians, among whom N. Bohr (Copenhagen), W. Pauli (Zürich), and W. Heisenberg (Leipzig) had the largest influence on my work” [2, p. 233].

In the late summer of 1932, Lev Landau moved to Kharkiv.

The course of events that forced a young scientist to leave Leningrad was reconstructed on the pages of memoirs by Academician Alexander Ilyich Akhiezer, who was a student of L. Landau in Kharkiv:

¹ This scientific institute changed its name several times: the Ukrainian Physics and Technology Institute (UPTI, at its foundation in 1928), the Kharkiv Institute of Physics and Technology (KIPT, in 1939), and the National Scientific Center “Kharkiv Institute of Physics and Technology” (NSC KIPT, in 1993).



L.D. LANDAU, in 1934



I.V. OBREIMOV, in 1929

“In August 1932, L. Landau moved to the UPTI. He was 24 years old at that time, but he was already well-known throughout the world as an outstanding physicist-theorist.

This state of affairs was favored by the fact that, in 1929–1931, he was on a scientific mission abroad and participated in seminars held by the prominent physicists M. Born, W. Heisenberg, W. Pauli, P. Dirac, and, finally, Niels Bohr himself.

His relations with those prominent scientists were very active, and the latter got convinced soon in the power of his extraordinary talent. He spoke even with the great Einstein and tried to incline him toward the “quantum-mechanical faith”, but, unfortunately, he failed.

Landau was especially appreciated by Niels Bohr, who, till his last days, considered Landau as one of his best pupils. Vice versa, Landau considered Bohr as his Teacher.

Many years later, when I talked with Ivan Vasil'evich Obreimov, he said that Landau was underestimated at the LPTI (the Leningrad Physics and Technology Institute – A.T.), and only he, Obreimov, being aware of how gifted Landau was, proposed him a position of the Head of theoretical department at the UPTI and the unrestricted freedom of action with respect to the training of young theorists and the selection of scientific topics.

After Landau had moved to Kharkiv, the UPTI became one of the best centers of physical science in the world.” [3, p. 46].

However, the Kharkiv period of Lev Davidovich Landau's life lasted only a few years: from 1932 to 1937. Nevertheless, it was marked by the following achievements:

- the development of Department of theoretical physics², the first at the UPTI (and in Ukraine);
- the execution of a number of fundamental works;
- the innovative pedagogical activity at the Kharkiv State University (KSU) and the Kharkiv Mechanical Engineering Institute (KMEI);
- the development of modern generalizing educational courses in theoretical and general physics;
- the foundation of a scientific school in theoretical physics.

These days, before the 110th anniversary of the birthday of the Nobel Prize winner Lev Davidovich Landau, it is worth listing his Kharkiv scientific publications:

1. To the theory of energy transfer at collisions I. *Phys. Z. Sow.* **1**, 88 (1932).
2. To the theory of energy transfer at collisions II. *Phys. Z. Sow.* **2**, 46 (1932).

² The theoretical department at the UPTI was organized by the initiative of its first director Ivan Vasil'evich Obreimov. At first, in 1928–1932, the department was headed by Dmitrii Dmitrievich Ivanenko, who worked at the LPTI.

3. To the theory of stars. *Phys. Z. Sow.* **1**, 285 (1932).
4. On the motion of electrons in the crystal lattice. *Phys. Z. Sow.* **3**, 664 (1933).
5. The second law of thermodynamics and the Universe. *Phys. Z. Sow.* **4**, 114 (1933) (in co-authorship with M. Bronshtein).
6. Possible explanation for the field dependence of susceptibility at low temperatures. *Phys. Z. Sow.* **4**, 675 (1933).
7. Internal temperature of stars. *Nature* **132**, 567 (1933) (in co-authorship with G. Gamov).
8. The structure of the unshifted scattering line. *Phys. Z. Sow.* **5**, 172 (1934) (in co-authorship with G. Placzek).
9. To the theory of the slowing down of fast electrons by radiation. *Phys. Z. Sow.* **5**, 761 (1934).
10. On the formation of electrons and positrons at a collision of two particles. *Phys. Z. Sow.* **6**, 244 (1934) (in co-authorship with E. Lifshitz).
11. To the theory of heat capacity anomalies. *Phys. Z. Sow.* **8**, 113 (1935).
12. To the theory of the magnetic permeability dispersion in ferromagnetic bodies. *Phys. Z. Sow.* **8**, 153 (1935) (in co-authorship with E. Lifshitz).
13. On relativistic corrections to the Schrödinger equation in the many-body problem. *Phys. Z. Sow.* **8**, 487 (1935).
14. To the theory of accommodation coefficient. *Phys. Z. Sow.* **8**, 489 (1935).
15. To the theory of photoelectromotive force in semiconductors. *Phys. Z. Sow.* **9**, 477 (1936) (in co-authorship with E. Lifshitz).
16. To the theory of sound dispersion. *Phys. Z. Sow.* **10**, 34 (1936) (in co-authorship with E. Teller).
17. To the theory of monomolecular reactions. *Phys. Z. Sow.* **10**, 67 (1936).
18. Kinetic equation in the Coulomb interaction case. *Phys. Z. Sow.* **10**, 154 (1936).
19. On the properties of metals at very low temperatures. *Phys. Z. Sow.* **10**, 649 (1936) (in co-authorship with I. Pomeranchuk).
20. Scattering of light by light. *Nature* **138**, 206 (1936) (in co-authorship with A. Akhiezer and I. Pomeranchuk).
21. On the sources of stellar energy. *Nature* **141**, 333 (1938).
22. On sound absorption in solids. *Phys. Z. Sow.* **11**, 18 (1937) (in co-authorship with Yu. Rumer).

2. Scientific Seminars at UPTI

Today, we have an opportunity to obtain a characteristic of the scientific and managerial activity of L.D. Landau in Kharkiv at first hand: from the memoirs of his Kharkiv pupils [4].

In particular, the Hungarian physicist Laszlo Tisza, who worked at the theoretical department headed by Lev Landau in 1934–1937, attracts attention to the following facts.

“... the Landau group consisted of A.S. Kompaneets, E.M. Lifshitz (Zhenya), L.M. Pyatigorskii, and A.I. Akhiezer...”

Kompaneets was the first from the list of Landau students, he left shortly after my arrival, but later, in Moscow, he joined Landau again. Isaak Pomeranchuk (Chuk), a new reinforcement of the group, arrived shortly after me, and Pyatigorskii left the group because of his private and political discrepancies with Landau. The group communication was very friendly... We all admired Landau...

In my opinion, through the time prism of more than 60 years, I could most objectively summarize what made him so specific. Of course, first of all, this was connected with the Thursday’s journal seminar.

Landau regularly looked through new additions to the library in a cozy room filled with shelves, where he marked 3 to 4 articles in order to distribute them among the group members to be represented at the general weekly review...

His brilliant understanding of the essence of every article was phenomenal. I recall that an article by Lars Onsager on electrolytes was my first task. The choice of the author deserves a comment.

Before his article on the Ising model in 1944, which made him a world-famous mathematical physicist, Onsager was considered to be a chemist, and he was little-known among the Western physicists. His articles on irreversible thermodynamics attracted general attention only in the 1940s.

However, those articles were introduced into the Theoretical Minimum as early as at the beginning of 1930s. Dau (Landau – transl.) expressed his enthusiasm with respect to Onsager as long ago as when the latter was little-known and did not obtain a general recognition. His thought was ultimate for us.

A next, more significant, of his characteristics was his ability to instantly answer any question that you



A.I. AKHIEZER, in 1948

put him... Each time, he enjoyed when he had to use this unique ability" [4, p. 313].

From the memoirs of Academician Alexander Ilyich Akhiezer, we have an opportunity to come to know that

"... every week, a general meeting of the Institute was held. It was the council one week, and the review meeting the next week. Original works carried out by the employees of the Institute were promulgated at the council, and papers in journals were reported at the review meetings.

Landau starred at both the council and review meetings. His speeches and remarks were always critical and concerned the very essence of the issue.

It is amazing how well he understood everything. It is much more amazing that he read little; only in the morning he came to the library with a big notebook and noted down the titles of works that were to be read later and told him.

Those works were reported by his students, as well as by visiting theorists, at his seminar. Landau understood each work instantly and distinguished correct works from the so-called 'pathological' ones.

The functioning of the seminar helped him to possess plenty of topics for independent researches. Although later, I was lucky to communicate with many theorists, I did not meet anybody identical to him by universality, intelligence power, and criticism" [4, p. 44].

3. "It was Here, in Kharkiv, that He Began to Elaborate, for the First Time, the Theoretical Minimum Programs"

One of the most important problems that the young leader of the theoretical department of the UPTI faced with was the problem of skilled scientific staff. Therefore, Landau, on his own initiative, initiated the training of scientists according to a self-developed methodology, which was called the "Theoretical Minimum". Many years later, this initiative was specially distinguished by Academician Petr Leonidovich Kapitza in his memorial paper "Lev Davidovich Landau" and published on the pages of the prestigious collection of biographies "Biographical Memoirs of the Fellows of the Royal Society":

"His wish to impart knowledge to others, especially his students, gave Landau the idea, while still in Kharkiv, of creating a Course in theoretical physics, which is now widely known as Landau's and Lifshitz's many-volume treatise. Landau would be unable to write such a course on his own; in spite of his being an excellent lecturer, he was not very good at expressing his scientific work in writing. Among the young physicists working at Kharkiv were two brothers: Evgeny and Il'ya Mikhailovich Lifshitz. Both were talented scientists with a wide grasp of theoretical physics. The elder, Evgeny Mikhailovich, has, in addition, a talent for literal expression of scientific thought. Lifshitz and Landau complemented each other exceptionally well in the work involved in creating a course in theoretical physics. They were also united by the great friendship which continued unflinchingly throughout Landau's creative life. The course was begun in Kharkiv in 1935 and served as an aid to examinations in theoretical physics, which were at first taken on the synopses of lectures given by Landau to research workers at the Kharkov Physical-Technical Institute" [1, p. 421].

Let us also cite the memoirs of Academician Evgeny Mikhailovich Lifshitz, one of the first Landau's students in Kharkiv:

"The Kharkiv period was a period of intense and diverse research work for Lev Davidovich. It was there that his work as a Teacher began and the cornerstone of his school was laid.

The theoretical physics of the 20th century is rich in brilliant surnames of the founders of the newest. Landau was one of them. But his influence

on the progress in science was not reduced to his own contribution. An outstanding physicist, he was also a true outstanding Teacher, a Teacher by vocation. In this respect, Lev Davidovich can only be compared with his teacher, Niels Bohr.

The issue of theoretical physics tutoring, as well as physics in general, attracted his attention as early as in the young age. It was here, in Kharkiv, that he began to elaborate, for the first time, the Theoretical Minimum programs, the cornerstone knowledge in theoretical physics that is required for physicists-experimenters and, separately, for those, who want to devote themselves to a professional work in theoretical physics.

Not confining himself to the elaboration of only programs, he lectured on theoretical physics for scientific researchers at the UPTI and for students at the Fiz-Mech (the Physico-Mechanical Faculty at the Kharkiv University – transl.).

Being highly interested in the ideas of developing the physics tutoring, he accepted the position of the head of the general (experimental – A.T.) physics chair at the KSU [later, after the war, he continued lecturing on general physics at the Faculty of Physics and Technology of the Moscow State University (MSU)].

It was here, in Kharkiv, that the idea grew and the implementation of the program aimed at composing the general course of theoretical physics and the course of general physics began” [3, p. 11–13].

Among the firsts who managed to pass the theoretical minimum exam was Alexander Ilyich Akhiezer. According to his memoirs,

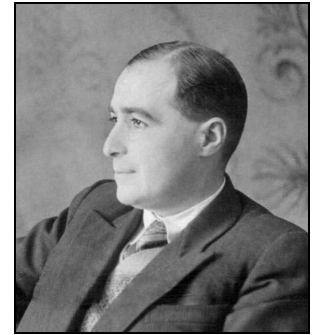
“... the theor-minimum consisted of classical mechanics, fundamentals of statistical physics and thermodynamics, mechanics of continuous media, special theory of relativity and classical electrodynamics, electrodynamics of continuous media, general theory of relativity and gravity, non-relativistic quantum mechanics, relativistic quantum mechanics, quantum statistics and kinetics.

Furthermore, one had to understand the mathematical analysis, differential equations, and the theory of functions of a complex variable.

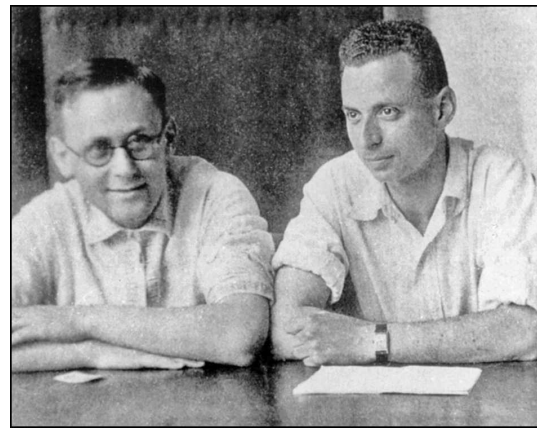
The theor-minimum programs were elaborated very carefully by Landau himself in order not to overload them with redundant details and not to complicate the examination. Really, the most important issues had been chosen.



E.M. LIFSHITZ, in 1930s,



I.M. LIFSHITZ, in 1948



A.I. AKHIEZER(left) and L. TISZA (right), in 1936

The same was with mathematics. Landau did not require to remember the proof of various sophisticated theorems. One had to quickly calculate integrals, solve basic differential equations, and apply the theory of functions of a complex variable.

It was required to pass eight exams in physical domains and a separate exam in mathematics.

Only after having passed the theor-minimum exams, an interested person was included into the Landau group and could even address him with familiarity. To those who passed the theor-minimum exams, Landau proposed a scientific topic to be solved without the help from Landau...

In Kharkiv, A.S. Kompaneets and E.M. Lifshitz were the first who passed the theor-minimum exams and became his disciples.

The author of these rows was the third, I.Ya. Pomeranchuk the fourth, and Laszlo Tisza the fifth” [4, p. 89–90].

4. Niels Bohr. Kharkiv. UPTI

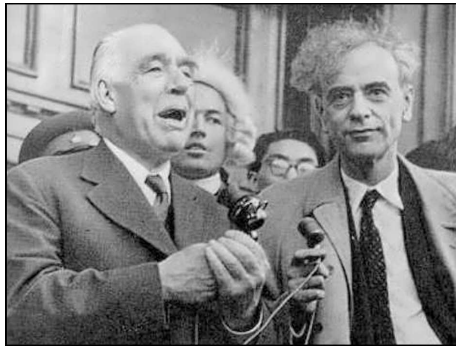
In Kharkiv, there emerged a center of theoretical physical thought; Soviet and foreign scientists visited it very often.

Academician I.V. OBRIMOV,
the founder and director of the UPTI

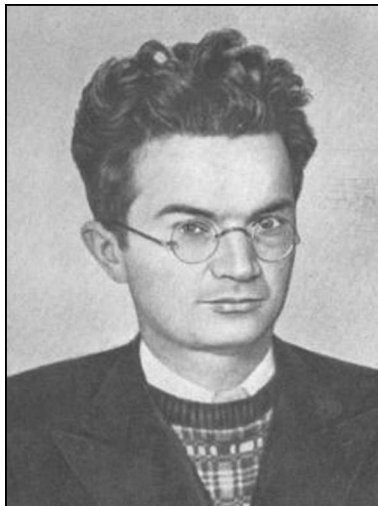
It was in Kharkiv, on the basis of the UPTI, that the first conferences on theoretical physics in the USSR were held: in 1929, 1931, and 1934.

Many years later, the first director of the Institute Ivan Vasil'evich Obreimov highlighted the cornerstone component of this UPTI phenomenon on the pages of his memoirs:

“In Kharkiv, there emerged a center of theoretical physical thought; Soviet and foreign scientists visited it very often. Every year, V.A. Fock arrived for two months from Leningrad. From the spring of 1930 and



N. BOHR and L. LANDAU, Moscow, in 1961



I.Ya. POMERANCHUK

during three years, Dirac arrived three times from Cambridge; and Podolsky, a theorist from Princeton (USA), worked in Kharkiv for a year. P.S. Ehrenfest came twice from Leiden on winter vacation, Placzek came two times... Weisskopf arrived twice, and Peierls once...

Hence, Kharkiv was like a capital of theoretical physics. It was there that a discussion on secondary quantization took place, in which Landau, Fock, Dirac, and Podolsky participated. It is important that all theorists came not as guests, but they worked there for several weeks.

In 1934, Niels Bohr came to us for three weeks, and every day before the lunch he worked with the theorists.

In 1933, L.D. Landau ultimately moved to Kharkiv. There emerged a group of his disciples (A.I. Akhiezer, I.M. Lifshitz, I.Ya. Pomeranchuk). The basis of the Kharkiv school of physicists-theorists was laid...” [5, p. 24].

It is worth separately emphasizing the eloquent fact that, in 1934, the UPTI was visited by the Nobel laureate Niels Bohr. According to the message in the scientific journal “Uspekhi Fizicheskikh Nauk” [6],

“On May 1–22 of this year, the All-Union Conference on theoretical physics organized by the Ukrainian Institute of Physics and Technology was held in Kharkiv. The conference was participated by theorists from Moscow, Leningrad, Kharkiv, and other cities; furthermore, there were many foreign scientists, among whom Professor Niels Bohr (Denmark) should be mentioned first of all.

The Kharkiv conference was mainly devoted to the discussion of theoretical works that were at the elaboration stage; many authors made reports about works that were unfinished or not formulated to the end; and discussion was not always enough to make incomprehensible issues clear.

Probably, many of the issues discussed at the conference will never be published: the conference has obviously got a character of production meeting, rather than a congress, which purpose was to highlight the progress”.

Here is a comment of Niels Bohr concerning the UPTI and dated May 22, 1934:

“I am glad to get opportunity to give expression for the feeling of great admiration and pleasure with which I have seen the beautiful new physical-technical institute in Kharkov, where the excellent condition

for experimental work in all branches of modern physics are utilized with greatest enthusiasm and success under most distinguished leadership and closed collaboration with brilliant theoretical physicist” [7].

It is worth illuminating the Kharkiv correspondence between Lev Landau and Niels Bohr [3, p. 334–336], because it characterizes the international scientific community at that time. In particular, we consider it necessary to cite a letter of L. Landau dated April 13, 1936:

“Dear Mr. Bohr, I am grateful for your letter. I was last month in Moscow and Leningrad and has just got the letter a few days ago. My ‘Paris’ journey in the spring has come to nothing. I have recently had so immensely much sorrow that I could not occupy myself with the matter, and now it is too late for this spring. Now the sorrows are almost ended, so that I would very much like to come to Copenhagen, if I succeed to have all the necessary formalities settled. I would very much like to have the exact time for the start of the conference. I would like Placzek to inform me about it. I congratulate you on your 50th birthday. I had the whole time planned to write an article to “Festskrift”, but on account of the sorrow I lacked the mood to do so. I would like to emphasize that you can always count on my faithfulness” [3, p. 334].

Here is Niels Bohr’s reply dated April 25, 1936:

“Dear Landau, your kind letter brought again all the mood back from the many pleasant and unforgettable times we have had together both in Copenhagen and in Russia. I am sorry to hear that you have had heavy sorrow. We should all be very glad if you could come here soon again, and I hope very much that it will be possible for you to take part in our conference on atomic physics in the week 14–26 June. On 21–28 June a philosophical congress will be held here, at which especially the causality questions in physics and biology will be discussed... With a sincere pleasure from all of us and especially from my wife. Your N. Bohr” [3, p. 335].

5. Sapientia Sat³: 1937

In 1937, L.D. Landau was forced to leave the UPTI and move to Moscow. Lev Davydovich continued his scientific activity at the Institute of Physical Problems (the Academy of Sciences of the USSR) headed

by P.L. Kapitza. Several factors stimulated Lev Davydovich Landau to do this.

In particular, the following facts can be found on the pages of A.I. Akhiezer’s memoirs:

“On April 1 (I do not remember the year, but it was within the first years of the Institute), a sealed order of the institute administration appeared on the notice board, where the scientists of the institute, including the research supervisors, were classified, and their salaries were indicated in accordance with their scientific masterpieces.

In the morning, after everybody had got acquainted with the order, there arose a scandal, and the offended persons ran to the director. But it turned out that he knew nothing about this order, although the order was signed with his signature.

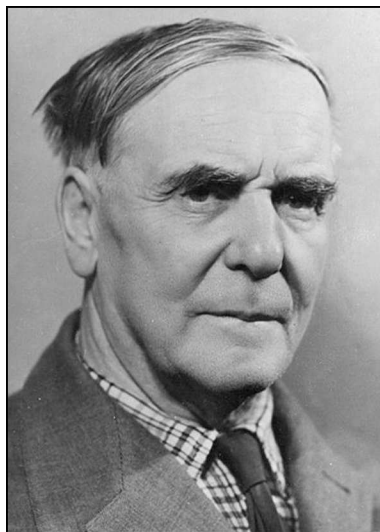
It turned out soon that this order was a fake invented by Landau. The typists at the institute office, who were favorably disposed toward Landau, helped him to print out the order and promulgate it. One cannot say that this event enhanced the sympathy of the scientific supervisors toward Landau” [4, p. 46–47].

In addition, Alexander Ilyich remembered the following:

“In Kharkiv, a Faculty of Physics and Mechanics was organized at the Mechanical Engineering Institute, like the Faculty of Physics and Mechanics at the Leningrad Polytechnic Institute. I.V. Obreimov became the dean of the new faculty. At this faculty, Landau headed the Chair of Theoretical Physics, and, from 1935, he was the head of the Chair of Experimental Physics at the Kharkiv University...

Landau was a great patriot, and he considered various promotions of the development of the physical education in the country to be one of his most important tasks. For this purpose, he wanted to obtain a government support and asked for a meeting with M.I. Bukharin who was a member of the Politburo of the Central Committee of the All-Union Communist Party (bolsheviks). Bukharin met with Landau. Landau was delighted with Bukharin and even published an article “Bourgeoisie and modern physics” in the *Izvestia* newspaper dated November 23, 1935. The very title testified that Landau was committed to the ideals of socialism, he highly appreciated the scientific achievements by Marx and demonstrated, like Einstein, a great respect to Lenin. No wonder that Landau was considered in Copenhagen although

³ Latin: Enough for the wise – (transl.).



P.L. KAPITSA

not entirely 'red', but 'pink'... He visited Copenhagen three times, and every time he returned back to the homeland...

The reformation of physics tutoring touched the interests of some gray-haired professorship...

Insults and ambitions against Landau were accumulated, and an explosion was expected. A proper moment came after a criminal assassination of S.M. Kirov, the secretary of the Leningrad Regional Committee, which started the period of Stalin's terror.

In March 1937, Landau was fired from the university. The reasons for his firing were not indicated in the order, but, as was found out later, it was a supposed propaganda of the idealism by Landau. Undoubtedly, there were denunciations and slanders against him. By supporting a protest, Shubnikov and the researchers from Landau's theoretical department, who worked at the university, put in applications for the dismissal. This action was qualified as a strike, and the whole group was summoned to Kyiv, to the People's Commissar V.P. Zatonskyi.

From the conversation with Zatonskyi, one could easily understand the sense of denunciations against Landau. The conversation ended with a proposal to the 'strikers' from the People's Commissar to return back to their workplaces and continue working. Landau however was not reinstated in his position.

Instead, unfavorable conditions were also initially created for Landau at the UPTI. The institute ad-

ministration preferred second-rank works, which allegedly had an important applied and even defence significance, against Landau's outstanding ones. Landau decided to move to Moscow, to work with P.L. Kapitza, for which the USSR government had built a new first-class institute... If Landau had stayed in Kharkiv, his fate would probably have been the same as that of Shubnikov and his other comrades, and he would have been shot. In Moscow, the wave of terror reached Landau only in a year, and he remained alive only owing to Kapitza" [4, p. 90–92].

Describing the further employment of L.D. Landau at the Institute of Physical Problems (IPP), it is appropriate to cite the memories of the then Director of the Institute, Academician P.L. Kapitza:

"In 1935, the Institute for Physical Problems was established in Moscow in order that I could continue my works started in Cambridge. Owing to Rutherford's goodwill, I could transport my equipment from the Mond Laboratory and, after a three-year delay, resume my work on strong magnetic fields.

After a scientific activity began at the IPP, Landau moved here from Kharkiv in 1937, and, a year later, his closest student and friend, the co-author of the course of theoretical physics E.M. Lifshitz followed him" [1, p. 419].

A year later, the wave of repressions caught L.D. Landau. The origins of his arrest can be analyzed on the basis of protocols of interrogations of the UPTI personnel. Let us cite the most "informative" of them:

"Question: What do you know about the members of the counter-revolutionary groups at the UPTI mentioned by you?

Answer: ... Landau Lev Davidovich, the son of a saboteur that was arrested by the NKVD. By his political beliefs, he is a Trotskyist. According to his Trotskyist viewpoints, which praise the people's enemy Trotsky, he spoke with shame about Comrade Stalin, who 'took Trotsky's achievements for his own', and spoke in public in the Kharkiv House of Scientists in 1933.

In science, Landau holds eclectic positions that are a mixture of idealism and mechanicism; he popularized those theories among the Soviet students at the KSU...

When Landau had been disclosed by students as an idealist, and the administration of the State Uni-

versity had demanded explanations from Landau, the latter organized a strike with Shubnikov, Gorskii, Lifshitz, Akhiezer, Diamantov, and other UPTI employees who moonlighted by lecturing at the State University. An analogous strike was organized by Landau in 1933–1934 at the Kharkiv Mechanical Engineering Institute with the participation of Landau, Obreimov, Sinelnikov, and others, whom I do not remember.

It is characteristic that the director of the KMEI Efimov, when having obtained applications from the strikers, summoned a typist and, in their presence, began to dictate a letter to Petrovskii at the State Administration of High School Institutions about the strike at the institute. The determination of the director forced Landau, Obreimov, and others to retreat, which stopped the strike. However, later this group left the KMEI.

Landau is an anti-Soviet person. Since Leningrad, he has been closely and friendly related with Ivanenko – a counter-revolutionary deported by the NKVD from Leningrad after the murder of Kirov (Ivanenko is a son of the editor of “Kievlyanin” [“the Kyiv citizen”, a newspaper – (transl.)] – and with Gamow...

Landau is one of the co-authors of a provocative fake order promulgated in the UPTI in 1934, with the aim to mock at Slitskin’s laboratory.

Landau was expelled from the trade union for his political hooliganism, and—in 1937 in Kharkiv—for a strike at the State University.

Hiding behind pompous phrases about ‘pure’ science and expressing a disdain for everything applied, Landau spoke following this context at scientific conferences, meetings, and hence carried out a large saboteur work...

Obreimov Ivan Vasil’evich is a nobleman’s son; he has a brother abroad, who emigrated together with the Whites. A member of Landau’s counter-revolutionary group... Obreimov is an author of the notorious counter-revolutionary ‘passage door’ theory, according to which Soviet young specialists should work at the UPTI for not longer than 1–2 years, and afterward they have to free their positions to others. Only super-gifted, high-skilled physicists have to obtain permanent positions at the institute...

Since the laboratory of Prof. Slutskin (the defence-aimed works) had been organized, Obreimov regu-

larly baited it trying to defame the scientific name of Prof. Slutskin and his collaborators.

In Obreimov’s premises, the meetings of the counter-revolutionary group were held” [8, p. 264–265].

Below, other interrogation protocols of the UPTI employees are cited, which illustrate the social and political background of the events at that time.

“Question: What do you know about the Trotskyist credo of Landau?

Answer: I have known Landau as a convinced Trotskyist since 1932. During a number of our private conversations in 1932–1936, Landau openly expressed his counter-revolutionary Trotskyist views.

He expressed disbelief about the possibility to build socialism in the USSR because of those contradictions that, in his opinion, exist among the working class and peasantry.

Difficulties at the collectivization were explained by Landau as a resistance offered by the peasantry to the Soviet state during this action. Landau believed that the policy of collectivization in agriculture would lead to a collapse and would be suspended soon. In collective farms, according to Landau, the labor is compulsory, and this fact explains the low productivity and low yields.

Landau also said that the compulsory labor in the collective farms was responsible for a high death rate in Ukraine in 1932–1933. Landau believed that the All-Union Communist Party (bolsheviks) was bureaucratic, a system that did not provide an opportunity for its reconstruction... There isn’t any democracy in the USSR, one may not freely criticize and express his opinion, a directive from above must always be expected for... Landau always spoke ironically about Comrade Stalin; for example, the ‘beloved leader’, the ‘father of nations’, and so forth” [8, p. 215].

“... Shubnikov, being supported by the members of the Landau and Korets organization and by means of provocations and harassment, expelled the senior scientist Ryabinin, who dealt with application problems without his permission, from the cryogenic laboratory... Being driven to despair, Ryabinin beat Landau and was forced later to leave the institute” [8, p. 257].

Only about twenty years later, the events described above were reconsidered by the relevant state authorities. Let us cite one of the archived documents that were published:

“This explanation was taken by me and written down by the director of the UPTI of the AS of the



K.D. SINELNIKOV



A.I. LEIPUNSKII

UkrSSR, Professor, full member of the AS, Honored Scientist of the UkrSSR Sinelnikov Kiril Dmitrievich, who lives in Kharkov, 6 Tchaikovskogo Str., apt. 1.

Senior authorized officer of the 1st division of the UKDB KhO senior lieutenant Khoteev.

K.D. Sinelnikov's explanation

July 3, 1956

... At that time, there were plenty of discussions at the UPTI about the direction of works; there were too many disputes and disagreements concerning the general direction of the scientific activity of the institute; there were many talks that the institute was working

badly owing to a large number of the employees that had no scientific results within several years; about the necessity to raise the theoretical level of the researchers; about the necessity to regularly 'clean' the institute from the useless ballast...

Prof. Landau was dismissed by the rector of the university on the basis of students' indignation at the mocking attitude of Prof. Landau with respect to them. The dismissal of Landau by the rector was illegal, because a dismissal of a professor could only be certified by an order of the Ministry (the People's Commissariat). Some of the UPTI employees, who lectured at the university, supported the protest and wrote a collective application for dismissal.

The party organization of the university appealed to the UPTI about a public consideration of the case. At a very heated meeting of the UPTI staff, the "strike" was undoubtedly condemned.

When speaking at that meeting, I analyzed the reasons that stimulated the conflict with the Landau students, pointed out an unacceptable arrogance of some of the researchers with respect to the students, and also marked that this arrogance originated from the old days when there was a group of undoubtedly gifted youth at the Leningrad University (Landau, Ivanenko, and others), who named themselves as a 'jazz band' and named all other students as 'subs', i.e. those who were worth less than themselves.

I never said about any counter-revolutionary organization. Landau's arrogance is explained by his well-known self-admiration rather than political reasons.

All UPTI employees who participated in the 'strike' recognized an unacceptable character of the 'collective protest' method applied by them" [8, p. 277–278].

In order to objectively apprehend the realities of the events at that time, it is worth characterizing the stand point of the then director of the UPTI Oleksandr Illich Leipunskii. Here is a fragment from his letter to the Head of the People's Commissars of the USSR V.I. Mezhlauk:

"Dear Valerii Ivanovich! As far as I am informed, you are still interested in Kapitza and his institute. So, I address you with the following affair.

At our institute, there is a young very gifted physicist-theorist L.D. Landau, who is now negotiating on his move to Kapitza's institute. He is, of course,

one of the leading scientists in this domain. By his endowment, this man substantially excelled Kapitza.

Unfortunately, his political physiognomy cannot be considered as entirely Soviet. He regards the Soviet community with internal (and sometimes, external) neglect.

The education process is sometimes quite painful for the student. Recently, we have subjected him to educational shocks. This resulted in an undoubted benefit, which he has to recognize himself; however, he is evidently inclined to free himself from a permanent pressure that he is subjected now, and change to a status according to which he and Kapitza would become recognized leaders of a certain group of scientists" [9, p. 51].

Instead, L.D. Landau leaved to Moscow and began his scientific activity at the Institute of Physical Problems of the AS of the USSR.

O.I. Akhiezer became a successor of L.D. Landau as the head of the theoretical department at the UPTI. Much later, in his declining years, Oleksandr Illich summarized the scientific and managerial workpiece of Lev Davidovich Landau made in Kharkiv:

"Landau worked at the UPTI from 1932 to 1937; and although this period was short, the influence of Landau on the scientific activity of the UPTI can hardly be overestimated. Landau was one of the few who made the Institute famous around the world. The UPTI was a springboard, where the great ideas of Landau in science, pedagogy, and staff training were formulated and, to a great extent, implemented.

The aim of Landau was clear from the very beginning: the creation of a theoretical department, the revealing of creative youth and a work with them, the scientific activity in theoretical physics, the pedagogical work, writing books and reviews in theoretical and general physics, interactions with experimenters...

Landau was lucky not to turn out in a group of arrested people at the UPTI. He was in Moscow. But the wave of terror and 'Yezhov's iron gloves' reached him there, and, in April 1938, he was arrested...

Much later, the materials of the 'Landau case' were published in the journal *Izvestia TsK KPSS*. From those documents, one can see that Landau was charged for the anti-Soviet activity and the participation in composing a counter-revolutionary leaflet. At



Near the entrance to the UPTI. Kharkiv, in 1930s. From left to right: (the 1st row) L.V. Shubnikov, O.I. Leipunskii, L.D. Landau, P.L. Kapitza; (the 2nd row) B.M. Finkel'shtein, A.M. Trapeznikova, K.D. Sinelnikov, Yu.M. Ryabinin

first, Landau rejected the allegations made against him, but later, maybe under the influence of some factors, he said, 'I consider it absurd to further deny my involvement in composing the counter-revolutionary document shown to me'. But the authorities did not manage to inflict bloody reprisals on him, as it was with Shubnikov, Rozenkevich, and Gorskii. Owing to tremendous efforts by Kapitza, the authorities were forced to free Landau. Nevertheless, he was not exculpated, but simply released on bail to Kapitza. We all must bow our heads in respect to the courage of this great man and scientist. Landau was only rehabilitated in 1990, many years after his death. So, from April 28, 1939, when he was freed, and to April 1, 1968, when Landau died, he remained guilty and accused in the participation in an anti-Soviet group...

After Landau had moved to Moscow and, if I could say so, after his second birth associated with his liberation from the Lubyanka, the connection between the theorists at the UPTI and Landau became even closer. In fact, no work was published without discussion with Landau" [10, p. 1021–1025].

1. *Physicists about Themselves* (Nauka, 1990) (in Russian).
2. *Physics. Problems, History, People* (Nauka, 1986) (in Russian).
3. *Recollections of L.D. Landau*. Edited by I.M. Khalatnikov (Nauka, 1988) (in Russian).
4. A.I. Akhiezer. *Essays and Memories* (Fakt, 2003) (in Russian).

5. I.V. Obreimov. The history of natural science thought within half a century. *Visn. Akad. Nauk Ukr. RSR* No. 10, 10 (1971) (in Ukrainian).
6. M.P. Bronshtein. Conference on theoretical physics. *Usp. Fiz. Nauk* **14**, 516 (1934) (in Russian).
7. A.Ya. Usikov. *Moments of Life* (Mystetstvo, 1990) (in Russian).
8. Yu.V. Pavlenko, Yu.N. Ranyuk, Yu.A. Khramov. *The UPTI Case. 1935–1938* (Feniks, 1998) (in Russian).
9. B.S. Gorobets. *The Three from the Atomic Project: Top-Secret Physicists Leipunskiis* (LKI, 2008) (in Russian).

10. O.I. Akhiezer. Landau and UPTI. *Ukr. Fiz. Zh.* **43**, 1013 (1998) (in Ukrainian).

Received 22.10.17.

Translated from Ukrainian by O.I. Voitenko

А. Таньшина

ЛЕВ ЛАНДАУ. УКРАЇНА, ХАРКІВ, УФТІ

Р е з ю м е

Упродовж 1932–1937 рр. саме Левом Давидовичем Ландау було закладено підґрунтя харківської наукової школи за галузю теоретична фізика.