

# Vavilov and FIAN: a perspective from 2016

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**Abstract.** The 2016 celebration of the 125th anniversary of the birth of Academician S I Vavilov, the outstanding physicist of the last century, provides an opportunity to compare what is going on today at the Russian Academy of Sciences (reforms, new members election, etc.) to the days long ago that preceded the foundation of the P N Lebedev Physical Institute (FIAN). The role of S I Vavilov and his academician colleagues in fighting bureaucracy and bureaucrats to create real academic science in our country is examined in this short paper.

**Keywords:** history of physics, S I Vavilov, FIAN

*...Have I made a mistake to have become a physicist?  
True, I love physics, to me it is an absolute prima res;  
after all, one may be fond of Pushkin and not be a  
'Pushkin', but loving physics means being a physicist.  
From S I Vavilov's diaries [1]*

One hundred twenty-five years separate us from the day of Sergei Ivanovich Vavilov's birth. Books and papers have been written and investigations have been performed, which are concerned with the legendary personality of the founder of the P N Lebedev Physical Institute of the Russian Academy of Sciences (LPI or FIAN in Russian abbreviation). S I Vavilov lived a short, according to modern notions, academic life but left a brilliant vestige both as a researcher and as an outstanding public figure. S I Vavilov's life abounded in striking and dramatic events: participation in the war, capture, scientific rise, conferral of academic title, foundation of a new type of physics institute, hardships of the second war, the deaths of his loved ones (especially of his beloved brother), supervision of the Academy of Sciences (AS) during the hardest times of post-war devastation under the oppression of Stalin's regime, and sudden death after another heart attack. For many years, appreciative descendants — present-day LPI staff members — have commemorated the birthday of the Founder with Vavilov Readings, which invariably attract physicists, chemists, technologists, and simply the people attracted by Sergei Ivanovich's personality. Conducted in 2016 were the jubilee 40th Vavilov readings.

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According to the established tradition, apart from valuable scientific reports, the Readings' preamble contains a historical essay related to Vavilov's name and his time. Not being a historian of science, the author of this essay has no pretensions of providing a rigorous account of the sequence of events preceding the LPI organization.

The 1920s was a time when the intellectual infrastructure (which comprised, in particular, religion, philosophy, and social creation) of Russian science was impoverished and deeply distorted, and the multistructural character of science (due to public and private sectors, which opened alternative paths for development) was undermined. The possibilities for the self-organization and self-control of science were quite narrow, its discipline structure was truncated, and the ties with world science were weakened.

As follows from historical documents, during the first years of the Soviet State the Bolshevik government hardly paid attention to the 'Imperial' Academy of Sciences.

It was not until 27 June 1925 that the Council of People's Commissars (CPC) pronounced the Academy of Sciences to be the supreme scientific institution of the country and appointed a special commission under the chairmanship of V P Milyutin to work out the statute of the All-Union Academy of Sciences (its initial name). Academy activities gradually fell under the jurisdiction of three CPC institutions. Milyutin's commission, which comprised A N Bakh, M N Pokrovskii, A Ya Vyshinskii, V P Volgin et al., considered the plans, reports, and budgets of the Academy. For the first time, scientists had to submit their workplans to government officials for approval. Moreover, the commission's resolutions were secret and not to be made public. The general management of the Academy's activities, including its foreign relations, was controlled by the CPC's commission for the promotion of the Academy's work, which was chaired by A S ENUKIDZE. The third institution — the Department of Scientific Organizations of the CPC (headed by E P VORONOV) — was concerned with taking care of day-to-day affairs. The commission worked out the first academy statute (1927), which stated: "...The USSR AS consists of members (academician), honorary members, corresponding members, and scientific personnel..."

The CPC approved the new statute; it contained clauses to which academicians had different attitudes. From then on, the Academy was charged with the obligation of "*accommodating exact theories... for practical application in industry and the cultural and economic development of the USSR.*" A clause appeared about expulsion of an academician from the Academy of Science [2]. According to academician N K Nikol'skii, the statute consolidated "*the conditions for administering the Academy that had formed without prior arrangement during the transitional years of military commun-*

ism,” when the urgent solution to a problem was sometimes a matter of life and death of famished or arrested scientists: from then on, the Presidium was allowed, without the participation of the remaining academicians, not only to decide upon but also to carry out ‘urgent activities’, with the only reservation being that the actions taken had to be reported to the nearest General Meeting.

To ensure that communists could become members of the Academy of Science at least in small numbers, an unheard-of number of vacancies were opened: the number of academic chairs was raised from 45 to 70, which actually doubled the numerical strength of the Academy, taking into account the deceased and the vacancies. According to the new electoral procedure, “representatives of the scientific institutions of the union republics at their option” could participate in the elections on equal grounds with academicians.

Subsequently, the party leaders would quite resolutely interfere in the Academy’s destiny. A meeting of the Politburo of the All-Union Communist (Bolshevik) Party (AC(B)P) with the participation of comrade Stalin was held on 23 March 1928, and the minutes of the meeting listed those who were to be elected members in the course of the next elections to the Academy:

(1) *AC(B)P members*— Bukharin, Krzhizhanovskii, Pokrovskii, Ryazanov, Gubkin, Lukin, Friche;

(2) *closer-to-us candidates* (Deborin, Bakh, Pryanishnikov, Kol'tsov, etc., 13 in all);

(3) *acceptable candidates* (15, with Vavilov, Kablukov, Rozhdestvenskii, Gedroits, Obruchev, Shokal'skii, and Chichibabin among them).

In less than one month, on 12 April 1928, the AS announced 41 vacancies, which ten scientists-communists had claims on: N I Bukharin, A N Bakh, I M Gubkin, A M Deborin, G M Krzhizhanovskii, N M Lukin, D B Ryazanov, P N Sakulin, M N Pokrovskii, and V M Friche.

On 6 June 1928, the thirty-three-year-old head of the Department of Scientific Organizations of the CPC E P Voronov summoned the indispensable Academy Secretary, sixty-five-year-old academician Sergei Fedorovich Oldenburg, an outstanding orientalist and a specialist in Indian culture, to repeat his previous demand: *The Government has waited for ten years and has repeatedly made overtures to the Academy, but in the eleventh year the Government will treat the Academy in its own way. The Academy has failed to recognize and occupy the position it must occupy in the Soviet State* [3].

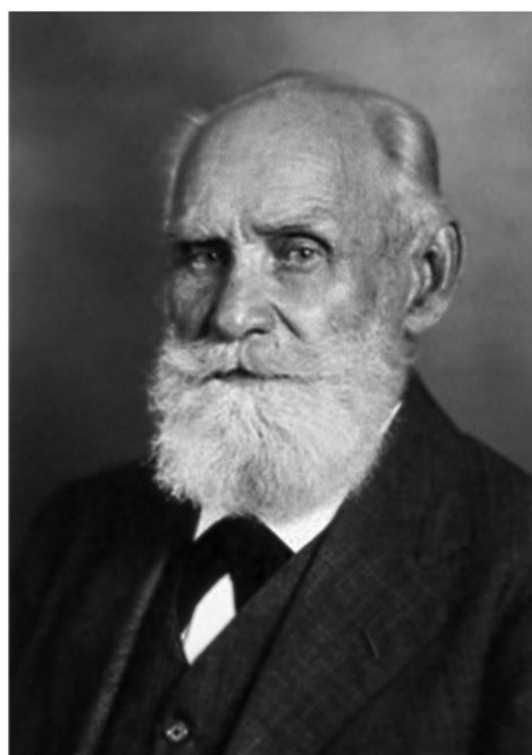
The destiny of the young functionary was far from perfect. Efim Pavlovich Voronov (1895–1957), an AC(B)P member since the age of 23, was expelled from the party in 1938 “for loss of political vigilance” and peculation of state funds. In 1938–1941, he was a shop superintendent in the Senior Office of Secondary Raw Materials.

The ideas of total reorganization of science were in the revolutionary air, and the people appointed by the new authorities to look after it generated several projects whose central point was the establishment of an all-embracing scientific agency. The authors somehow proceeded from several propositions which they regarded as axioms: 1) the science inherited from the old state system is ruled by “high priests of science”, and they should be overthrown; 2) science should be “mobilized” to serve the cause of revolution; 3) the “concentration and centralization” of science are of absolute necessity; 4) a new special control structure should be organized in the state machine for achieving these goals. The authors of these projects would usually see themselves at the

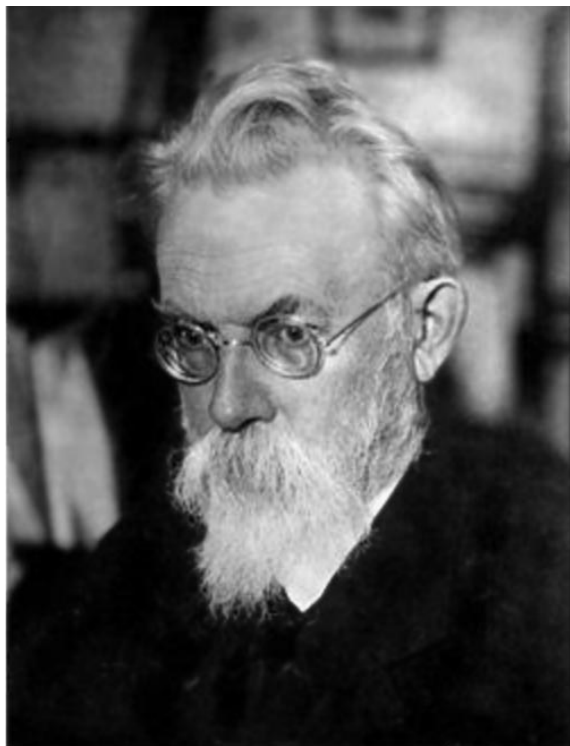


Academician Sergei Fedorovich Oldenburg (1863–1934), the Indispensable Secretary of the Academy.

vertex of their imaginary pyramids. By way of example mention can be made of the idea of a Scientific and Technical Department (STD) of the Supreme Soviet of the National Economy (SSNE), which was introduced by yesterday’s technology student N P Gorbunov and approved by the



Academician I P Pavlov (1849–1936), a 1904 Nobel Prize laureate.



Academician V I Vernadsky (1863–1945).

CPC, where Gorbunov was a secretary: the CPC decided that the STD SSNE would be *at the head of all scientific institutions, societies, organizations, laboratories, etc. within the Russian Socialist Federative Socialist Republic for the purpose of their consolidation and distribution of all tasks from Soviet Power among them* [4].

Of importance is the citation from academician V I Vernadsky's letter (1932) to his son: *...During the discussion of the Statute of the Academy, I addressed the meeting (it was my mistake) and spoke, in highly discreet terms but clearly and definitely, about the necessity of free scientific work and a solicitous attitude toward talented people, about protection of gifted people as the greatest benefit for the country. This was a bomb. It was immediately demanded that I give an explanation, and it turned out that it took a lot of effort to stop my persecution in the press and prevent this error of mine from publication (publicity). They explained to me that academicians-communists were taking the trouble to prevent the Academy from being demolished—they are struggling for this—and that this statement of mine, at the present political moment, might have consequences abroad...* [5].

The Nobel laureate academician I P Pavlov also made his contribution to the discussion of the critical issue of elections to the Academy. He thus spoke to the General meeting of the Academy on 6 October 1928: *...For the first time in the history of our Academy, to the best of my knowledge, before the elections the government declares the desirability of certain candidates for it.... I believe that this undermines the Academy's dignity...* (see also Ref. [7]).

The newly elected (1929) academician P N Sakulin wrote a letter to the indispensable Academy Secretary Oldenburg: *It is important not only to establish relations with the party group of scientists but also to make these relations normal. It is plainly clear that this group is entering the academy to inspect and control it rather than work in it. Today, insistently enforced in*

*all segments of the ideological and generally cultural front is the principle which I call an ideological and methodological dictatorship. Below, Sakulin wrote: this is a crucial moment. The party formula 'to inspect and control' must be decisively opposed to the freedom of scientific thought. When entering the Academy, a scientist should know that he may acquire a 'leading' position not because he has a party-membership card in his pocket but because he impresses others by the significance of his scientific merits. The present state of affairs is such that only the academy is capable of advocating this position. Scientists in the whole country look to it with faith and hope as if at a citadel of science* [8].

After the failure of several communists in the elections to the Academy, the delegation of academicians was summoned to a CPC meeting in Moscow. V Kuibyshev's speech was the bluntest; he was not only the SSNE president, but also a member of Stalin's Politburo. He demanded that the Academy be treated "with fire and sword" [5] and simply be closed down. The majority in the SSNE nevertheless decided to authorize a re-vote. It was significant to force the Academy to its knees.

*In the twelfth year of the proletarian dictatorship, it is time to abolish the old rotten anachronism of secret ballot. In the Soviet Republic every honest citizen must vote openly* [9]. *We demand that the entire activity of the Academy of Sciences be under the inspection of all the proletarian public* [10].

Endeavoring to save the Academy, academicians nevertheless admitted them into their midst. But peace did not set in. None of the warring parties reached their goals. Attempts to make the Academy completely obedient did not meet with success. Since the most prominent figures among the communists admitted to the Academy were Bukharin and Ryazanov, who fell into disgrace at precisely that time, the Academy of Science became a real stronghold of pluralism. Surgical intervention became inevitable.

One of the most consistent hardliners was M N Pokrovskii, who became an academician in January 1929. In April 1929 he declared: "The period of peaceful coexistence has come to an end." Pokrovskii considered the centralization of science as something like collectivization, and his call to take science away from scientists and pass it to four thousand workers' faculty students who were graduating from the institutes of higher education bore a strong resemblance to calls for the dispossession of kulaks (wealthy peasants).

Not all prominent academicians were forgiven for their moves in defense of Academy independence. An example is provided by the tragic fate of S I Vavilov's teacher, an outstanding biophysicist and geophysicist, Petr Petrovich Lazarev, who founded, by the way, the journal *Uspekhi Fizicheskikh Nauk* (now *Physics-Uspekhi* in English translation) [11] in 1918. A few words about P P Lazarev, who was elected a member of the Academy at the age of 39 in 1917. He began working at Moscow University in P N Lebedev's laboratory in 1903.

Petr Petrovich showed civil courage and left Moscow University with a group of professors in disagreement with the reactionary actions of the Minister of Public Education L Kasso (the case of Kasso). In 1912, in Warsaw he defended his Doctoral thesis in physics entitled "Bleaching of dyes and pigments in the visible spectrum." In 1912, after P N Lebedev's death, Lazarev took charge of his laboratory. The reader interested in P P Lazarev's biography is referred to the remarkable paper by E V Shpol'skii, "Petr Petrovich Lazarev (1878–1942)" [12].



Academician P P Lazarev (1878–1942).

In January 1929, Lazarev incurred displeasure by disputing the re-balloting of the communists who were voted down in the elections for membership in the USSR Academy of Science. A host of denunciations against him followed after one of his usual lectures in which he pointed out Engels's mistake on the issue of  $\sqrt{-1}$  (although to the same audience he spoke of the very interesting, in his opinion, thoughts in Engels's *Dialectics of Nature*). Lazarev was arrested at home on the night of 5 March 1931. The Institute of Physics and Biophysics, Lazarev's main brainchild, was transferred to the jurisdiction of the SSNE and turned into the chemical Institute of Special Tasks, which was to be engaged in some secret kinds of radiation. All of Lazarev's staff members were discharged and all valuable equipment vanished. Unable to withstand the hardship, Lazarev's spouse Ol'ga Aleksandrovna committed suicide. In September 1931, he was released from prison and sent to exile in Sverdlovsk. It is likely that the petitions of several academicians played a role, as did their successful tactics: their application to V M Molotov, who supported the Academy. As his farewell, P P Lazarev delivered a lecture at the Joint State Political Directorate: *The inception and end of the Universe*. P P Lazarev returned to the capital at the end of February 1932 [13].

"I am quite happy that he has been allowed to come back," wrote academician Vernadskii in his diary. "*It was not the Academy governing body that petitioned for him, but Menzbir (academician M A Menzbir, the founder of Russian ornithology) and comrades and pupils. The Vavilovs refused to sign the petition (res!). It went through Molotov*" [14, p. 251]. Lazarev remained out of favor till the end of his life. He was attacked for "pseudo-scientific theories" in 1938.

The slogans "to reorganize the Academy of Sciences" were replaced with the demand to put "the Academy of Sciences to the service of socialist development". The proletarian public discussed the candidates of new academi-



Academician A P Karpinskii (1846–1936), the first elected president of the Russian Academy of Sciences.

cians (the old ones were under arrest and in the House of Pretrial Incarceration). On 4 February 1931, the newspapers published material entitled "Counter-revolutionary attack of academician Karpinskii." ("The Statute of the Academy of Sciences" approved in 1930. § 19 of that statute was introduced, in Karpinskii's words, by the government without the knowledge of the AS. This clause enabled expelling four Academy members suspected of counter-revolutionary activities. The "counter-revolutionary attack" consisted merely of A P Karpinskii interceding for the academicians—arrested but not yet convicted!)

The extraordinary session of the General Meeting of the Academy (2 February 1931) became the apotheosis. Given below are extracts from the verbatim account of the session.

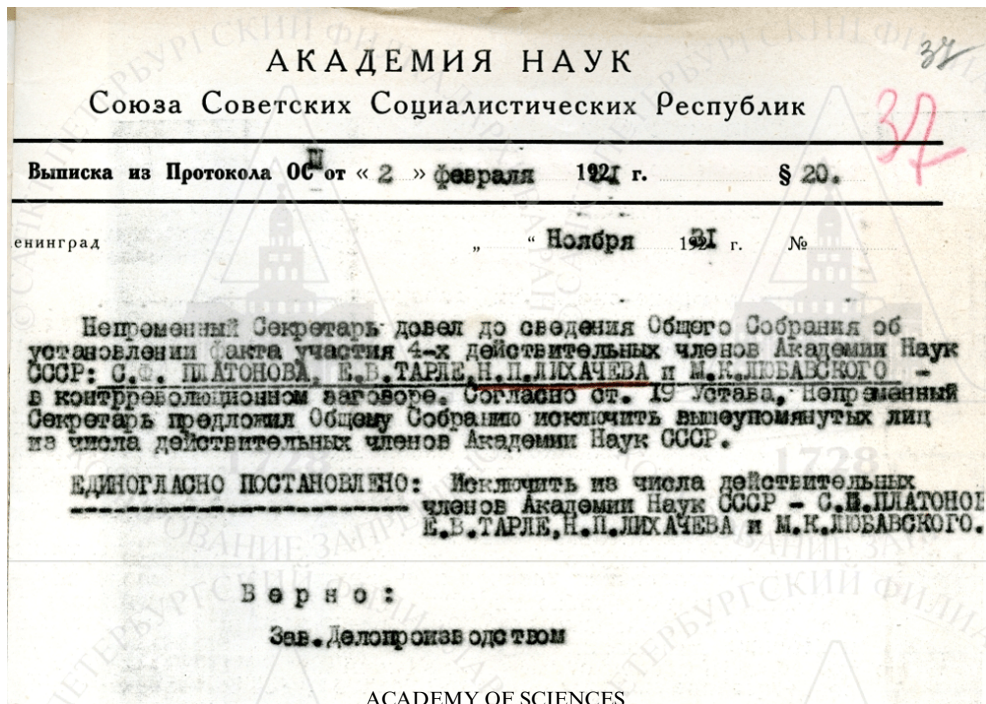
Chairman (the indispensable secretary V P Volgin. — A.F.V.): *Comrades, let me declare the extraordinary General Meeting of the Academy open...*

*At present, as the indispensable Academy secretary I have received an absolutely official communication concerning four of the above persons, i.e. academicians Platonov, Tarle, Likhachev, and Lyubavskii. This communication runs as follows: the four above academicians have been arrested on charges of counter-revolutionary activities and organizing a counter-revolutionary plot aimed at the overthrow of the existing Soviet order and the restoration of constitutional monarchy; materials serve as undeniable evidence of their real participation in this plot; lastly, they themselves have confessed that they had participated...*

Chairman: *Does anybody else want to speak?* (No one is willing to).

*Then let me put to a vote the question in the following form: who objects, the expulsion of the indicated members from the Academy?*

Chairman: *Let me nevertheless ask you who is against my proposal?* [No one (!? — A G V)]. *Who abstains?* [No one (!? —



Extract from the resolution of the General Meeting of 2 February 1931. § 20.  
Leningrad November 1931

The Indispensable Secretary informed the General Meeting of the establishment of the fact of participation of four full members of the USSR Academy of Sciences, namely, of S.F. PLATONOV, E.V. TARLE, N.P. LIKHACHEV, and M.K. LYUBAVSKII, in a counterrevolutionary plot. According to Article 19 of the Statute, the Indispensable Secretary proposed that the General Meeting should expel the aforementioned persons from the list of full members of the USSR Academy of Sciences.

RESOLVED UNANIMOUSLY: To expel S.F. PLATONOV, E.V. TARLE, N.P. LIKHACHEV, and M.K. LYUBAVSKII from the list of full members of the USSR Academy of Sciences.

Correct: Registrar

Extract from the resolution of the General Meeting of the USSR Academy of Science.

A G V)]. Let me consider the resolution of the General Meeting to be unanimously adopted. Let me declare our extraordinary General Meeting closed [15].

As regards the expulsion procedure, the future saw its even greater simplification: in April 1938, president V L Komarov familiarized the General Meeting with an expulsion list of 21 people and after the three briefest unanswered rhetorical questions (who would like to speak? to ask? all clear?) summarized: “Then allow me to conclude that the General Meeting subscribes to the Presidium’s opinion and approves the expulsion of the indicated persons” [16].

Reverting to the history of the LPI, there is good reason to mention the General Meeting of the USSR AS of 29 March 1932, which was of paramount importance to Soviet physics. This meeting saw the election of 24 new Academy members; among them “in the chair of physical sciences” were N N Semenov and S I Vavilov.

Also elected corresponding members were scientists who are the pride of Soviet physics. Our attention is drawn to the young age of the new Academy members: G S Landsberg, the ‘oldest’, was 42, and the youngest, G A Gamov (Gamow), was only 28!

Concerning the organization of the Physical Institute, mention should be made of the initiative of academicians V A Steklov, A N Krylov, and A F Ioffe, who are credited for



N N Semenov (36 years of age).






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S I Vavilov (41 years of age).




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G A Gamov (Gamow) (28 years of age).

the fact that the 1921 Academy Conference adopted a resolution about the establishment of the Physico-Mathematical Institute on the basis of the Physics Laboratory and the Mathematical Office. The Physics Laboratory had been set up by B B Golitsyn in 1912. V A Steklov was elected director of the Institute, who remained in that position until his death in 1926.

The Physicomathematical Institute, which was located in Leningrad, was structurally simple and consisted of only three departments: physical, mathematical, and seismic. After V A Steklov's death, the Physicomathematical Institute was headed by academician A F Ioffe for two years (1926–1928). In 1928, academician A N Krylov was elected director of the institute, remaining so until 1932.

In the summer of 1932, S I Vavilov accepted the offer of V L Komarov, vice-president of the USSR AS, and headed the Physical Department of the small Physicomathematical Institute of the USSR AS. The entire staff of the Institute amounted to fewer than 10 members at that time. Despite the small staff, highly topical lines of physics research were pursued in the Physical Department even in 1933:

- (i) studies of neutron properties;
- (ii) studies of the glow of liquids under irradiation;
- (iii) studies of colored crystals;
- (iv) investigations of the microstructure of liquids;
- (v) investigations of electric breakdown in gases;
- (vi) electron-diffraction and X-ray studies of catalysts.

A historically significant date is 25 April 1934, when the government adopted a resolution to transfer the USSR AS to Moscow “for the further coordination of the entire Academy work with the scientific needs of socialist construction” [17, 18].

The official establishment of the Physical Institute of the USSR Academy of Sciences (LPI) is dated 28 April 1934, when the General Meeting of the USSR Academy of Sciences adopted a resolution to divide the Physicomathematical




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A N Terenin (37 years of age).

Institute into two institutes: Mathematical and Physical. In the summer of 1934, both Institutes, along with the Academy, moved to Moscow and occupied the building on 3rd Miusskaya street, which had been built by donations to Petr Nikolaevich Lebedev's laboratory back in 1912.

On 18 December 1934, the Physical Institute was conferred the name of P N Lebedev. The Physical Institute incorporated the traditions of Golitsyn's (St. Petersburg) and Lebedev's (Moscow) schools of science. The Physical Institute was headed by academician S I Vavilov, a pupil of academician P P Lazarev (P N Lebedev's assistant and close associate).




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G S Landsberg (42 years of age).




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V A Fock (34 years of age).




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Academician A A Steklov (1863–1926).




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Academician A N Krylov (1863–1945).

The above shows the difficulty of the task S I Vavilov, an unaffiliated person, faced in organizing the Institute and reflects, at least partly, the atmosphere in the academic environment of our country at the initiation of LPI. Sergei Ivanovich displayed remarkable qualities as an organizer, and partly as a politician, and had the courage to invite to the new institute the most prominent physicists of that time. He conceived an institute of a new type and did not fear finding himself in the shadow of invited scientists.

Being an optical scientist, S I Vavilov had an exceptionally broad mental outlook. He recognized the importance of the

then rapidly developing physics of atomic nuclei and the necessity to support ‘new physics’, which emerged early in the 20th century—the theory of relativity and quantum mechanics. Sergei Ivanovich set up a truly ‘polyphysical’ institute, which encompassed the main areas of contemporary physics.

Because of size limitations, it is impossible to comprehensively describe LPI activities in those years. But it is possible to list those outstanding scientists who accepted S I Vavilov’s invitation: the Laboratory of the Atomic Nucleus was headed by D V Skobel’tsyn, the Laboratory of Oscillation Physics by



The LPI building on Miusskaya street [19].

N D Papaleksi, the Laboratory of Physical Optics by G S Landsberg, the Laboratory of Spectral Analysis by S I Mandel'shtam, the Laboratory of Dielectrics Physics by B M Vul, the Theoretical Physics Laboratory by I E Tamm, and the Acoustics Laboratory by A A Andreev. From 1934 through 1937, a part of the institute was also the Laboratory of Surface Effects supervised by P A Rebinder.

And, of course, there was S I Vavilov's beloved brain-child—the Luminescence Laboratory—which brought a Nobel Laureate, Sergei Ivanovich's pupil P A Cherenkov.

It is appropriate to conclude this article with a short citation from S I Vavilov's speech (1945), which remains topical: *In the peace years, like in the war years, physicists are prepared to apply their knowledge, skills, and all their patriotism to the benefit of the native people and all of mankind...* [20, p. 505].

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