

The nuclear shield in the ‘thirty-year war’ of physicists against ignorant criticism of modern physical theories

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Abstract. This article deals with the almost ‘thirty-year war’ led by physicists against the authorities’ incompetent philosophical and ideological interference with science. The ‘war’ is shown to have been related to the history of Soviet nuclear weapons. Theoretical milestones of 20th century physics, to wit, theory of relativity and quantum mechanics, suffered endless ‘attacks on philosophical grounds’. The theories were proclaimed idealistic as well as unduly abstract and out of touch with practice; their authors and followers were labelled ‘physical idealists’, and later, in the 1940s and 1950s, even ‘cosmopolitans without kith or kin’. Meanwhile, quantum and relativistic theories, as is widely known, had become the basis of nuclear physics and of the means of studying the atomic nucleus (charged particle accelerators, for instance). The two theories thus served, to a great extent, as a basis for both peaceful and military uses of nuclear energy, made possible by the discovery of uranium nuclear fission under the action of neutrons. In the first part, the article recounts how prominent physicists led the way to resisting philosophical and ideological pressure and standing up for relativity, quantum theories and nuclear physics, thus enabling the launch of the atomic project. The second part

contains extensive material proving the point that physicists effectively used the ‘nuclear shield’ in the 1940s and 1950s against the ‘philosophical-cosmopolitan’ pressure, indeed saving physics from a tragic fate as that of biology at the Academy of Agricultural Sciences (VASKhNIL) session in 1948.

1. Introduction

Since olden times, physics has come hand in hand with philosophy. A new wave of mutual influence between the two originated in the first three decades of the 20th century, when the appearance of quantum and relativistic theories caused a revolutionary change in the foundations of physics. Understanding and accepting the new theories required the methodology of both natural science and philosophy. The perpetrators of the quantum–relativity revolution (M Planck, A Einstein, N Bohr, E Schrödinger, W Heisenberg, M Born, A Eddington, H Weyl and others) had a sound knowledge of philosophy. Still, in times when new meaning is given to the fundamental notions of science which are also philosophical categories, such as space, time, motion, causality, etc., the scientists themselves are often obliged to act as philosophers.

By the late 1930s, the development of nuclear physics that ensued from the discovery of the neutron led to the finding of uranium nuclear fission, thus presenting, for the first time ever, an opportunity for the practical use of nuclear energy. Of course, in order to use this opportunity one needed a greatly advanced nuclear physics sucked in an integrated complex of experimental and theoretical findings. The complex had to include both the most up-to-date experimental equipment, such as accelerators of charged particles, electronic equipment, etc., and the brand-new theoretical

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ideas on the structure of atomic nuclei, on nuclear forces, based on the novel theoretical foundation: quantum mechanics, relativity and quantum field theory. Besides, designing the experimental equipment itself, accelerators for one thing, was largely based on relativity and quantum theory and demanded sophisticated theoretical research.

While a researcher who had a good grasp of the new theoretical toolbox had no more need to turn to the philosophical aspects of quantum theory and relativity, it was impossible to understand or master them unless one went into the depth of the physical interpretation bordering with philosophy. Even after the foundations of relativity and quantum mechanics were finalized in the 1930s, physico-philosophical rethinking continued to develop around them, causing acute arguments, for instance, about the meaning of the principles of uncertainty and complementarity in quantum mechanics, what causality would be like under this theory, the reality of relativistic effects, possible applications of the general theory of relativity to the Universe and so forth. A range of similar issues arose from nuclear physics and the physics of elementary particles, also related to the quantum field theory (interconversion of particles, concepts like ‘elementary’ or ‘structure’, the problem of vacuum, etc.)

However, whenever we mention the link of physics to philosophy within the atomic project, it is not the above problems we have in mind, but rather, the very special situations that arose when Soviet physicists had to resist the pressure from philosophers and ideologists, seriously affecting nuclear physics or even the entire Soviet nuclear weapons project.

The point is that the USSR had a state-imposed philosophical doctrine, namely, dialectical and historical materialism considered to be the theoretical basis of Marxist philosophy. Therefore, when the theory of relativity, quantum mechanics and other modern theories forced physicists into discussing scientific methodology and philosophical issues, and most of the creators of the new physics were found not to preach dialectical materialism, the watchmen of Marxist ideology armed with philosophy raised the alarm.

As early as the 1920s, physicists began to feel the pressure from philosophy and ideology and they had to find a way of living under it. Once in a while, the pressure would surge, jeopardizing the still not fully mature Soviet theoretical and nuclear physics.

Yet another kind of pressure that kept putting fundamental physical theories and consequently nuclear physics at stake was of a technological and utilitarian nature. Why should one do physical research in fields that are allegedly useless to technology and certainly have nothing to do with industry? At the time, physics was seen as a ‘scientific basis of socialist technology’. Although this technology-based argument seemed to have a different nature, it would, as a rule, add up with the philosophical–ideological one.

In this paper, we shall first look at the way Soviet physicists resisted both kinds of pressure in the 1930s while maintaining theoretical culture and a sufficiently high level of research in nuclear physics. As a result, they managed to build up sufficient ‘nuclear potential’, where scientific results, institutions and staff were concerned, to enable the successful launch of the Soviet nuclear weapons project despite the inevitable ‘scattering’ of resources with the beginning of the war.

The second major controversy occurred in the late 1940s (dragging on into the 1950s), when allegations of idealism and

the campaign against cosmopolitanism both put Soviet physics at risk of ideological extermination. Most probably, this time it was the dramatic accomplishment of the atomic project that played the decisive role in forestalling the meticulously planned action, meant to resemble the 1948 VASKhNIL (abbreviation related to agricultural analogue of the USSR Academy of Sciences — V I Lenin All-Union Academy of Agricultural Sciences) session that uprooted Soviet genetics. In the years to follow, ‘nuclear trumps’ continued to help physicists withstand the authorities’ ideological and utilitarian attacks, sometimes solicited by dishonest or incompetent colleagues. In the post-war years, the leadership of the USSR Academy of Sciences (S I Vavilov, A N Nesmeyanov, L A Artsimovich and others) kept supporting physicists, thus promoting a ‘nuclear-academic alliance’.

This paper is an update of one published in 1998 [1]. A shorter earlier version was presented at the International Symposium on the History of the Soviet Atomic Project in Dubna in 1996 [2].

Recent publications by A V Andreev, G E Gorelik, S S Ilizarov, A B Kozhevnikov, Yu I Krivonosov, A S Sonin, and K A Tomilin [3–17] were very important for my work. I am grateful to K A Tomilin and I S Drovenikov for their help and discussion.

2. Between the Scylla of philosophical press and the Charybdis of technical demands: maintaining the nuclear-theoretical potential before the atomic project (the 1930s)

2.1 Relativity and quanta as ‘idealistic offspring of the decaying capitalist world’

Although the crucial stage of nuclear physics’ development started after J Chadwick’s discovery of the neutron in 1932, the theoretical foundations of this field — quantum mechanics and quantum field theory — were created as early as the second half of 1920s, and its other basic constituent, the theory of relativity, dates back to the first decade of the 20th century. It was precisely relativism (in the physical sense) and later quanta that became the target of philosophical-ideological censure in the 1920s. Whereas in 1922, both V I Lenin [18] and L D Trotsky [in the newly founded specialized philosophical magazine called *Pod Znamenem Marksizma* or *PZM* (*Under the Banner of Marxism*)] had kind words in defence of A Einstein and the theory of relativity [19, p.19], in 1924, A M Deborin, editor-in-chief of the same magazine, referred to the theory of relativity as “sophistry that upends the world” and is based on “the same gnosiological principles as the philosophies of Mach, Hume and others” (quoted from Ref. [11, p. 17]).

It was also in 1924 and in the same magazine that one of the most ardent critics of ‘physical idealism’ and relativity, the physicist A K Timiryazev, thus summed up his comparison of relativity to Marxist ideology: “It’s a long way from Einstein’s theory to dialectical materialism” (quoted from Ref. [11, p. 20]). It is noteworthy that in the 1920s and 30s Deborin headed an influential group of philosophers (the so-called ‘dialecticians’, later labelled ‘pro-Men’shevik idealists’), which in those days was at odds with another philosophical group, also of consequence at the time, that of ‘mechanists’, of which Timiryazev, Jr. was a member (see Refs [19, 20]).

In the mid-1920s, the 'mechanists' joined, besides A K Timiryazev, by other physicists and mechanical engineers with a bias to mechanistic thinking (N P Kasterin, Ya I Grdina, G A Kharazov, later V F Mitkevich and others) went much further in their criticisms of relativity than the Deborin group did. Timiryazev alone published at least ten articles condemning relativity in 1925–1926. Timiryazev and the 'mechanists' enjoyed the unexpected support of D Miller, an American experimenter who had in those years published a series of articles where he claimed having registered the 'ether wind' in Michelson–Morley-type experiments.

At the 5th session of Russian physicists in Moscow, Timiryazev made an extensive anti-relativistic presentation, followed by hot discussions. A F Ioffe and Ya I Frenkel' stood up for relativity at that session. A brilliant book by S I Vavilov *Experimental Foundations of the Theory of Relativity* saw the light about a year later. Leading Soviet physicists — the above plus L I Mandel'shtam, I E Tamm, V A Fock and some others — showed true 'relativistic solidarity', and the theory of relativity kept its stand (see Refs [21, 22]). We must note that in those years there were a few philosophers, S Yu Semkovskii and B M Gessen first of all, who advocated the theory of relativity from the standpoint of dialectical materialism [22, 23].

By the early 30s, the philosophers' groups had already been condemned by wardens of Communist party ideology, only to be replaced by a more flexible new group of 'Stalinist youth': M B Mitin, P F Yudin, F K Konstantinov et al. [20, pp. 414–415]. They proclaimed 'the Party spirit' to be the core principle of Marxist philosophy. The same rule was supposed to hold true for physics. Roughly at the same time, É Kol'man and A A Maksimov became the top men in the philosophy of natural science. Both were very active members of the *PZM* editorial board, well-known Party functionaries specializing in the philosophy of exact natural sciences and mathematics [5, 10].

The campaign against 'physical idealism' soon drifted into the realm of the 'class struggle'. The latest physical theories were labelled 'phenomena of bourgeois science'. People started to talk about 'sabotage in science' (that was the title of a 1931 article by Kol'man)¹. There is no need to quote here the invectives of Maksimov, Kol'man and other watchdogs of philosophical virtue against relativity and quantum theory². Let us only note that the concepts of quantum mechanics

¹ In another article dated the same year, Kol'man informs against Ya I Frenkel' for saying at a 1931 conference: "The dialectical method has no right to aspire to a leading role in science", and comments: "This is only one instance of an outrageous foray of a hardened Machist who heads a group of physicists, the so-called 'Leningrad school' (Gamov, Landau, Bronshtein, Ivanenko and others)" (quoted from Ref. [11, pp. 36, 37]). Then, after thus informing on the young theorists, he recaps: "This is the philosophy that these gentry like Frenkel' prefer to preach over dialectical materialism: they preach devilry, etc." [ibid.]

² It is enough to quote a few titles of articles by Kol'man and Maksimov published by *PZM* in the early 1930s: "On dynamic and static laws" (1931), "Urgent tasks of natural science and technology at the stage of reconstruction" (1931), "A letter by comrade Stalin and the tasks at the fronts of natural science and medicine" (1931), "The problem of causality in modern physics" (1934), "New appeals for and against indeterminism in physics" (1934) and some others (by Kol'man; the above mentioned article "Sabotage in science" appeared in 1931 in *Bol'shevik* magazine which printed another article by Kol'man in 1933, namely, "Against recent revelations of bourgeois obscurantism"); "M Planck and his struggle against physical idealism" (1932), "On the reflection of class struggle in modern natural science" (1932), "Marxism and the natural science" (1933), etc. (by Maksimov).

annoying them most of all were the principles of uncertainty, complementarity, the probabilistic interpretation and the problem of causality. Bringing academic discussions on the relation of philosophy to physics down to the level of admonitions on the adherence of science to Communist Party principles, the class struggle in science, sabotage of scientists, etc. was fraught with a ban on teaching the physical theories to students and with the persecution of theoretical physicists.

2.2 The 'useless' neutrons and nuclei and dialectical materialism (1932–1936)

The discovery of the neutron by J Chadwick in 1932 was a landmark in the history of nuclear physics³. Let us add that another sequence of discoveries of prime importance was made in the 'year of nuclear wonders' (the finding of the positron, deuterium, the proton–neutron model of the nucleus and in fact the discovery of strong interactions, the construction of the first accelerator of charged particles and the first nuclear reaction with accelerated protons, etc.) Already in December 1932, the Leningrad Physico-Technical Institute (LFTI, also called FizTekh for brevity) had opened a nuclear physics department, formally headed by A F Ioffe himself but actually led by I V Kurchatov, and a nuclear physics seminar (presided over by D D Ivanenko). G A Gamov and L V Mysovskii from the Radium Institute were invited to act as consultants.

In September 1933, the 1st All-Union Conference on the Atomic Nucleus was organized at the LFTI. Amongst those present were both leading Soviet scientists working in the physics of the microscopic world (A F Ioffe, Ya I Frenkel', D V Skobel'tsyn, I E Tamm, V A Fock, D D Ivanenko, M P Bronshtein, G A Gamov, K D Sinel'nikov, A I Leipunskii, S É Frish and others) and prominent Western physicists working in the same field: P Dirac, F Perrin, F Joliot, F Rasetti, L Gray et al. [25]. This was tantamount to a recognition of the high reputation of the young Soviet physics, and a strong stimulus to the progress of nuclear physics in our country.

Increasingly persistent efforts to "eradicate the attempts by 'old specialists' to do pure science" [26, p. 190] ran parallel to the escalating philosophical–ideological pressure. The two kinds of processes ('philosophical' and 'technical' pressing) would often join their destroying consequences.

A typical example having to do with the discovery of the neutron is described in the memoirs of S É Frish: "I can vividly remember the following episode. Dmitrii Sergeevich (Rozhdestvenskii, the organizer and scientific leader of the State Optical Institute (GOI) — VV) tried to organize an all-institute seminar at GOI that would cover scientific and technical matters in equal proportion. He suggested that I give a talk at the first meeting of the seminar. I spoke about a recent major event in science — the discovery of the neutron. That talk of mine was later discussed by the executives of the local Party Committee as well as young scientists; it was judged to be an attempt to divert the attention of the Institute's scientists from urgent practical tasks by telling them stories of bourgeois physicists amusing themselves by finding useless particles" [26, p. 191].

³ The event was immediately noticed by V I Vernadskii, who wrote in his diary on March 10, 1932: "Read the news. Chadwick's paper suggests the neutron, etc." (quoted from Ref. [24, p. 59]).

As the double threat to the new promising field of science built up, A F Ioffe made a point of emphasizing the technical value of nuclear physics and its special appeal from the point of view of dialectical materialism. In an article in 1934, he wrote: "... The nuclear problem urgently calls for further progress of engineering; the voltage now reached by high-voltage technology, measured in hundreds of thousands of volts, has to be replaced by millions of volts..." [27, p. 698], see also Ref. [28, pp. 35–36].

In the same article, Ioffe goes on to assert that "... in nuclear physics, more than in any other field, one must bear in mind and should not dread the possibility of uncovering principally new properties of matter. I believe that this goes to show the might of the dialectical method which has none of that conservatism (i.e. "the conservatism based on common sense and past macroscopic experience" — V V), the method that predicted the entire development pattern of modern physics ... None other than the dialectical method can enable us to move onward in the absolutely new forefront field of nuclear physics..." [27, p. 698], see also [28, p. 36].

It is not fully clear just how sincere Ioffe was when he glorified 'the might of the dialectical method'; he realized perfectly well, though, that the only way to shield modern science from the raids of ideological watchdogs was to compromise sensibly with the official philosophical doctrine. As to the abundant technical outcomes of experimental nuclear physics, ensuing events showed that he was absolutely right. The engineering of particle accelerators and precision measuring instruments called for rapid development of electronics, radio and electrical engineering, thus creating great resources for technical progress.

In the 1930s, LFTI, GOI, the Khar'kov UFTI, and the Institute of Chemical Physics, Moscow were subordinated to VSNKh (the Supreme Council of National Economics) and later Narkomtyazhprom (the People's Commissariat of Heavy Industry) whose Department of Science and Technology was headed by N I Bukharin; according to D D Ivanenko, he used to pay frequent visits to LFTI and was 'relatively close to A F Ioffe' [29, p. 284]. At the time, Bukharin's support could mean a lot⁴.

In the brilliant essay *Scientific Thinking as a Planetary Phenomenon*, written in 1936–1938 and only first published in full in 1991, V I Vernadskii talks about the outrageous way in which official philosophers (or rather, administrators of philosophy) interfered with apparently specialized activities, in no way related to philosophy: 'radioactive methods' for

⁴ "I can recall... a personal meeting with Bukharin, — Ivanenko wrote in his memoirs, — that took place after the discovery of the neutron; LFTI had already opened a nuclear physics department in December 1932 and I had published my proton–neutron model of the atomic nucleus. He was interested to learn about the progress of physics, and approved the project to take an expedition to Armenia to study cosmic rays..." [29, p. 284]. Further down the page, Ivanenko recalls a remarkable piece of evidence of Bukharin's being strikingly well briefed in nuclear physics: "Bukharin was known to be familiar with Gamov's work. At one of the sessions devoted to recent achievements of nuclear physics, Bukharin suggested that Georgii Antonovich investigate whether nuclear processes in stars, which were a mere hypothesis at the time, could be used in laboratory conditions" [29, p. 286]. Obviously, Bukharin knew from his contact with Ioffe and FizTekh scientists about the enormous resources of nuclear energy and the possibility of extracting it by fusion of light nuclei. Thus in a popular scientific article in 1931 Ioffe wrote: "If we take four hydrogen atoms, merge their nuclei with two electrons and lay aside the other two, we will get a helium atom — and a huge amount of free energy. If we could turn hydrogen into helium that way, we would have a great source of energy..." [28, p. 35].

determining geological age practiced at the Radium Institute and Geological Committee. "In 1934, — he wrote, — "illiterate philosophers entrusted with planning the research activities of the Geological Committee made misguided efforts to use dialectical materialism to prove that radioactive methods of determining geological age were based on false assumptions lacking dialectical proof. They insisted that radio geologists were relying on facts and empirical generalizations that were dialectically impossible. The philosophers were supported by a few geologists who were doing philosophy and headed the Committee's scientific administration. They managed to hold up my work by about two years..." [32, pp. 526, 527].

Eventually, Vernadskii and the radiogeologists did get the upper hand but only after an extensive philosophical discussion between several hundred (sic!) geologists and philosophers and also because the "philosophical leaders of the Geological Committee were soon denounced as heretics who misunderstood the official doctrine of dialectical materialism, and were dismissed from the Committee..." [*ibid.*].

In December 1937, V I Vernadskii once again reminded G M Krzhizhanovskii of this instance as an example when incompetent philosophers (and geologists involved with philosophy) interfered with science (from a letter dated December 10): "I work in fields of knowledge which philosophers do not understand; they did not even take the trouble of getting acquainted with them before passing their judgements. There is already a vast experience of their harmful activities and faulty interpretations. They started by trying to prevent the progress of geochemistry, but life soon put an end to this attempt... Later, the philosophical organization at TsNIGRI suspended scientific research on determining geological age. It went beyond the point of absurdity trying to prove the impossibility of a scientifically established fact (underlined by V I Vernadskii — V V): the radioactive decay of atoms is independent of any other phenomena on the planet. I managed to arrange for a public session with TsNIGRI physicists, and the philosophers proved to be fully ignorant in the field they had discussed. Here is a fact of history of which the most recent precedent dates back to 17th century science... I must point out that the majority of philosophers who had opposed geochemistry, radiogeology and biogeochemistry (Academician A M Deborin, Perkin, Novogrudskii, philosophers-geologists from TsNIGRI) had since been pronounced philosophical heretics, and their opinions do not reflect the standpoint of official philosophy. Only Maksimov who recently appeared in press (writing up the philosophical aspects of geochemistry, etc. — V V) has not been rejected. In his work, I see just as little understanding of the scientific phenomena he writes about as in the work of his predecessors" (quoted from Ref. [33, pp. 224, 225]).

Running ahead, let us mention that in this book [32] (to be specific, in paragraphs 151–156) Vernadskii made an exact diagnosis of the situation in Soviet philosophy, saying that its creative potential "is slowly freezing and degenerating into dry scholastics or verbal Talmudism", and the reason why this is happening is that "dialectical materialism is the official philosophy enjoying powerful support of the state authorities, making it in fact impossible to criticize it freely and preventing unrestricted development of any other philosophical concepts" [32, p. 519].

In his memoirs, I N Golovin tells the story of I E Tamm who resisted the 'philosophical attacks' in the mid-1930s and

despite them, kept teaching (side by side with his colleagues) courses of quantum mechanics, relativity and one of the first courses of nuclear physics at Moscow State University. To conclude this section, let us quote from those memoirs: "(Quantum mechanics) brings us into the midst of absolutely new and extraordinary concepts and phenomena", — Tamm would say. — "Many old physicists cannot, or even will not understand it at all. Philosophers, especially the ones who deem themselves materialists, have declared a war on the main concepts of quantum mechanics. But I shall show you ... the great powers of the new mechanics, I shall make you see that one can never perceive the phenomena of the microscopic world without it..." [34, p. 150]. And below: "His lectures and personal academic encounters, the lectures by Leontovich, Mandel'shtam and a number of other, less brilliant personalities, taught us to separate science from the ignorant fuss around science, and to hold scientific grounds in times when quantum mechanics and the theory of relativity were condemned by some as 'idealistic offspring of the decaying capitalist world'" [34, p. 152].

2.3 "Isn't it high time we made a decisive break with idealism and turned to dialectical materialism?" (1936)

Physicists felt an abrupt surge of dual pressure in 1936, during the preparation for the so-called March session of the USSR Academy of Sciences expressly devoted to the situation in physics (see Refs [30, 31] for details on the session). At the preparatory meeting in January 1936, the official leaders of the Academy (G M Krzhizhanovskii and N P Gorbunov), supported by A Deborin who had just recently 'resurfaced', tried to place the focus of the future session on 'creating order in the ranks of physicists'. This time, however, the alignment of forces was clearly not in their favor (for one thing, both the physicists' most prominent and dangerous philosophical enemies — É Kol'man, A A Maksimov, A K Timiryazev — and the most active 'pure philosophers' — Mitin, Yudin and others — were absent from the meeting).

Nonetheless, the pressure was considerable. Krzhizhanovskii began by suggesting an investigation of "whether everything is all right with (physicists' — V V) philosophical thinking" (quoted from Ref. [31, p. 43]. Deborin the 'expert' confirmed that "...There is no doubt, at least to me, that many of our physicists remain up to this day under the influence of what is called Machism or neo-Machism..." [31, p. 44]. He tried to explain "the gap between our physics and our present-day life" by the fact that "physics falls behind our philosophy in its general principles, theoretical and philosophical foundations... it bears a strong impact of bourgeois philosophical thinking..." [31, p. 44]. Following Kol'man, in 1936 Deborin explained the 'philosophical harmfulness' of Soviet physicists and their keenness on the indeterminism of quantum mechanics by nothing less than fascism. His final conclusion culminated in a sacramental question: "Isn't it high time we made a decisive break with idealism and turned to dialectical materialism?" [31, p. 44].

Deborin was supported by seemingly one of the 'physicists' crowd', B M Vul, a young physicist from the P N Lebedev Physics Institute (FIAN), one of the few members of the Communist Party among the physicists of those days: "I agree with Deborin that our theoretical physics is not always approached from the point of view of dialectical materialism... some physicists are frankly hostile to dialectical materialism... It is also a fact that some young physicists like, for instance, Bronshtein and some others deny regularity (i.e. they accept

violations of the conservation of energy and momentum in microscopic processes and accept statistical causality in the microscopic world — V V). That they are social outsiders and politically hostile to us is also a fact" [31, p. 45].

Still, the majority of the influential physicists present at the conference, including Ioffe, Frenkel', Fock and Tamm, supported by B M Gessen (the only philosopher that physicists acknowledged to be competent in their field), managed to keep their stand and removed the philosophical 'putting in order' from the agenda of the planned session⁵.

However, a week before the session, Mitin and Maksimov, who had been absent at the meeting in January and did not talk to the session proper, were instructed to write (in cooperation with Deborin and Gessen) a paragraph for the draft of the session's resolution, called 'modern tendencies in physics judged from the point of view of philosophy'.

A lot was said about nuclear physics both at the preparatory meeting and at the session itself. Scientists from FizTekh — Ioffe and Frenkel' — believed it was exactly where a technical revolution would eventually start. "If we manage to get control over pressure in the nucleus, we shall enter a new era, this will be a technological jump forward" (Frenkel') [31, p. 41]. D S Rozhdestvenskii believed any practical use of intraatomic energy to be a very remote prospect; the FizTekh people expected the problem to be solved in the coming few years.

Two of the six main talks at the March session were in the field of nuclear physics. Whereas the talk given by Fock was rather highly specialized, devoted to a new method in the quantum theory of many-body systems and quantum electrodynamics, Tamm's talk "The problem of the atomic nucleus" was a general survey of the situation in the field by early 1936. First of all, he stated that progress in this young field of physics would have great philosophical consequences, leading "...to reconsideration and considerable expansion of physical concepts and knowledge in general" [35, p. 922]. He agreed with Frenkel' in that "the development of nuclear physics will certainly involve practical uses, etc." [35, p. 922].

Tamm stressed the point that quantum mechanics and theory of relativity were the only theoretical key to understanding nuclear processes⁶. Tamm said nuclear physics had

⁵ Here are some samples of physicists' arguments. Ioffe: "Given such a state of affairs..., when our theoreticians have not thought over or analyzed all their theoretical ideas from the point of view of dialectical materialism; on the other hand, when not one of our philosophers except Boris Mikhailovich (i.e. Gessen — V V) knows any modern physics, the result can be nothing but a confusion" [31, pp. 43, 44]. He is echoed by Tamm: "I am deeply convinced that mistrust and hostility ... towards new physics is often caused by the fact that non-physicists hardly ever have a true understanding of the new theories: the nucleus, or quantum mechanics" [31, p. 45]. Ioffe: "... I wish for a 100 percent victory of dialectical materialism just as anyone else, but I believe it is pointless to raise this (i.e. philosophical — V V) discussion now [*ibid.*]. Fock: "These (i.e. philosophical — V V) matters are all very interesting, but they will not do for a general meeting because this kind of discussion can hardly be expected to yield anything worthwhile... It would be better to hold a smaller meeting to discuss them". [31, p. 55]. Gessen, by the way, mostly with the talks by Deborin and Vul in mind, dared to remark that "we must not adopt the approach of just labelling things: this is materialism, this is idealism" [31, p. 46].

⁶ "... The combination of small sizes and huge energies (in nuclear physics — V V) is not incidental; it is explained by modern quantum mechanics" [35, p. 923]. And further "...Studying nuclear reactions confirmed both the law of conservation of energy and the law according to which energy is proportional to mass, one of the most important conclusions of Einstein's theory of relativity" [35, p. 939], etc.

a great technical future: “The energy resources concealed within nuclei are truly inexhaustible. If humanity learns to use these resources, which will happen sooner or later, this will decide the fate of our technology and economy” [35, p. 940]. Meanwhile, Tamm was not inclined to ‘cut a dash’ and vouch for development of ‘nuclear energy’ projects in the close future. “Our knowledge of the nucleus is so rudimentary that we cannot so much as properly formulate the question of practical ways to using nuclear energy resources” [35, p. 941].

Judging by Tamm’s talk and the speeches made by I V Kurchatov, Ya I Frenkel’ and others during the discussion, one could see that Soviet scientists were quite advanced in the field. Besides those listed above, leading researchers included A I Alikhanov, A I Alikhan’yan, L A Artsimovich, D D Ivanenko, A I Leĭpunskii, K D Sinel’nikov, D V Skobel’tsyn, L V Mysovskii and others. By the way, when the latter (a prominent specialist on radioactivity and nuclear physics) voiced his doubts of potential practical uses of nuclear energy, Tamm remarked: “It is indeed naive to think that the utilization of nuclear energy is a matter of five or ten years. We still have a huge, colossal amount of work to do, but I see no reason to doubt that sooner or later ... the problem will be solved” [36, p. 347]. The most optimistic (‘naive’) forecast proved to be the most exact, but who could have expected that just two and a half to three years after the session, the discovery of nuclear fission of uranium would make nuclear power engineering a realistic prospect!

The bulk of nuclear research was done at institutes (LFTI, UFTI, etc.) that in 1936 were under the authority of Narkomtyazhprom (the People’s Commissariat of Heavy Industry). The latter had a few sensible people in its leadership who realized the importance of fundamental research (Bukharin and A A Armand, who replaced the former as head of NIS of Narkomtyazhprom). “We believe and even insist”, — Armand said at the session, — “that research in both theoretical and nuclear physics should be conducted at our institutes. We believe that physics can provide skilled assistance to industry only when physics itself reaches a high level of development” [36, pp. 131, 132].

The dual pressure on Soviet physics in the 1930s was thus not universal. First, the greatest part of the scientific community, and especially its leaders, were unanimous in their understanding of modern physics and tried to do research at ‘the international level’. The leaders — Ioffe, Rozhdestvenskii, Mandel’shtam, Vavilov and others — were prominent scientists, heads of major scientific schools, and remarkable organizers. The authorities could not but heed their opinion. Second, some of the philosophers that were somehow involved with the philosophical and methodological aspects of science, physics in particular, were reasonably competent scientists who believed that new physical theories were in full harmony with dialectical materialism. B M Gessen was one of them, and so had been S Yu Semkovskii in the 1920s. As we know, Gessen backed the physicists at the January 1936 meeting where it was decided not to hold a wide philosophical discussion at the coming March session. Third, some of the leaders of the Communist party and state authorities (like Bukharin, Armand and others) realized the need for fundamental research, in particular, in quantum and relativistic theories and in nuclear physics.

2.4 “... A proclivity to Machism ... led to loss of touch between theory and practice...” (1938)

1937 gave a special color to every aspect of life in the country, including physics: mass arrests were reaching an unprecedented scale, especially after a case was brought against Zinov’ev and Kamenev in August 1936, and Bukharin, Rykov and Tomskii were pronounced accomplices. Many of the scientists mentioned above were arrested in 1936–1938; some were shot, some survived. Physicists persecuted by the state included M P Bronshteĭn, L D Landau, A I Leĭpunskii, V A Fock, Yu B Rumer (let us also mention S P Shubin, A A Vitt, L V Shubnikov, V K Frederiks, V R Bursian, P I Lukirskii, I V Obreimov, L V Rozenkevich, Yu A Krutkov et al.). Amongst philosophers who were close to physics, B M Gessen, S V Vasil’ev, T N Gornshĭn and some others were also arrested [37].

Against this background, highly unfavorable for physicists, a new attempt at organizing a ‘philosophical session’ was made by Academician V F Mitkevich, a major electrical engineer, an active supporter of the ether hypothesis and opponent of ‘physical idealism’ [4]. In January 1937, in a letter addressed to Gorbunov and Krzhizhanovskii, he insisted that such a session be organized in order to look at “the main natural-philosophical ideas of modern physics” (quoted from Ref. [4, p. 320]). He accused Tamm, Fock and Frenkel’ of advocating physical idealism, and Ioffe and Vavilov, of conspiring with them⁷. The bias of Mitkevich toward the ether theory and mechanistic turn of mind was obvious. For that very reason, he soon suggested to Gorbunov that two genuine ‘mechanists’ — A K Timiryazev and N P Kasterin⁸ — be elected members of the Academy of Sciences in the field of physics as doubtless “holding the grounds of dialectical materialism” (quoted from Ref. [4, p. 322]).

N P Gorbunov gave orders for the preparation of the ‘philosophical session’: Mitkevich himself was to be the main speaker, A A Maksimov was to head the preparatory commission. But things were not going fast enough. In a letter to Gorbunov, Mitkevich insisted that Ioffe and Vavilov give explicit answers to his questions about long-range and short-range action, and Gorbunov agreed. Vavilov published in *PZM* (No. 7, 1937) a review of Mitkevich’s booklet *Basic Views on Physics*, showing Mitkevich to be totally ignorant of the main concepts of modern physics and a follower of the ether-mechanistic theory. In July 1937, in a letter to the editorial board of *PZM*, Ioffe wrote that the approach and reasoning of Mitkevich “dates back entirely to the 19th century” and there is “no time to discuss Ac. Mitkevich’s paper on ether” (quoted from Ref. [4, p. 325]). Six months later, Ioffe did eventually author a paper for *PZM* under a title that speaks for itself: “On the situation at the philosophical front of Soviet physics” [38]. The paper was preceded by one written by Maksimov and titled “On the philosophical views of Academician V F Mitkevich and the ways progress in

⁷ Mitkevich took part in the Academy March session and tried to provoke Tamm into discussing short-range and long-range action, later known as the discussion on ‘the color of the meridian’ [4, 31], but their private controversy did not unfold into a wide discussion since it had not been planned ahead.

⁸ The work of N P Kasterin in which he tried to deduce the Maxwell and Schrödinger equations from the generalized equations of a certain etheric gas dynamics had been highly appraised by N E Zhukovskii and later S A Chaplygin and, of course, A K Timiryazev. In June 1938, at a joint session of the physics and mathematics groups of the USSR Academy of Sciences, physicists (Tamm, Fock, Frenkel’, Blokhintsev, Leontovich et al.) subjected Kasterin’s work to severe criticism.

Soviet physics" [39]. Even before it was printed, Maksimov's paper was praised by G M Krzhizhanovskii, Vice-President of the USSR Academy of Sciences. This is what the latter wrote to the editorial board of the magazine: "In general, I consider this article to be absolutely correct; had I been writing it myself, though, I would have further toned down the first part, where Mitkevich's mistakes are criticized, and enhanced the second, directed against Fock, Tamm, Frenkel' and Company" (quoted from Ref. [4, p. 325]). Meanwhile, he observed that "there is not enough stress on Mitkevich's unsatisfactory understanding of modern physics: after all, he has fallen behind the times quite a bit in this field..." [4, p. 325].

The session was postponed many times and never took place. The turning point was a letter by Fock to the Presidium of the USSR Academy of Sciences, dated February 13, 1938 [4, pp. 326–329]. The letter suggested that the extremely low scientific and philosophical standard of articles by Mitkevich and Maksimov did not meet "the true needs of Soviet philosophy to elaborate a consistent materialist approach to the new physics and to override idealistic misinterpretations of the new theories" [4, p. 327]. Fock pointed out a number of concrete mistakes and logical fallacies in the works of the two authors, coming to the conclusion that "the proposed discussion... will be held at an unacceptably low scientific level, unworthy of Soviet science and the Soviet Academy of Sciences" and that one should "therefore... reconsider the matter of organizing such a discussion at the moment" [4, p. 320].

Obviously, once again the decisive factor had been the solidarity of physicists, the worldwide popularity of Vavilov, Ioffe and Fock who stood up vigorously for quantum and relativistic physics, and managed to do so from the standpoint of dialectical materialism. Their opponents (Mitkevich, Maksimov, and their allies Timiryazev and Kasterin), despite their philosophical and ideological appeal, looked backward, incompetent, and marginal in comparison, something Krzhizhanovskii also admitted. Probably, an earlier letter by Fock to the science department of the Central Committee of the Communist Party in July 1937, had also played its part. The letter described the huge damage to Soviet science done by the ignorant and aggressive philosophical–physical writings of V E L'vov and the like (see Ref. [4]). The same letter mentioned the conflict between Mitkevich and the 'Company' of Fock, Tamm and Frenkel'; it said, in particular, that "L'vov dares to say that Academician Mitkevich's struggle against modern physics enjoys the 'ideological support of the Communist Party'" [4, p. 331].

Nuclear physics continued to progress actively despite the adverse political atmosphere, the mass arrests of which many scientists became victims, and the actual destruction of one of the leading native research centres in nuclear physics, the Ukrainian Physico-Technical Institute (UFTI) based in Khar'kov. In September 1937, the 2nd All-Union Conference on the Atomic Nucleus was held in Moscow; it was attended by several major Western physicists: W Pauli, R Peierls, P Auger and E J Williams all came to Moscow in spite of the notorious 'year 1937' being in full swing. I V Kurchatov, I E Tamm, K D Sinel'nikov, I M Frank and others reported new results. In the meantime, arrangements were being made for the 'philosophical session'; had it been held, it could have become a major obstacle to the progress of theoretical and nuclear physics in the country. A F Ioffe was certainly aware of it. In his opening speech at the conference, he said once again with greater emphasis and in detail how

important was dialectical materialism for the understanding of nuclear phenomena: "... The nucleus brings us to a very specific new field with completely new regularities. Here, we face the infinite variety of the world around us, which V I Lenin regarded as glorious evidence in favor of dialectical materialism. Unfortunately, it is the very emergence of new laws and regularities in every field, quite natural from the point of view of dialectical materialism, that a number of people in the ranks of Soviet scientists tend to regard as some sort of idealistic heresy. I believe there is no idealistic threat to speak of here, to the contrary", etc. (quoted from Ref. [28, p. 22]). It is clear which 'people' Ioffe meant: Mitkevich, Timiryazev, Kasterin (note that Ioffe spoke about scientists in general, not exclusively about philosophers), certainly Maksimov and Kol'man, probably even Krzhizhanovskii and Gorbunov and some others. 'The Ioffe defence' was based on an energetic championship of dialectical materialism and efforts to adapt it to the most advanced physics in a way that would leave physical theories free from any philosophical limitations. The strategy obviously proved quite efficient in the struggle for theoretical physics and nuclear research. The same weapon was used by Fock, Vavilov and even Frenkel', although the latter had, as we have seen, a strong reputation for defying dialectical materialism⁹.

Keeping in mind the increasing technicist pressure on physics, Ioffe tried to explain why "there is such an exceptional interest" in nuclear physics. His first argument was that "the nuclei hold the world's main supply of energy... 99.9 percent of energy resources are made up from the energy of atomic nuclei, at a concentration that is infinitely greater than that in fossil fuel, etc... Thus, the age-old need for cheap energy sources and the main goal of alchemy — obtaining noble and valuable elements from inexpensive ones — both lurk in the nucleus in a kind of radical form" [28, p. 21].

The third conference on nuclear physics was held two and a half months prior to the discovery of nuclear fission of uranium (in early October 1938). It was focused on nuclear forces, the physics and engineering of cyclotrons, nuclear isomers and the study of the effect of slow neutrons on various substances. The leadership of I V Kurchatov and his group in neutron physics was evident. They were following exactly the path that soon lead O Hahn and F Strassmann to the discovery of uranium nuclear fission, the future scientific source of national uranium (atomic and nuclear) projects, including the Soviet one.

The fourth conference, held in Khar'kov in mid-November 1939, was dominated by two events: the discovery by Hahn and Strassmann¹⁰ and the recent beginning of World War II, which directed the problem of using intraatomic energy to the military route. The presentations made by Yu B Khariton and Ya B Zel'dovich, G N Flerov and

⁹ In an article entitled "A reply to A A Maksimov", sent to *PZM* in September 1937 but not published, Ya I Frenkel' demonstrated the 'materialistic sides' of newest physics and the 'Ioffe–Vavilov–Fock–Tamm–Frenkel' line' as opposed to the 'idealistic line of Mitkevich–Timiryazev–Maksimov–Kasterin'. He compared the approach of the latter to modern theories with the attitudes adopted by the leaders of 'Arian' physics — J Stark, P Lenard and E Gehrcke [40, p. 58].

¹⁰ In a survey of the conference, published later in *PZM*, N A Dobrotin wrote: "Studies of the phenomenon of uranium fission progressed at a rate unprecedented in the history of science. In the first six months after the printing of the paper by Hahn and Strassmann, physics journals would publish, on average, a paper a day on the fission of uranium and thorium" [41, p. 190].

L I Rusinov and others were concerned with key issues of uranium nuclear fission closely linked to prospects of conducting a chain fission reaction. A large survey on the fission of uranium was made by A I Leipunskii, who was expelled from the Communist Party and lost his position as director of UFTI in 1937, was arrested for helping ‘enemies of the people’ Landau and Shubnikov on July 14, 1938 and released in August during the brief rehabilitation campaign after the arrest of the former head of NKVD N I Ezhov.

A year later, the last nuclear conference was held in Moscow; the central presentation on the fission of heavy nuclei was made by Kurchatov; Flerov and Petrzhak spoke on the discovery of spontaneous fission of uranium nuclei.

In 1939, in a paper called “Technical goals of Soviet physics” A F Ioffe pointed out that efforts to put intraatomic energy to practical use have reached a dramatically new stage, and emphasized the contribution of Soviet scientists: “Soviet physicists have analyzed this phenomenon (i.e. nuclear fission of uranium — V V) and determined the conditions under which the goal may be achieved. It is still hard to say whether such conditions can be created; this is what our research is aimed to establish. Most likely there will be no technical outcome for this once. However, this example goes to show the short-sightedness of sceptics who rejected the use of nuclear energy to start with” [42, p. 141].

Roughly a year later, Ioffe wrote an article “Problems of nuclear physics” for *Pravda* newspaper (published on October 29, 1940), discussing the discovery by Hahn and Strassmann, explanation and corroboration of it, and emotionally commented: “Thus began this work that will perhaps change the face of contemporary physics. A favorite topic of science fiction novels is becoming the job of the scientist and the engineer” [43]¹¹.

Ioffe made a special emphasis on the essential practical, applied aspect of nuclear physics (although avoiding making any hasty promises) as long as technicistic and utilitarian pressure persisted. In his memoirs, S É Frish tells the story of D S Rozhdestvenskii, a patriarch of GOI, who was forced to leave the Institute in early 1939 after his research on the spectroscopy of rare-earth elements was pronounced ‘irrelevant’ and ‘useless’ by the Director of GOI, D P Chekhmatayev: “The motive was simple: rare-earth elements are too rare to be worth studying” [26, p. 240]¹².

¹¹ We are reminded that from 1939–1940 a number of serious steps had already been made in Germany, England and the USA to launch national uranium projects: since April 1939, the German physicists P Harteck, W Heisenberg, C von Weizsäcker, O Hahn, K Diebner, E Bagge and others started to co-ordinate their efforts to separate the isotopes of uranium and build a nuclear reactor; on October 11, 1939, Roosevelt reacted to Einstein’s famous ‘letter to the president’ with “This asks for action”; in April 1940, British Uranium Committee had its first session, presided over by J P Thompson (Chadwick and J Cockroft were on it). In July 1940, the Presidium of the USSR Academy of Sciences established a Commission on the Uranium Problem chaired by V G Khlopin, Director of the Radium Institute; its member physicists were Ioffe (Vice-Chairman), S I Vavilov, P L Kapitzza, L I Mandel’shtam, P P Lazarev, I V Kurchatov and Yu B Khariton [44].

¹² “The irony was”, — Frish continued, — “that the development of atomic industry soon required good knowledge of the properties of rare-earth elements. Fortunately, both Rozhdestvenskii at GOI and Khlopin at RIAN had ignored the ban and carried on their work on rare-earth elements. Had he (Khlopin — V V) not, alongside Rozhdestvenskii, had the obstinacy of a true scientist who insists on doing his ‘worthless’ research, it would certainly have delayed the making of the atomic bomb” [26, p. 320].

At the ‘philosophy front’ of physics, tension also persisted. During 1938–1940, the same crowd — Maksimov, Kol’man, Mitkevich, Timiryazev et al. — kept attacking the ‘physical idealism’ of Ioffe, Vavilov, Tamm, Frenkel’, Fock and ‘Company’¹³. In fact, it was the theories themselves (such as relativity and quantum mechanics) rather than their interpretations by philosophers that were judged idealistic. Timiryazev thus wrote of “the theory of relativity as a source of physical idealism”. As to Maksimov, he attributed the ‘idealism’ of the above mentioned ‘Company’ to their having lost touch with technical needs and practice: “As a rule, the proclivity for Machism, typical of a certain stratum of Soviet physicists, leads to loss of touch between theory and practice. While the majority of Soviet physicists work hard and do their best to fulfil Stalin’s five-year plans, some ‘theoretical’ physicists train personnel who prove unable to handle practical issues since they do not have proper knowledge of classical mechanics and electrodynamics; they were taught to scorn practical work and practical physicists” [45, p. 204].

When the ‘philosophical’ and ‘utilitarian’ fronts joined up and started to raise the issue of education and personnel, the physical community was threatened with ‘practical conclusions’ that could jeopardize the scientific potential and involvement of major researchers in theoretical and nuclear physics that were essential for launching the national nuclear weapons project. Still, even in pre-war years, physicists managed to check the authorities’ attempted ‘philosophical-utilitarian’ campaigns and to keep up theoretical and nuclear physics at a relatively high level where both teaching and research were concerned¹⁴.

3. The atomic project as a shield against ‘philosophical-cosmopolitan’ attacks on physics (1947–1960)

3.1 “Modern theoretical physics is inundated with adverse philosophical trends that hinder its development...” (1947)

There was a lull at the ‘philosophical front’ of physics during the war against Nazis. As early as 1946, however, ideological campaigns were resumed. The first one concerned art and literature [the Acts of the Central Committee of the Communist Party (TsK VKP(b)) “On the *Zvezda* and *Leningrad* magazines”, “On the repertoire of theatres”, etc.). In June 1947, there were wide discussions of a book by Academician G F Aleksandrov *History of Western European Philosophy*, during which A A Zhdanov himself ‘opened fire’ (it was just after the war) at ‘physical idealism’. Timiryazev and Maksi-

¹³ If we just take the articles they published over those years in *PZM*, the titles speak for themselves: “The revival of Pythagorean trends in modern physics” (Kol’man, 1938), “Relativity theory and dialectical materialism” and “The quantum theory and dialectical materialism” (Kol’man, 1939), “Modern physical views on matter and motion in dialectical materialism” (Maksimov, 1939), “On present-day struggle of materialism against idealism” (Mitkevich, 1938), “Once again about the wave of idealist in contemporary physics” (Timiryazev, 1938) and so forth.

¹⁴ I already mentioned that before the war major nuclear conferences used to be held almost every year; very costly accelerators were being built in Leningrad (at RIAN and LFTI) and in Khar’kov (at UFTI). The press, including *PZM*, published articles not only by Maksimov, Kol’man, Timiryazev and others, but also by their opponents Vavilov, Ioffe, Fock et al., the latter group trying to adapt dialectical materialism to modern physics.

mov, two experienced steady champions of Marxist-Leninist ideology in physics, were anxious to take his side¹⁵.

In 1947, *PZM* was replaced by a new magazine *Voprosy Filosofii* (*Problems of Philosophy*) headed by B M Kedrov. The 2nd issue of the new magazine contained the renowned paper by M A Markov "On the nature of physical knowledge", the first chapter of his book *On the Microscopic World*. Vavilov wrote the introduction to the paper, giving a very positive appraisal of the author's novel ideas and profound methodological analysis of quantum mechanics, based on dialectical materialism. The 'philosophical wardens', Maksimov in the first place, labelled the paper 'pro-Bohr' and therefore intrinsically idealistic [47]. As a result, 'the Markov story' became one of the main pretexts for holding the conference 'on philosophy and physics' that came to be known as 'the conference that failed to happen'. Here is how M A Markov himself put it: "At one of the USSR Academy of Sciences' Presidium sessions that condemned modern biology, Maksimov, according to Vavilov, suggested that the same should be done for quantum theory, i.e. one should discuss the 'ideological perversions' that are manifested in this field. "Maksimov named you as the leader of the perversions", — the President of the Academy told me" [46, p. 248]¹⁶. Markov and his article were indeed pointed out in the 'anteroom'¹⁷ as one of the most clear symptoms of 'physical idealism' and cosmopolitanism; the unrepentant 'centaur' who taught a course on nuclear physics was soon fired from Moscow State University.

Markov's book was discussed at FIAN in January 1948 (before Maksimov's articles saw the light); it was admitted "to be, in fact, the first paper treating the foundations of quantum mechanics from the standpoint of Marxist-Leninist philosophy" (quoted from Ref. [11, p. 94]). The methodological seminar at the Physics Department of Moscow State University was very negative in its judgement of Markov's paper. It was so much like the 1930s discussions, even led by the same people: Timiryazev and Maksimov. The 'Company' of Ioffe, Vavilov, Frenkel', Fock and Tamm was joined by Markov who, by the way, had been deeply interested in dialectical materialistic interpretations of quantum mechanics since the early 1930s.

A new tune which gained in voice in the post-war years and often sounded in unison with criticisms of 'physical idealism' was 'cosmopolitanism'. One of its sources was the open anti-Semitism of Stalin and his clique (for more detail, see Refs [11, 16, 17]). The alleged 'cosmopolitans' were the same people — Ioffe, Fock, Frenkel', Landau, Khaikin — plus Leontovich and Ginzburg. Their names were mentioned at a Scientific Council session of the Physics Department of Moscow State University by V N Kessenikh (he was Head of Department at the time), A A Sokolov, V K Semenchenko and others on November 13, 1947.

¹⁵ Timiryazev: "Modern theoretical physics is inundated with adverse philosophical trends that hinder its development; these adverse trends do not meet with due resistance. This is why the lag in our philosophical activities leads to a lag in physics and other natural sciences" (quoted from Ref. [11, p. 88].

¹⁶ Maksimov's article condemning Markov was published in *Literaturnaya Gazeta* under the title "On a philosophical centaur". M A Markov was the centaur in question.

¹⁷ Contemporary physicists used to refer to the series of preparatory sessions for the 'conference that failed to happen' as the 'anteroom' [46, p. 248].

The budding hostility between the professors of the Physics Department and the 'academic physicists', most of them pupils of L I Mandel'shtam, was described in a letter to Stalin written by S T Konobeevskii, a Corresponding Member of the Academy who had headed the Physics Department for a year and was then replaced at his post by V N Kessenikh: "In 1944, the prominent, talented scientist L I Mandel'shtam died after creating a major science school and a new scientific direction in the physics of vibrations and radio physics. The Mandel'shtam school and his pupils gradually moved away from the University (the author names brilliant physicists and professors who had to leave the Department: Academicians G S Landsberg and M A Leontovich, Corresponding Member of the Academy I E Tamm, Professor S É Khaikin and others — V V) ... The departure of many prominent scientists reinforced the standing of a group of elder generation 'professional' lecturers and researchers who were not engaged in active research (Konobeevskii next tells the story of a failed attempt to improve things at the Department by appointing himself its dean to replace A S Predvoditelev: he had to face the strong and very warlike organized resistance of the Physics Department employees and its Communist Party group. He also recounts being denied membership in the Communist Party on an absurd 'cosmopolitan' pretext — V V) ... There is a kind of 'ideology' that juxtaposes a special 'university science' to unwholesome 'academic science', etc." (quoted from Ref. [3, pp. 6–13]).

The letter is dated October 26, 1947. S T Konobeevskii soon joined one of the leading 'closed' institutes working on the atomic project, NII-9 [its name was later changed to VNII (All-Union Scientific Research Institute) of Non-Organic Materials] and became the 'father of Soviet radiation materials science' [48, p. 412]. He was admitted to a Communist Party in 1948 at that very institute.

In those years (1947–1948), the Soviet nuclear project reached the industrial stage [48, 49]. In December 1946, the first European reactor (the physical reactor F-1) was launched at Laboratory No. 2 led by Kurchatov. Plutonium and uranium gas diffusion plants were being constructed at full speed. In June 1948, an industrial reactor producing plutonium-239 reached projected output. Throughout 1948, cascades of gas diffusion machines, intended for the main plant (D-1) separating uranium isotopes, underwent performance and acceptance tests. In Arzamas-16 (KB-11), finishing touches were made to the design of the atomic bomb. Leading Soviet physicists joined efforts in making the atomic bomb; some of them headed sections of the project: I V Kurchatov, N N Semenov, I K Kikoin, L A Artsimovich, G N Flerov, A I Alikhanov, Yu B Khariton, Ya B Zel'dovich, D A Frank-Kamenetskiĭ, A P Aleksandrov, L D Landau, I Ya Pomeranchuk, I M Frank, I I Gurevich, A I Leipunskii and others. They were later joined by I E Tamm, N N Bogolyubov, V L Ginzburg, A D Sakharov, M A Leontovich and others.

The above names, with a few exceptions, were not mentioned in the philosophical–physical discussions of those years. The exceptions were L D Landau, who was not one of the leading theoreticians in the atomic project although he did some important work, and the FIAN physicists who were included in the 'atomic business' at a later stage in 1948: Tamm, Ginzburg and some others.

Perhaps the roads of 'physical philosophy' and the Soviet atomic project would not have crossed at all in a significant

way if it had not been for the fact that the situation in physics became acutely critical by the end of 1948–early 1949. The cause was the campaign against ‘cosmopolitans’ that unfolded after the August 1948 session of the Academy of Agricultural Sciences (VASKhNIL); it brought the ruin of Soviet biology, primarily genetics. The session was approved by the authorities as an exemplary measure against idealism and ‘cosmopolitanism’. For several years starting in late 1948, a wave of ‘philosophical–cosmopolitical’ conferences and meetings stimulated by the session ravaged through the country. The victory of the ‘Michurin approach’ stimulated the enemies of the Ioffe–Vavilov–Fock–Tamm–Frenkel ‘Company’ (later added to the black list were Kapitza, the deceased Mandel’shtam, Leontovich, Khaikin, Markov and some others), both physicists and philosophers, to organize a similar ‘carnage’ with the naturally following ‘practical conclusions’ which could have done serious harm to modern physics and its teaching at universities.

3.2 “... Adopting cosmopolitan standpoints inevitably leads to ... attitudes hostile to Marxism”: preparing for the physicists’ ‘conference that failed to happen’ (1949)

The story of the ‘conference that failed to happen’ or a series of preparatory sessions for what was planned to become a ‘physical simile’ of the Academy of Agricultural Sciences (VASKhNIL) session, formally initiated by a letter of the Minister for Higher Education S V Kaftanov and President of the USSR Academy of Sciences S I Vavilov dated December 3, 1948, has been written up in detail [11, 16, 17]. Therefore, without going into particulars, I shall focus on the features that are important in this context.

(1) The unprecedented scope and thoroughness of the preparatory activities: 42 sessions of the Organizing committee, each many hours long, with dozens of invited physicists and philosophers (a total of around a hundred persons took part) were held over three months (from December 20, 1948 until March 16, 1949, the session was planned to start on March 21). The shorthand reports of the preparatory sessions add up to more than a thousand pages.

(2) The goals of the planned conference were rather clearly formulated in the draft resolution and introductory report by Kaftanov. The first, and main, goal was declared to be “the complete rooting out of cosmopolitanism, which is the theoretical basis of all ideological perversions in our physics” [50, sheet 31]. The second goal which seemed at first to be the principal one, was “reinforcing the joint work of physicists and philosophers on the methodological problems of physics” on the basis of V I Lenin’s work of genius, *Materialism and Empiriocriticism*. The introduction to the draft resolution listed our ‘cosmopolitans’ and ‘idealists’ (there was a virtually unbreakable link between the two, i.e. in most cases they were the same people)¹⁸. Kaftanov’s report directly mentioned the need to ‘debunk those theories (i.e. those of modern physics — V V) from the standpoint of dialectical materialism’.

(3) After ‘debunking’ latest theories, ‘idealists’ and ‘cosmopolitans’, radical changes were planned for the teaching and training of scientific specialists. This meant that the ‘patriotic materialist physicists’ were to occupy leading positions in universities, publishing houses, journals, academic councils, etc.

The majority of physicists charged with ‘idealism’ and ‘cosmopolitanism’ were the leading theorists, acknowledged specialists in relativity, quantum theory and nuclear physics (Frenkel’, Fock, Tamm, Landau, Lifshitz, Ginzburg, Markov, Leontovich and others). Only a few of them at the time were either directly or indirectly involved in the nuclear project (Landau, Tamm and Ginzburg; to some extent, so was Leontovich: since 1949, he had headed the Chair of Theoretical Physics at the Moscow Engineering and Physics Institute, MIFI, which trained most of the staff of the Soviet atomic project). Since the physicists and philosophers in the ‘patriotic materialist’ wing were trying to expose relativity and quantum mechanics as a variety of ‘Morganism–Weissmannism’, the physicists at the other extremity based their defence on the scientific value of the two theories and their conformity with Marxist philosophy (by the tradition started by Ioffe, Fock, Tamm and Vavilov before the war). In some of the speeches (by Vavilov, Tamm, Ginzburg et al.), the ‘nuclear’ argument was mentioned as well.

It was thus with a purpose that Vavilov mentioned the atomic bomb when he spoke about the fundamental importance of physics to both philosophy and technical progress: “Technical discoveries were made by virtue of intelligent use of the results of science, physics in the first place. This is how steam and electric machines, the telegraph, radio and atomic bomb came to be” [51, sheet 64]. Physics, he argued, is a whole entity, it cannot exist without its theoretical foundation, relativity and quantum mechanics in the first place.

Tamm was prepared to criticize particular idealistic statements made by Schrödinger, Jordan and Eddington (he even used the label ‘Eddingtonism’ in a derogatory way to denote Eddington’s ‘neo-Pythagorean philosophy’); he also mentioned the need to ‘stand up for our scientific priority in a number of major discoveries’ (the discoveries in question were combination (Raman) scattering of light, found and explained independently by Mandel’shtam and Landsberg, the discovery and explanation of superfluidity by Kapitza and Landau, etc.). He kept insisting, however, that modern physical theories (together with their interpretations) are the key to grasping the physics of the microscopic world, understanding its philosophy and using it in practice.

“... The basic principles of relativity and quantum mechanics (including the uncertainty relation and the principle of complementarity) reflect the properties of objective reality”, — went Tamm’s speech; he wouldn’t budge an inch in core matters. — “Saying that these principles put limitations on applying classical conception to the microscopic world and must hold in any future correct physical theory is by no means an attempt to bring dogmatism into the progress of modern science...” [52, sheet 163]. Mentioning the latest results in nuclear and elementary particle physics (particularly the great leap forward in experimental and theoretical aspects of quantum electrodynamics: Lamb shift, the renormalization technique, the discovery of pions, K-mesons and hyperons, etc.), he emphasized the fact that they were based on relativity and quanta. “While building a new theory (for the microscopic world — V V)”, — Tamm said, — “we can use more quantum

¹⁸ The list provided in the draft resolution started with the names of A F Ioffe, P L Kapitza, L D Landau, Ya I Frenkel’, M A Markov and the philosopher B M Kedrov. Kaftanov’s report also mentioned V A Fock and É V Shpol’skii. Later on, I E Tamm, G S Landsberg, M A Leontovich, E M Lifshitz, S É Khaikin, N D Papaleksi, V L Ginzburg and others were added. Note that Vavilov’s talk, despite its mild philosophical criticism of Frenkel’, Landau, Lifshitz and a few others, was chastized for lack of ‘political acuteness’ [11, 16, 17].

dynamics than we could ever think of" [52, sheet 168]. In other words, the importance of quanta and relativity increases as we go deeper into matter and into high energies.

His pupil V L Ginzburg echoed with: "Relativity and quantum mechanics have equipped physicists with ideas and methods which are adequate to the immensely grown potential of experiment; it is now impossible to do work in atomic or nuclear physics without using these theories". "Therefore", — concluded Ginzburg, — "any attempts to understate the scientific value and importance of relativity or quantum mechanics (labelling them 'idealistic', etc. — V V) should be met with a sharp rebuff as detrimental to scientific progress in our country" [53, sheet 155].

The authorities were aware of the fact that the creation of atomic weapons was based on nuclear physics; specialists in the field were unanimous that the latter was unthinkable without the theory of relativity and quantum mechanics.

'Patriotic materialists' used arguments of two kinds. On the one hand, they were trying to condemn relativity and quantum mechanics as symptoms of idealism and cosmopolitanism. We shall come back to that later. On the other hand, any allusions they made to nuclear physics and atomic power problem were ridiculous to the ear of specialists in the trade.

An especially obvious blunder was to include the book by H D W Smyth *Atomic Energy for Military Purposes* (1945, Russian translation 1946) in the draft resolution of the planned conference as an instance of idealistic propaganda: "Books and papers of bourgeois physicists are translated into Russian without criticism of any kind and are widely circulated. Among the books that openly advocate idealism are some that have created a sensation — Schrödinger's *What is Life? The Physical Aspect of the Living Cell* and Smyth's *Atomic Energy for Military Purposes* [50, sheet 21]. The subtitle of Smyth's book read: "The Official Report on the Development of the Atomic Bomb under the Auspices of the United States Government" [54]. This monograph was used as a handbook by all atomic physicists working on nuclear arms and contained, for example, the following text: "The equivalence of mass and energy is chosen as the guiding principle in the presentation of the background material of the 'Introduction' (a 'philosophical offence' in itself — V V) [54, p. 1]; and below: "...energy may sometimes be converted into matter and matter into energy. Specifically, such a conversion is observed in the phenomenon of nuclear fission of uranium, a process in which atomic nuclei split into fragments with the release of an enormous amount of energy" [54, pp. 1, 2]. Still later one read that the equivalence is described by the formula $E = mc^2$ (where E is the amount of energy equivalent to the mass m , and c is the speed of light) and is one of the main conclusions of the theory of relativity.

The thesis (an elementary one, in fact) that mass is equivalent to energy¹⁹ was turned into an 'idealistic bugbear' by our 'materialists' (as Tamm put it). As one of the

¹⁹ I E Tamm commented on this story in 1962: "The misunderstanding arose only because some philosophers could not understand the meaning of the physical theory or physical terminology... In physical writing at home and abroad, we can indeed meet the expression that mass 'transforms into' energy. In fact, the expression is not wrong, it is (for the sake of brevity) not stated clearly enough: the processes in question are those in which the rest mass of reacting bodies decreases whereas their kinetic energy, related to their velocity, increases. Their total mass, meanwhile, and likewise their total energy, are always constant whatever the process (underlined by Tamm — V V). All of this is quite obvious to any competent physicist. Unfortunately, in the recent past, a whole ange of

most aggressive 'materialist physicists' N S Akulov said during the discussion of V A Fock's talk: "Had a senior or graduate student, or an experimenter who heard it from somebody said something of the kind (i.e. that atomic energy is released at the expense of rest mass of the nucleus — V V), never mind, but Vladimir Aleksandrovich, one of our leading theorists, how can he say that atomic energy is produced at the expense of the rest mass of the nucleus...?" [56] (quoted from Ref. [11, p. 148]). When A F Ioffe exclaimed "How long are you going to talk nonsense?", Akulov came back with "Abram Fedorovich, you've talked so much nonsense in your life..." (*ibid.*). Akulov was eventually ordered out of the room after he failed to apologize to A F Ioffe on the request of the session chairman A V Topchiev.

Two specialists in physical chemistry, N I Kobozev and S S Vasil'ev, who attacked the 'academic' researchers in physical chemistry and chemical physics, A N Frumkin and N N Semenov in the first place, went as far as accusing them of scientific incompetence as well as cosmopolitanism and idealism. One of the accusations directly dealt with the atomic bomb. "The forecast that technical use of intraatomic energy is not possible", — went Kobozev's speech, — "publicly made by Semenov, Zel'dovich and Khariton on the eve of the first use of the bomb, has tainted the reputation of those scientists and that of the whole institute (the Institute of Chemical Physics — V V)" [57, sheet 195].

Here is what S S Vasil'ev intended to say about N N Semenov and his theory of chain reactions, awarded the Nobel prize in chemistry in 1956: "N N Semenov tackles a variety of problems; the outcome is invariably a flop. His book called *Chain Reactions* and subsequent papers contain a whole range of physical and mathematical blunders... Pretending to be a prominent scientist, he misguided the scientific community of our Motherland by denying the possibility of practical use of atomic energy on the very eve of its becoming a true fact" [58, sheet 224].

In fact, it had been the other way round. It was Semenov's very pupils Khariton and Zel'dovich who were maybe the first scientists to realize that the fission of uranium bombarded by slow neutrons amounted to a branched chain reaction. They published fundamental papers to that effect; Semenov, upon reading them, reacted right away by sending a letter to the Oil Narkomat (People's Commissariat) reporting the potential uses of atomic energy on that basis [59]. What Kobozev and Vasil'ev meant was a popular science review written by N N Semenov in 1944, in which he briefly mentioned the difficulties of using atomic energy [60, p. 103]. At that very moment, however, the atomic project had already started, and Semenov's pupils Khariton and Zel'dovich soon became its top men. By February – March 1949, less than six months remained until the tests of the first Soviet atomic bomb. Khariton was its head designer and Zel'dovich, in fact, its head theoretician (both were later made thrice Heroes of Socialist Labor for outstanding contribution to producing Soviet nuclear weapons).

Until the end of February 1949, the general atmosphere at the Organizing committee sessions was not in favor of 'academic' physicists or 'idealist cosmopolitans'. Even a

philosophers in this country have failed to understand the theory and terminology of physics and turned the misunderstanding into a kind of 'idealistic bugbear'; while struggling against their own invention, they ended up denying the entire theory of relativity" (quoted from Ref. [55, p. 127]).

highly compromising report made by S I Vavilov²⁰, despite Vavilov's status as president of the USSR Academy of Sciences, was fiercely criticized by A A Maksimov, A S Predvoditelev, N S Shvetsov, K A Putilov, V F Nozdrev, B M Vul, B M Kedrov, I V Kuznetsov and others. Vavilov was reproached for his gentle treatment of Ya I Frenkel', M A Markov and other 'idealist physicists', including I E Tamm, V A Fock, and M A Leontovich. The report was accused of lacking 'political acuteness'. Nozdrev proposed to reject the report; however, due to the efforts of A V Topchiev and S V Kaftanov, it was eventually approved 'in general' on the condition that the author would take into account the remarks made at the session.

A few days later, Ya I Frenkel' gave his talk; despite some degree of 'repentance' on his part — "I have to admit that in the past I have not strictly and consistently adhered to this (i.e. dialectical materialist) philosophical position" (quoted from Ref. [16, p. 360]) — his speech was severely reproved.

A subsequent speech by A K Timiryazev, openly directed against relativity and quantum mechanics, was endorsed. The focus of the speech was a 'proof' of the fact that the theory of relativity and quantum mechanics were 'based on idealist philosophy'; the 'idealist scum' 'invented by foreigners' was "hindering the progress of Soviet physics" [61, sheet 241].

In the last days of February and early March, 'the idealist cosmopolitans' 'showed their teeth'. A series of speeches by 'academic' physicists — M A Markov, V A Fock, G S Landsberg, A A Andronov and I E Tamm — advocated the theory of relativity and quantum mechanics. We have already shown what Tamm's arguments amounted to (see pp. [1269, 1270] of this article, you will also find there some quotations from Tamm).

Fock made his case along the same lines, stressing the fundamental consequence of the main principles of relativity and quantum mechanics. He thus said that "the theory of relativity was put to the most thorough test by experiment, and we can trust it to be a true reflection of some essential properties of space and time" (quoted from Ref. [16, p. 362]). Unlike Tamm, Fock went into the details of philosophical interpretations of quantum mechanics; in fact, he backed the viewpoint of Bohr and Heisenberg but argued it to be fully compatible with dialectical materialism.

Landsberg and Andronov likewise spoke unequivocally in favor of the theories, while denying the charges of 'cosmopolitanism' and idealism raised against 'academic' physicists. The physicists, Tamm for instance, treated the issue of 'cosmopolitanism versus patriotism' as a matter of 'defending our scientific priority in a range of major discoveries', in particular, the discovery of combination scattering of light by Mandel'shtam and Landsberg and the discovery and theoretical explanation of superfluidity by Kapitza and Landau [52, sheets 170, 171].

As a result, despite the fact that these talks were 'not endorsed'²¹, the overall tendency in the 'anteroom' was clearly not in favor of 'materialist patriots'. On March 7, 1949, they took their last shot: the presentation by

V F Nozdrev who opened furious fire at the 'cosmopolitans' (Ioffe, Frenkel', Kapitza, Landau, Khaikin, Veksler, Markov et al.), stressing the point that "adopting cosmopolitan standpoints inevitably leads ... to attitudes hostile to Marxism" [62, sheet 104].

In a sense, the summary can be found in the report given by S V Kaftanov, considerably enlarged compared to the first draft. It was entitled "To future triumphs of Soviet physics"; participants of preparatory sessions were acquainted with its text; it was discussed on March 16, the last day of preparing the 'conference that failed to happen'. Emphasis was made on the adherence of physics to ideological and Communist Party principles, on 'cosmopolitan' and 'idealistic' views of some Soviet physicists (however, the charges were not made in the direct and sharp style of the speeches by Nozdrev, Akulov, Kessenikh and others). Although the names of Frenkel', Fock and Landau did appear on Kaftanov's list of 'defendants', he used them with respectful phrases like 'our most prominent theoretician', 'our major scientist', etc.; the talk concluded with a slightly camouflaged thrust at Timiryazev, Maksimov and other irreconcilable opponents of relativity and quanta: "... It would be a gross error bordering on ignorance to fully deny the positive role of many new achievements in physics that build up the foundation of modern science only because footmen of the bourgeoisie draw idealistic conclusions from the most up-to-date physical theories" [63, sheet 163]. This meant that the attempt to declare relativity and quantum mechanics 'false theories' the way genetics had been, failed this time.

3.3 "... And thus had the atomic bomb been the saving of physics..." (1949)

The last session of the Organizing committee was thus held on March 16, 1949. The thoroughly planned conference was supposed to open with Kaftanov's speech on March 21. But it did not open on March 21, nor on May 10 (Kaftanov asked Malenkov to postpone the conference to May 10): it failed to happen altogether, that is why I referred to the whole preparatory saga as 'the conference that failed to happen'. A note by Shepilov, head of the Propaganda and Agitation Department of the Central Committee of the All-Union Communist Party, to Malenkov (dated April 9) proposed in view of 'the inadequate preparation of the conference and an imperative need to conduct a more profound study of problems and proposals in the field of physics', to postpone the conference 'to a later date' (the timing of the conference was planned to be 'given special consideration') [11, pp. 159, 160].

There are several possible explanations of this unexpected decision of authorities, mentioned in the works [11, 16, 17, 64, 65, 73]. The prevalent story is the 'nuclear' one, by which Kurchatov and 'his team' made it clear to the authorities that the conference might hold back the completion of the atomic project. There exist at least two or three more versions. The first one is based on Communist Party documents and suggests that the conference was in fact poorly prepared for and therefore pointless. The final decision was made by D T Shepilov with regard to the standpoint of S I Vavilov, who realized the potential danger of the conference (Vavilov procrastinated with finalizing his report and failed to join Kaftanov's request to postpone the conference for mid-May 1949).

Another 'authoritative version' also focuses on Vavilov's part: it was his initiative to create a special secretariat at the Presidium of the USSR Academy of Sciences. On February

²⁰ Note that S I Vavilov did not directly take part in the Organizing committee. The participants were acquainted with his report and discussed it for two days (February 16 and 18).

²¹ Markov was recommended to 'totally restructure' his presentation and 'thoroughly criticize his mistakes'; Fock, to make his presentation 'more politically correct'; Landsberg, Andronov and Tamm, to restructure their reports and take into account the censure of their opponents.

26, 1949, the Central Committee of the All-Union Communist Party [VKP(b)] sanctioned its creation and appointed A V Topchiev, head of the Organizing committee of the planned conference, the scientific secretary (Academician-Secretary) of the secretariat. Yu A Zhdanov, head of the Science Department of the Central Committee of the All-Union Communist Party [VKP(b)] and one of 'Shepilov's men', became a member. As a result, the 'ideology wardens' had a hand in the administration of science, and the conference was not so urgent any more [73].

Another version has it that authorities cancelled the conference on the grounds that it could serve to disclose atomic secrets [11, 16, 17, 64, 65].

That the conference should be cancelled was clearly of the greatest concern to those physicists who had been charged with cosmopolitanism, idealism and 'being out of touch with practice'. Their names had been listed in the draft resolution of the conference, in Kaftanov's programme speech and in the speeches of their opponents. The physicists in question included Ioffe, Kapitza, Papaleksi, Frenkel', Fock, Tamm, Leontovich, Landau, Markov, Ginzburg, Khaikin, Rytov, et al. Of course, Vavilov also advocated them. The inevitable 'practical conclusions' after the conference would have seriously impaired the standing of 'academic' physicists, done considerable damage to physics, and dramatically reduced the level at which theoretical physics was taught in the USSR. It would hardly have affected the timing of the work on the first Soviet atomic bomb, conducted by dozens of leading physicists. It was just in spring 1949 that this work was nearing completion. Nuclear physicists involved in the project (among them I V Kurchatov, I K Kikoin, L A Artsimovich, G N Flerov, A I Alikhanov, N N Semenov, Yu B Khariton, Ya B Zel'dovich, I Ya Pomeranchuk, L D Landau, A I Leipunskii et al.), most of them Ioffe's pupils, and likewise the 'academic' physicists accused of all seven deadly sins, belonged to the elite of the physical community and would hardly have tolerated a pogrom of physics. However, it could have affected the newly started thermonuclear project that required enormous theoretical and experimental efforts to make it progress in the right direction. I thus believe the version based on 'nuclear arguments' to be the most credible one.

There is a lot of evidence to support it, though either memorative or indirect. Yet both kinds are quite convincing. There are several alike-but-different variations of the 'nuclear' version, every one of which deserves mentioning and keeping record of. One is due to I N Golovin, former deputy of I V Kurchatov, author of the first and best book about him, one of the oldest researchers at Laboratory No. 2. His version is based on an account by general V A Makhnev, Beriya's personal assistant at the time: "At a session in early 1949, Beriya asked Kurchatov whether relativity and quantum mechanics were really idealist and had to be given up? To which Kurchatov answered: "We are making the atomic bomb, which is based on the theory of relativity and quantum mechanics. If we give them up, we'll have to give up the bomb, too". Beriya was clearly put off by this answer and said the bomb was what mattered most and everything else was rubbish. Apparently, he reported to Stalin right away, and the latter gave orders to cancel the conference" (quoted from Ref. [11, p. 161], see also [66])²².

²² See below footnote 24 to p. 1273, in particular, Ginzburg's rendering of the same scenario.

A P Aleksandrov, one of the project leaders (he was at the time the Director of the Institute for Physical Problems that did important work in the project) and Kurchatov's close friend, suggests another version: "Soon after the war was over, in forty-six, I think, they told me to come to the Central Committee of the Communist Party and started to tell me that the quantum theory and relativity were all moonshine. There was a very mixed crowd, I couldn't see what it was all about. Two know-all from Moscow State University carried on worst of all. I told them a very simple thing: "The atomic bomb itself demonstrates such a transformation of matter and energy which follows from the new theories and from nothing else. If we give them up, we'll have to give up the bomb, too. Fine, you can renounce quantum mechanics and make the bomb yourselves, as you please." I came back and told Kurchatov about it. He laughed and said: "Don't worry." They actually left us alone after that. The parable went round that physicists had defeated their own 'Lysenkoism' (by name of the leader of pogroms against genetics — NI) by the atomic bomb" [67, p. 3]. In all probability, the author got the year wrong: this must have happened in 1948 or 1949. It also matters that Kurchatov worried no more and even laughed. This could only mean one thing: Kurchatov had already had an exchange of the kind at a higher level (with Beriya or Stalin) and the outcome had been in the physicists' favor. It is curious that both stories have almost the same wording ("if we give up relativity and quantum mechanics, we'll have to give up the bomb, too") and that Aleksandrov mentioned 'the parable that went round' 'that physicists had defeated their own 'Lysenkoism' by the atomic bomb.

Another account comes from S É Frish who took part in the 'conference that failed to happen' and made a very faithful record of it: "Some time later I learned (notice that Frish was definite that it was something he learned, not thought or heard of — V V) that a short while before the session (probably meaning the last session on March 16, 1949 — V V) Kurchatov made a statement to the government saying that he could not take responsibility for future progress in making nuclear weapons if a ban was put on relativity and quantum mechanics. The evident practical importance of these theories had played into the hand of physics. This was the saving of physics" [26, p. 357]. A very similar story was told by Yu F Orlov who cited G I Budker: "Budker, who became a close friend of mine in the last years of his life and my freedom, told me how the catastrophe had been prevented from happening. Igor' Vasil'evich Kurchatov, head of the atomic project, warned Stalin that distracting physicists, however slightly, by 'philosophical discussion' would ruin the timing of the atomic weapons' production. The entire programme was based on quantum mechanics and the theory of relativity, everything would go to pieces, Iosif Vissarionovich. Stalin understood. Having priority in atomic weapons and rockets was the No. 1 objective of the state... So he ordered that physicists, with their counterfeit but, for reasons unknown, powerful science, be left alone for a while... Thus had the atomic bomb been the saving of physics" [68, pp. 108, 109]. What the three variants have in common is what they arrive at: the conference would condemn relativity and quantum mechanics without which the atomic bomb cannot be made, therefore, the conference must be cancelled.

E K Zavoiskii, who made the discovery of electronic paramagnetic resonance and worked in Arzamas-16 at the time, told the story as follows: "...Natural philosophy with a pseudodialectical flavor had run roughshod over biology,

leaving Russian science lying in ruin for years to come, so it seemed (meaning the August 1948 session of VASKhNIL — V V). This is a grudge for philosophers who have long resented relativity and quantum mechanics. Being ossified as they are, they were smashed by the principle of uncertainty and the ‘disappearance’ of their favorite ‘mass’ (meaning the Einstein equation for equivalence of mass and energy, $E = mc^2$, a cause of special concern for philosophers and mechanistically-reasoning physicists — V V); the birth of cybernetics also shocked them. They dream of bringing the curse of Lysenko’s philosophers down on the heads of physicists and of organizing a massacre. But wait a moment...mass did transform into energy in the sky of Japan... and how! 20000 tons of explosives in a ball small enough to hold in your hand. But caution! the dogmatists’ philosophy can do *nothing of the kind* (italicized by Zavoiskii — V V), all they can do is shoot the breeze... who knows what happens next! And so the well-considered violent raid on exact sciences was arrested. Who were the heroes of that battle? Apparently, they were I V Kurchatov, S I Vavilov and their associates” [69, p. 221]. Zavoiskii’s story has the same plot but it is not clear who talked to whom: Kurchatov or someone else (probably Vavilov) to Stalin or Beriya or to someone else.

Yet another variation of the nuclear version appeared fairly recently. It belongs to V F Kalinin, a veteran of atomic engineering, first scientific secretary of the nuclear reactor section attached to the Scientific-Technical Council of the First Chief Directorate of Council of People’s Commissars, then Council of Ministers (PGU). His story goes like this: “Looking back to Kurchatov, I cannot but mention an event that many have heard of: the encounter of Kurchatov and Stalin, at which it was, in fact, decided to call off the conference condemning idealism in physics. I know about the encounter from Dmitrii Vasil’evich Efremov, a man I have great respect for. He used to work as a designer in Leningrad, then he became deputy head of PGU and vice-chairman of the State Committee on Atomic Energy (GKAÉ). He trusted me very much... This is what he told me about the annulment of the conference...”. Efremov’s narrative follows: “The encounter took place in late 1948 — early 1949. Stalin summoned Kurchatov and myself and said: “Comrade Kurchatov, the Academy is preparing a conference that will condemn idealism in physics. You must take control and give the central report. This is very important.” At the time, the Academy of Sciences was preparing such a conference, at which physicists were supposed to speak up, and Kurchatov was trying to avoid it all the time. Stalin probably found out. Igor’ Vasil’evich said: “Iosif Vissarionovich, we have lots of work to do, it is undesirable to distract people.” Stalin insisted: “Comrade Kurchatov, this is very important, I ask you to do it”. “Iosif Vissarionovich, I have got Russians, Georgians (exactly in this order), Jews, Armenians, Ukrainians, Tartars and many others working for me; some of them even believe in God but they are all working strenuously, with determination, we must not disturb their work”. “Comrade Kurchatov, idealism in physics is very harmful. Please do what Comrade Lysenko has done. He has expunged the Morganists and Weissmannists. We must do the same for physics.” At this moment Igor’ Vasil’evich rose and said with emotion: “Iosif Vissarionovich, this will prevent us from fulfilling on time the task you set before us.” Stalin noticed the state Kurchatov was in and said:

“Don’t worry, Comrade Kurchatov, don’t worry. We can do that (condemn idealism — V V) later on. Better tell me if we can make tactical atomic weapons?” ... Igor’ Vasil’evich had thus saved physics from a pogrom” [70, pp. 132, 133].

The Kalinin–Efremov version is substantially different from the rest in that it shows Stalin to have been the first to speak to Kurchatov and try to use ‘nuclear arguments’ against idealism and cosmopolitanism. Indeed, the situation in the ‘anteroom’ was far from being in favor of ‘patriotic materialists’. The sum total of scientific reputations (at home and abroad) of ‘cosmopolitan idealists’ like Ioffe, Kapitza, Frenkel’, Fock, Landau, Tamm, Semenov, the recently deceased Mandel’shtam and of his school (Landsberg, Leontovich, Andronov, Khaikin and others), de facto supported by the Academy President S I Vavilov, was incomparably greater than that of their opponents. The most active ‘patriotic materialists’ led by A A Maksimov, N S Akulov and V F Nozdrev, showed incompetence bordering on ignorance and bad morals that were evident to all. Thanks to Vavilov, ‘cosmopolitan idealists’, though losing in numbers, were at a scientific and moral advantage in the ‘anteroom’.

Things being what they were, a ‘third party’ working on the atomic bomb under the watchful eye of Beriya, could determine the outcome of the battle in favor of the ‘patriots’. However, the authorities’ attempts to pressurize Kurchatov’s crowd — according to Aleksandrov and some others, there had been more than one — met with such a resistance which could obstruct the physicists’ main task: producing atomic weapons.

A few details of Kurchatov’s conversation with Stalin support the plausibility of this version. When Kurchatov said that he had “Russians, Georgians, Jews et al. working for him” (he named several other ethnic groups but Efremov is confident that this was the exact order in which they were named) and that some of them “even believe in God” (to say nothing of idealism), he apparently meant the following: ‘anti-cosmopolitan’ ambitions, on one hand, and condemnation of idealism, on the other, were clearly of lesser importance than the main objective, the making of the bomb²³.

²³ The American historian E Pollock pointed out to me the fact that I V Kurchatov’s name does not appear on the recently published list of visitors to Stalin’s study in the Kremlin between December 1948 and April 1949 [88]. Later on, however, he acquainted me with another document in which the name of I V Kurchatov, head of the Soviet atomic project, appears in connection with the cancellation of the ‘conference that failed to happen’. The document is a draft decree of the Secretariat of the Central Committee of the All-Union Communist Party [VKP(b)], written by S V Kaftanov and addressed to Malenkov. It envisions establishing a special commission that would consider Kaftanov’s report “On major faults in the training of physicists and measures to correct them” and would draft ensuing proposals, to be submitted to the VKP(b) Central Committee by April 20, 1949. The commission was supposed to include I V Kurchatov as well as Shepilov, Kaftanov, S I Vavilov, A V Topchiev, Yu A Zhdanov, A N Nesmeyanov, V S Emel’yanov and others. The commission was in fact never organized. A report dated July 20, 1949 and written by M Yakovlev, head of sector at the Propaganda and Agitation Department of the VKP(b) Central Committee, was addressed to Malenkov; it says that the establishment of the commission “was planned to be discussed in connection with the All-Union conference of heads of chairs at universities and scientists working in physics institutes”, that “ruling No. 426/334 of the Secretariat of the VKP(b) Central Committee, passed on April 9, 1949, postponed the physicists’ conference on the grounds of inadequate preparation”, and that “the establishment of the above-mentioned commission is thus no longer appropriate” [89].

On the whole, as I have already mentioned, the existence of several variants of the 'nuclear' motive for the cancellation of the conference may point to both the extreme secrecy of that action and to the authorities' multiple attempts to make use of nuclear physicists in the conflict in question (in all probability, discussions of the conference goals between nuclear physicists and the authorities were held on the initiative of the latter). The versions of Golovin, Frish, Aleksandrov and Kalinin – Efremov all agree in this respect.

Less detailed variants of the 'nuclear' version (like the parable that 'physicists had defeated their own 'Lysenkoism' with the atomic bomb') give the basic motive but lack important details (how the balance of power in the 'anteroom' evolved, who contacted whom, etc.)²⁴. However, the stories of both Frish and Zavoiskii exhibit interesting details: Frish dates the event by the eve of the last session on March 16; Zavoiskii opposes physicists to philosophers, which is wrong (in reality, a greater part of 'patriotic materialists' were physicists, and their criticisms were sometimes directed at philosophers — Kedrov, Kuznetsov and others — as well as physicists) and puts the name of Vavilov alongside Kurchatov's as one of the 'heroes of war'.

In this context, one may also quote a fragment from the memoirs of I M Frank about Leontovich, which relates to the 'conference that failed to happen': "... A group of people who had not done very well in science but certainly enjoyed the support of someone or other, tried to arrange a physics session similar to the notorious 1948 VASKhNIL session. However, physics was at the time challenged with atomic power engineering and space flight projects, and not one of the enthusiasts of pogroms against physics could come up

²⁴ This more or less coincides with what M A Markov, I S Shklovskii, V L Ginzburg, P L Kapitza et al. wrote about the incident. Markov: "For reasons unknown to me, the trial of physicists planned to reproduce that of biologists did not take place. Some believe it failed to happen owing to Kurchatov who lead the atomic project and was respected in government circles" [46, p. 248]. Shklovskii: "This was a noteworthy time. A short while before that, in 1948, the notorious VASKhNIL session came as a shock... Lysenko's initiative caused similar 'moves' in other sciences... They all but declared quantum mechanics and relativity 'bourgeois subversive acts' and wanted to organize a pogrom similar to the VASKhNIL session but were 'called to order' from the top: after all, they were aware up there that the country's military potential could not be built without genuine physics. This time, unlike the case of biology, there was no bloodshed" [71, pp. 176, 177]. Ginzburg: "A 'Lysenko cleansing' awaited physics as well; an 'All-Union conference' was on the way, it was already scheduled for March 21, 1949 and then cancelled at the very last moment. No documents to that effect have survived, or maybe they haven't been found yet. This is the most probable version" [66, p. 3]. Ginzburg goes on to describe his version fully matching that of Golovin – Makhnev. A year before that, he himself had been in a very precarious situation: he was married to a deportee, obliged to settle in a remote area after serving sentence due to 'political' 58th Art. Besides, he was already on the list of 'bootlickers of the West'. As a result, the Highest Certifying Commission (VAK) did not confirm his degree of full professor, etc. "On the grounds of all that", — wrote V L Ginzburg, — "I was an excellent candidate for arrest". He adds: "I was saved by... the hydrogen bomb", on which he worked in Tamm's group from 1948 (see also the recently published collection of V L Ginzburg's papers and talks [87, pp. 254, 258]). According to D A Chernyakhovskii's memories of Yu B Khariton, the latter could also have had a hand in the cancelling of the physicists' conference. Yu B Khariton emphasized the fact that the authorities put a priority on pragmatism before ideology. "Having been summoned by Beriia and left alone with him in the room", — Khariton told Chernyakhovskii, — Khariton expressed his concern about the planned event (i.e. the 1949 physicists' conference — V V). To which Beriia replied unequivocally: "We won't let those little shits interrupt our work". The ideological 'discussion' in physics was aborted" [91, p. 448].

with an idea that would appeal to the big bosses, like Lysenko's ramulous wheat, and could be appointed to meet all those challenges. Owing to the efforts of S I Vavilov and the order from the top, an end was put to these activities. Physics was in demand. A pogrom of physics, not simply abuse of individual physicists, could have put the country's military potential at risk" [72, p. 211].

As I already mentioned, it was Vavilov's idea to expand the 'All-Union conference of heads of chairs at universities and colleges', turning it into an 'All-Union conference of physicists' and involving the academic elite in organizing it [9, 17]. During his visit to Leningrad in January 1949 for an anniversary session of the USSR Academy of Sciences, devoted to the history of native science, he may have stimulated Leningrad State University physicists (Fock, Frish and others) to defend modern physical theories [16, 17]. He intended to give the central talk at that conference, "On the current status of physics and the tasks of Soviet physicists", which was two hours long; in the talk, he did his best to make relativity and quantum mechanics appear in no way idealistic and fully in agreement with dialectical materialism.

On March 17, 1949, the chairman of the conference Organizing committee A V Topchiev was promoted to the rank of Academician-Secretary, a very high rank in the academic hierarchy, and V D Esakov concludes that it was probably done in 'exchange' for supporting Vavilov's standpoint that holding the conference would be inappropriate [73]. Vavilov doubtless played a part in involving 'academic' physicists in preparatory activities, in consolidating their positions and thus radically changing the atmosphere and distribution of power compared to what they had been at the 1948 VASKhNIL session.

This could have been exactly what 'inadequate preparation of the conference' meant (as Shepilov's report stated). In this light, there may be some truth in Maksimov's version: he reasoned that the disposition at Organizing committee sessions was not in favor of 'patriotic materialists' and consequently "the conference could be used to reinforce the standing of idealism and cosmopolitanism, to challenge dialectical materialism" (quoted from Ref. [11, p. 160]). By the way, he also believed that Vavilov's talk was "influenced by the people around him" [*ibid.*]. The insufficient ardour of influential philosophers — Kedrov, Kuznetsov, Omel'yanovskii (Maksimov considered them to be the initiators of the 'anti-Marxist trend' in 'anteroom discussions') — had, in his opinion, also played into the hands of 'cosmopolitan idealists'.

As a result, the reputation and stubbornness of 'academic' physicists, Vavilov's efforts, the want of a commonly shared standpoint in the philosophers' ranks, the odious style of speeches made by 'patriotic materialists' could all have added up to make the authorities appeal to Kurchatov and his team. The appeal, had it been made, was double-edged. Kurchatov's team could not afford to kill the goose that laid the golden eggs. We cannot, however, dismiss the possibility that Kurchatov was directly or indirectly approached by Vavilov or another session participants, perhaps Tamm, Fock or Ioffe.

The story itself soon became a myth and is often used to illustrate the dangers of ideological interference with science. Without mentioning any names, P L Kapitza sketched a vivid picture of it in his talk at the 1962 General Session of the USSR Academy of Sciences: "Many people still have fresh memories of the time when a number of philosophers (in reality, there were many more physicists than philosophers in

that number — V V) tried to refute the theory of relativity using the dialectical method in a dogmatic way. The strongest criticism was directed at... the conclusion of the theory of relativity which shows energy to be equivalent to mass multiplied by squared speed of light ($E = mc^2$). Physicists have long ago verified Einstein's law by experimenting with elementary particles. Understanding the results of experiments required profound knowledge of modern physics, but some philosophers demonstrated its lacking. And then the physicists produced nuclear reactions and showed Einstein's law to be true for an entire atomic bomb, not just separate atoms. Just imagine physicists following in the wake of some philosopher's ideas (meaning the same people — V V) and abandoning their work on applying relativity to nuclear physics! Where would the country have been had they not prepared for putting nuclear physics to practical use?" [74, pp. 194, 195].

Running ahead, note that when Kapitza's talk was published in *Ékonomicheskaya Gazeta* (March 26, 1962), 'some' philosophers were displeased. The *Communist* magazine (in May 1962) published an editorial called "Peaceful coexistence does not imply abating the ideological struggle" (see Ref. [55]), in which Kapitza was accused of "being sceptical about the co-operation of Soviet natural scientists and philosophers" and "seeing nothing but mistakes and harm to natural science in philosophers' activities".

I E Tamm joined in the polemic, writing a letter to the editorial board of *Ékonomicheskaya Gazeta* in support of Kapitza. His letter ended as follows: "The physicists in my generation remember how hard it was to apply physical theory and to teach it in colleges in the atmosphere of those days. Fortunately, only a few of the physicists were so intimidated with charges of idealism that they went off the right track. Had it not been so, we wouldn't be able to use atomic energy at all because atomic technology is entirely based on quantum mechanics and theory of relativity" (quoted from Ref. [55, p. 127]). Tamm's letter was not printed because the newspaper's department of science and high school was closed down and its editor I D Sobko had to leave.

Finally, let me name one more document which indirectly sustains the 'nuclear' motive for cancelling the 'All-Union physicists' conference' in March 1949. It is the so-called 'letter of three hundred' scientists to the Presidium of the CPSU (Communist Party of the Soviet Union) Central Committee about the situation in biology, sent in October 1955. Attached to the main text was a letter by a group of physicists, signed by the country's leading physicists including leaders of the Soviet atomic project Yu B Khariton, A D Sakharov, I E Tamm, G N Flerov, as well as L D Landau, P L Kapitza and others. The letter was directed against the Lysenko doctrine, which had done terrible harm to the whole native biology.

"... There were attempts to create a similar situation (i.e. in the Lysenko style — V V) in other fields of natural science", — read the letter. — "Some of our philosophers and physicists were thus trying very hard, under the cover of dialectical phraseology, to 'renounce' relativity and quantum theories, i.e. exactly those fields of physics that have yielded the greatest practical output: peaceful uses of atomic power and, on the contrary, atomic and hydrogen weapons. Yet Soviet physics did not go on the wrong track; owing to its correct choice of research direction, the socialist Motherland holds a leading position in the research and use of the power that the atomic nucleus contains" (quoted from book [75, p. 461]).

This plot, close to the one suggested by Kapitza and Tamm in 1962, gives an accurate image of the difficult relationship between physics and philosophy under the canopy of the atomic project that existed in the 1930s–1950s. Of course, the image is simplistic and mollified, probably inaccurate in detail. "Some philosophers", 'only a few of the physicists', 'using the dialectical method in a dogmatic way' (or 'fascinated at the dialectical phraseology', and of the physicists themselves: 'intimidated with charges of idealism') took to 'the wrong track' (trying to 'renounce' the relativity and quantum theories) and tried to put the entire physics 'on the wrong track'. This failed, and physicists succeeded in adapting atomic power to military and peaceful uses.

According to the 'nuclear' version of why the conference 'on physics, philosophy and cosmopolitanism' was cancelled, the physicists working on the atomic project informed the authorities, either directly or indirectly, that the growing urge to organize a 'Lysenko cleansing' of Soviet physics (using biology as a model) was liable to slow down the progress of the atomic project if not suspend the project altogether. The reason was not only that nuclear physicists would sabotage the work on the bomb out of solidarity with their colleagues, but also that relativity and quantum theories were indeed the theoretical foundation of nuclear physics, and many potential 'cosmopolitans' and 'idealists' were exactly the top men in the field.

3.4 The aftermath of the 'conference that failed to happen' (1949–1952)

The All-Union physicists' conference, thoroughly prepared and foreboding serious 'practical conclusions', failed to happen. Everyone thought it had been postponed for a while since no official 'announcements' were made. Only a few physicists, probably I V Kurchatov and S I Vavilov, knew the truth.

This did not mean, however, that the ideological pressure subsided. The campaign against 'physical idealism' and 'cosmopolitanism' unfolded; nuclear physicists, busy with their work, could not always react in time to 'particular accomplishments' of 'patriotic materialists'.

As soon as in May 24, 1949, a session of the Scientific Council at the P N Lebedev Physics Institute (FIAN) was focused "On cosmopolitan mistakes made by FIAN staff" [11, 17]. The perpetrators of 'mistakes' were named: they were S É Khaïkin, S M Rytov, V L Ginzburg, Ya L Al'pert. S I Vavilov had to take it upon himself to deliver the admonition. There was a price to pay for the 'big victory' in March: a series of minor (more or less local) concessions not threatening dangerous 'practical conclusions'. Of the 'cosmopolitan' four, only Khaïkin was accused of physical idealism for his book 'Mechanics' which was widely discussed at the time.

A book by A F Ioffe *Fundamental Concepts of Modern Physics* also saw the light in 1949. Its last chapter, a rather long one, was called "Methodological conclusions" [76, pp. 325–357]. In that chapter (or rather, in Section 6) A F Ioffe openly denounced all kinds of idealism in physics and went on to prove that modern physics celebrates the glory of dialectical materialism, which and only which can provide a 'correct understanding of new facts'. In April 1950, the Scientific Council of LFTI approved the book despite criticisms against Ioffe. Meanwhile, Ioffe's old enemies and the authorities had long wanted to strike at the patriarch of Soviet physics who had, by the way, been made a member of

the Presidium of the USSR Academy of Sciences in June 1949. In autumn 1950, he was dismissed from the post of Director of LFTI, remaining head of the semiconductor laboratory. Notice that the decision to discharge A F Ioffe was taken at the supreme level of authority and was coordinated with the leadership of the USSR Academy of Sciences (S I Vavilov) and that of the 'atomic department' (I V Kurchatov, A P Zavenyagin and L P Beriya). As the sole argument for the dismissal, relevant documents state the 'declining years' of Ioffe allegedly prevented him from fulfilling the duties of Director of the Institute [92] (I am thankful to E Pollock for pointing out these documents to me).

Immediately afterwards, Ioffe's book was bombarded with criticism (reviews by philosophers I V Kuznetsov and N F Ovchinnikov in *Uspekhi Fizicheskikh Nauk* and M É Omel'yanovskii in *Voprosy Filosofii*). The main objects of criticism were the author's 'subjectivistic interpretations' of relativity and quantum theories. In March 1952, the LFTI held another discussion of the book by its former Director, now replaced by A P Komar, the most ardent censor of the 'idealism' and 'cosmopolitanism' of the Academy member fallen from grace. Ioffe was compelled to repent at least to some extent.

Despite the 'nuclear shield' protecting physicists, those were hard times. By the way, the fact that the 'shield' helped is corroborated by a remark of V L Ginzburg, already quoted here: "I was saved ... by the hydrogen bomb" [66, 87], and a phrase attributed to L D Landau in the notorious KGB report on his person, which went that his main motive for participating in the atomic project was that scientists involved in it were much better protected against impending 'practical conclusions' [12, p. 155] (see also p. 1280 of this article).

At the same time, being in the atomic project was not a 100 percent guarantee against harassment and 'practical conclusions'. The 'cases' of Ioffe and the 'cosmopolitan four' are good examples. One more (not directly connected to 'philosophy') is the persecution of A I Alikhanov and the Heat Engineering Laboratory (TTL, later ITEP, the Institute of Theoretical and Experimental Physics) he headed, which worked on the heavy-water reactor.

Perhaps the authorities felt or even knew that "Abram Isaakovich did not like the Soviet rule or the rulers" [77, p. 79]; maybe they could not stand the fact that Alikhanov supported P L Kapitza in his hard times and that the "TTL was an island of freedom (limited, of course) and reason" [*ibid.*]. Perhaps there was some degree of confrontation between him and Kurchatov. As a result, in 1951, at the peak of anti-Semitism and the campaign against cosmopolitans, a PGU commission came to supervise the work of TTL at the moment when the heavy-water reactor was being made ready for launching, and Alikhanov and his deputy V V Vladimirov were absent from the laboratory. "Going by the report of the commission", — recounted B L Ioffe, — "the deputy head of PGU Zavenyagin signed an order that was as good as a pogrom of the institute: several dozen of the top employees, most of them but not all Jews, were fired, and the director was charged with severe financial and administrative offences" [77, p. 81]. It was all done by physicists' hands (by PGU people). Still, the pogrom did not happen: "... The launching of the reactor at the base was a success, Alikhanov came back victorious, called on Vannikov and secured the cancellation, or rather the alteration of that order. ...The institute survived despite heavy losses..." [*ibid.*]. Let me add

that every time the political situation in the country became strained (for example, in 1956 and even in 1968, during interventions into Hungary and Czechoslovakia, respectively), the 'freedom island' would be harassed again. In 1968, Alikhanov was dismissed from his post and died eighteen months later.

An echo of the 'conference that failed to happen' was the notorious 'green volume' also known as 'green poison', *The Philosophical Aspects of Modern Physics*, printed in autumn 1952 [78]. Its Introduction was an abridged version of the report that S I Vavilov, deceased by that time, was supposed to give at the opening of the infamous conference (note that neither the editorial preface nor the endnotes made any mention of it). The story of the volume's publication and ensuing discussions is described in Ref. [11, pp. 173–179]. The book was also full of the anti-relativistic and anti-quantum passion that had ruled in the 'anteroom'. Typical phrases were 'reactionary Einsteinianism', the 'materialist theory of rapid motions' (in place of the theory of relativity), 'the reactionary role of complementarity theory', etc. Still, many articles in the volume were more academic and reserved in style and phraseology than the preparation for the 'conference that failed to happen' had been. This had immediate effect: on November 17, 1952, *Pravda* newspaper reproved the 'green volume' for 'indecisive criticism', for the fact that "recent papers, full of idealistic fallacies, are not subjected to profound scientific analysis and criticism". On the same day, there was a meeting of the FIAN Scientific Council, where V A Fock, G S Landsberg and B M Vul raised their voices against several of the volume's articles, first of all against those by I V Kuznetsov, R Ya Shteinman, Ya P Terletskii. Two months later (on January 27, 1953), Fock said at the FIAN seminar on philosophy that "not a single article in the volume contains full recognition of the fact that relativity and quantum mechanics are correct"; instead, a number of articles "contain a more or less direct negation of the theories". I V Kuznetsov and R Ya Shteinman, invited to the seminar, tried to object but were outnumbered and enjoyed no success.

Meanwhile, the discussion about Volume 5 of the *Collected Works* by L I Mandel'shtam, prepared for print by S M Rytov in 1949, was in full swing [11]. It deserves special mention. Mandel'shtam (especially where his lectures on the theory of relativity were concerned) was charged with Machism, 'conventionalism' and 'operationalism'. At the price of some concessions, Vavilov managed to rescue Volume 5 and to publish it in 1950 [79]. But the 'court examination' went on. At an FIAN all-institute colloquium on January 28, 1952, the majority of institute physicists, first of all I E Tamm, G S Landsberg, E L Feinberg, S M Rytov, M A Markov, S É Khaikin, V L Ginzburg and some others, stood up for L I Mandel'shtam and argued with A D Aleksandrov, A P Komar and the rest. Almost a year later, on February 9, 1953, the discussion was resumed. Things were nearing a compromise: Volume 5 of Mandel'shtam's works was published, condemning his 'isms' could not be avoided, but nobody wanted to raise a big campaign.

The only person to speak boldly in defence of his teacher and against the mildly accusatory conclusions of the *ad hoc* commission²⁵ was M A Leontovich, who believed that

²⁵ The commission was headed by B M Vul and comprised A P Komar, V I Veksler, V A Fock, S É Khaikin, A A Kolomenskii, and A A Sushchinskii.

adopting even this (comparatively mild) conclusion would amount to “denying the physical meaning of the theory of relativity, attacking it, in a way, and could do just as much harm as the forays of some of our philosophers” (quoted from Ref. [11, p. 187]).

3.5 “Against ignorant criticism of modern physical theories”: a pre-emptive ‘nuclear strike’ (1952)

One of the most conclusive and best documented confirmations of the efficiency of the ‘nuclear shield’ against the attacks of philosophers and ideologues is the case of the publication of V A Fock’s paper “Against ignorant criticism of modern physical theories” in the first issue of *Voprosy Filosofii* (*Problems in Philosophy*) in 1953 [80]. It was preceded by the following chain of events described in the publications of S S Ilizarov and L I Pushkareva, and also A M Blokh [14, 81].

On June 13, 1952 a newspaper called *Krasnyĭ Flot* (*The Red Navy*) published A A Maksimov’s article “Against reactionary Einsteinianism in physics”, replete with biting accusations against the theory of relativity. On July 18, the ‘central full-back’ of relativity and quantum mechanics V A Fock wrote a letter to the All-Union Communist Party (b) Central Committee (CC) secretary G M Malenkov in which he informed the secretariat of the damage done by publications of this sort and requested “help ... in publishing (his response — V V) in one of the authoritative magazines of the Soviet media” (quoted from Ref. [81]). The correspondence was forwarded to Yu A Zhdanov (head of the department of science and educational institutes of the Communist Party CC) who recommended publishing Fock’s article in *Voprosy Filosofii* despite the rather “weak arguments in the scientist’s objections”, than back to Malenkov (who marked it with “For the CC secretariat”) and then to a Political Bureau member M A Suslov, who on August 6 wrote on it: “Archive. Discussed at a meeting of the secretariat”. Ilizarov et al. were unable to find any traces of the minutes.

However, a note by Yu A Zhdanov of August 14, 1952 was found, which expresses a wish to “reconsider the situation in the methodology of modern physics and ... have the conclusions and suggestions reported to the All-Union Communist Party (b) Central Committee”, “that is”, — recaps the author of the article in *Nezavisimaya Gazeta*, — “to resume the preparation of the final reckoning with the physicists, delayed in 1949” [81]. The editorial of the *Pravda* daily of 17 November 1952, mentioned earlier, classified even the ‘green volume’ as ideologically insufficiently belligerent.

Clouds were thus gathering, and the important aspects were not merely Fock’s article or Maksimov’s article. This collision was in a sense an occasion for nuclear-physics scientists to try to defend fundamental physics from the looming philosophical-cosmopolitan pogrom, this time using a ‘pre-emptive’ strike.

We know that in December 1952 (not later than December 24) a letter was received by L P Beriya, chief of the atomic project and deputy chairman of the Council of Ministers of the USSR, from the academicians Tamm, Artsimovich, Kikoin and others, with a cover letter from I V Kurchatov and a refereeing report written by D I Blokhintsev on Fock’s article “Against ignorant criticism of modern physical theories” (not surprisingly, the letter and the referee’s report were marked ‘Secret’).

The gist of the academicians’ letter was a request to publish Fock’s article. Actually, though, it was rather a

‘direct stimulus to address’ such high rungs of administration. The real gist was to declare on behalf of the leading scientists of the atomic project that the theory of relativity and quantum mechanics form the theoretical foundation of both the modern physics as a whole and the nuclear engineering (including atomic and hydrogen bombs) in particular and that therefore the currently intensifying attacks on these theories are unforgivable. The academicians emphasized that in reality both these theories are “in essence profoundly materialistic” and “are confirmed with spectacular accuracy by an enormous wealth of experimental data”. The letter stated bluntly: “By accusing the modern physics in toto of idealism, Maksimov effectively assigns all its greatest achievements to idealism” (quoted from Ref. [14, pp. 217, 218]).

The authors of the letter then stated that “Maksimov is unfortunately not alone”, that *Voprosy Filosofii*, *Literaturnaya Gazeta* (*Literary Gazette*) and some other periodicals are known to have published similar articles. The letter declared that such articles cause a great deal of damage, disorientate researchers, result in an “unacceptable lowering of the level ... of education” and “channel the attention and efforts of researchers away from the important problems” that face them.

All 14 physicists that signed the main letter and the referee’s report and also mentioned in Kurchatov’s cover letter, were the scientific elite of the atomic project: I V Kurchatov himself, L A Artsimovich, I K Kikoin, S L Sobolev (leaders of the ‘separational’ branch, i.e. connected with the separation of uranium isotopes); outstanding world-class theorists, the later Nobel Prize winners in physics L D Landau and I E Tamm (their contribution to the atomic and especially hydrogen weapons program is well known) and also one of the initiating organizers of the Soviet atomic project G N Flerov; A I Alikhanov, head of the TTL laboratory, later ITEP, where the heavy-water reactor was developed; one of the chief theorists of the Soviet hydrogen bomb A D Sakharov; M A Leontovich and I N Golovin, who at the beginning of 1951 joined the project of controlled nuclear fusion at the Institute of Atomic Energy (IAE); the deputy director of IAE from 1947 to 1953 M G Meshcheryakov; the future director of IAE and president of the Academy of Sciences of the USSR but then director of the Institute for Physical Problems A P Aleksandrov, and finally the author of the referee report on Fock’s article, Director of the Obninsk Physics and Power Engineering Institute D I Blokhintsev. Note that with the exception of Golovin and, at that moment, Meshcheryakov they all had Academy membership titles (full or corresponding members). These scientists, rewarded by the government with very prestigious prizes and decorations, were well known in Beriya’s Special Committee, especially after successful tests of atomic bombs in 1949 and 1951 (in 1953, tests of the first hydrogen bomb were being prepared).

In his referee report Blokhintsev underlined the dual harm done by Maksimov’s muddled paper to physics and to philosophy, and thereby stressed the topical importance of Fock’s article and its significance in matters of principle. The report mostly consisted of three critical points: (1) on possible limits to the application of the theory of relativity to the microscopic world; (2) on the problems of applying special theory of relativity to accelerated motion, and (3) a ‘modestly patriotic’ remark (which served to certify the ideological loyalty of the authors of the letter and of the referee himself!) that Fock’s article fails to give its due to the

contribution of Soviet scientists to the theory of relativity or its predecessors (in this connection, it mentions Lobachevsky, Lebedev, Umov, Fock himself, Tamm, Veksler's theory of phasotron and Terletskii's theory of betatron accelerators).

Kurchatov's cover letter introduced Fock's article and mentioned that Fock's views are shared by Kurchatov, Sobolev, Leontovich, Tamm, Kikoin, Blokhintsev and Golovin.

On December 24 (this is also the date on the academicians' letter) Beriya requested Malenkov to consider Fock's article and the academicians' letter. Having listed the 'advocates', Beriya wrote that "the physicists known to you, comrades Kurchatov, Alikhanov, Landau, Tamm and others ... requested that we help publish the article".

Not later than December 31, N A Mikhaïlov, the secretary of the Central Committee of the CPSU, and Yu A Zhdanov reported to Malenkov, who passed on the materials to them, that the job was done: they recommended the publication of Fock's article in *Problems in Philosophy* and, in addition, reprimanded the editor-in-chief of the *Krasnyĭ Flot* daily paper S S Zenushkin, stressing as "unacceptable practice the publication of materials that are beyond the competence of the editorial board of the paper". Mikhaïlov's and Zhdanov's report bears Suslov's mark 'Approve' and a note (with an illegible signature): "...Academician Fock's article is submitted to the editors of *Problems in Philosophy* for publication. 2.I.1953".

Fock's article appeared in the first issue of the journal [80]. Maksimov was crushed, I V Kuznetsov was reprimanded as well, theory of relativity was defended, and in addition Fock succeeded in protecting Mandel'shtam, whose fifth volume of *Collected Works* was at the time on everybody's tongue²⁶.

²⁶ This well-documented story can be complemented with picturesque and very plausible evidence from 'scientific folklore', namely, one of 'I K Kikoin's stories' committed to paper by one of his post-graduates of the 1960s V I Ozhgin: "In 1951, I K Kikoin lived in the Urals. On one of his trips to Moscow, he was met by V A Fock who said: "I couldn't sleep this last week. I received Maksimov's article against special theory of relativity from *Pravda* editorial board with a request for reviewing. I responded that the article shows as much vulgarity as it shows ignorance". Several weeks later Isaak Konstantinovich received an envelope with a cutting from the *Krasnyĭ Flot* daily paper with that very article by L Maksimov (the title of the article was "Pseudo science", it attacked special theory of relativity and demanded that it be removed from university programs). Kikoin was furious. He remembered that L Maksimov had written a laudatory introduction to Langevin's book, which had a chapter on special theory of relativity. I K Kikoin wrote an angry letter to *Krasnyĭ Flot*. Fock and Tamm did the same. The three met in Moscow and merged their letters into a joint article. They gave this article to Kurchatov who sent it to the Central Committee of the CPSU for publication in *Pravda* but with the advice: retain only Fock's name since Tamm and Kikoin were 'classified'. Kikoin told this story at *Pravda*'s 60th anniversary: "You can praise a paper not only for what it printed but also because it refused to print an article by Maksimov, Corresponding Member of the USSR Academy of Sciences in philosophy" [90, pp. 211, 212]. If we remove from this narrative several errors and slips (the year must be 1952, by no means 1951; the title of Maksimov's paper in *Krasnyĭ Flot* was "Against revolutionary Einsteinianism in physics", not "Pseudo science"; Maksimov's correct initials were A A; Kurchatov and others asked to publish the article in the journal *Problems in Philosophy*, not in *Pravda*), we extract several new details: (1) Maksimov first sent his anti-Einsteinian article to *Pravda* which refused to print it (possibly, Fock's opinion had to be reckoned with); (2) Kikoin, Fock and Tamm wrote their 'angry letters' to *Krasnyĭ Flot* about Maksimov's articles, combined them into a joint article that only Fock signed since Kikoin and Tamm were under the secrecy cover.

It becomes then clear why the FIAN physicists were so brave kicking the 'green volume' at their philosophy seminar on January 27, 1953. Fock said: "The general approach of this collection of papers is definitely antiscience... The low general level both in scientific and in philosophical passages in most papers, and rabidly antiscience attitude in some of them makes me consider the volume as wicked and potentially harmful" (quoted from Ref. [11, p. 178]).

This impressive story which proves with documentary evidence the efficiency of 'nuclear arguments' in fighting against ideology-permeated and ignorance-driven criticism of fundamental theories and thereby fighting for the survival of true physics, ended on a ridiculous note, namely with Maksimov's 'complaining' letter to Beriya (dated February 5, 1953). Maksimov, unaware of the 'pre-emptive strike', wrote what can only be called a denouncement of Fock who, in his words, "resuscitates trends, almost destroyed in the USSR, that can be traced back to idealistic physicists of capitalist countries". Having then listed all 'obscurantist trends' from Weissmannism–Morganism to "Einstein's ... closed and finite universe", he emphasized: "All those who cling to beliefs of this sort regard Fock as their ring-leader". Maksimov also informed that Fock was saying everywhere that his article, accepted at *Problems in Philosophy*, was approved by Beriya himself. This letter was again forwarded to Mikhaïlov and Zhdanov who checked Maksimov's 'complaint' and found it unjustified [11, p. 186].

3.6 The 'nuclear shield' protects physics education (1953–1954)

Another evidence in favor of the efficiency of 'nuclear shielding' was the personnel restructuring of the Physics Department of Moscow State University when the department was being inspected by a commission of the Communist Party Central Committee; it was headed by the SredMash minister (1953–1954) V A Malyshev [10]. This inspection was preceded by a chain of written pleas by some representatives of 'university science' to the highest levels of State power about difficulties and persecutions suffered by physicists at the university. Among the authors of these letters we find A A Sokolov, A S Predvoditelev, N S Akulov, D D Ivanenko, S N Rzhvkin, V K Semenchenko, F A Korolev, and V F Nozdrev. We can recall here the intense 'philosophically-patriotic' activities of most of these authors before the 'conference that failed to happen' at the beginning of 1949, later resumed in 1949–1953 in connection with efforts to expose physical idealism in the works of A F Ioffe, L I Mandel'shtam and their disciples.

It became clear at the beginning of the 1950s that the well-publicized Laboratory No. 15, created at the Physics Department in September 1949 and working on nuclear physics problems (headed by a vigorous chemistry technologist A P Znoĭko), was in fact far removed from realistic problems of nuclear science: in M G Meshcheryakov's opinion, its work was not scientific at all. Meshcheryakov, from Kurchatov's team, headed the commission inspecting the research at this laboratory in December 1952 and gave a negative evaluation.

A high-level commission was created in December 1953 on the initiative of the Presidium of the Central Committee of the Communist Party of the USSR to check the current status of student training at the Physics Department of Moscow State University; it was headed by the first 'atomic' minister V A Malyshev. Before the commission started its inspection, a

letter signed by Malyshev, the minister of culture P K Ponomarenko, the President of the USSR Academy of Sciences A N Nesmeyanov and the Academician-Secretary of the Division of Physics and Mathematics of the Academy M V Keldysh, was sent to the Presidium of the Central Committee of the Communist Party of the USSR and personally to G M Malenkov and N S Khrushchev. The letter opened with the words: “A group of scientists: Academicians Kurchatov I V, Leontovich M A, Sobolev S L, Lavrent’ev M A, Fock V A, Tamm I E, Artsimovich L A, Petrovskii I G, Corresponding Member Meshcheryakov M G, and professor Blokhintsev D I informed us of the unhealthy, as they believe, situation that reigns at the Physics Department of Moscow State University” (quoted from Ref. [10, p. 256]).

Note that the list of scientists troubled by the situation at the physics department opened with Kurchatov, and all others, with the exceptions of Petrovskii and Fock, were intimately involved in the atomic project.

The letter of Malyshev et al. pointed to the low level of scientific work at the department, poor quality of training in the physics of the day, insignificance of research areas, chaos in specialized physics chairs²⁷ and insufficient skill level of the teaching staff. The letter stated: “For some time now, the Physics Department has been run by an unprincipled group of people, the majority of whom have no scientific or teaching value. This group succeeded at a certain moment in chasing a number of outstanding physicists from the university — Academy full members V A Fock, M A Leontovich, I E Tamm, and the corresponding member S T Kono-beevskii”. The names of the leaders of this group were also given: two assistant department heads, F A Korolev and R V Telesnin, professors V F Nozdrev and Kh M Fataliev and the department head A A Sokolov.

This was followed by a paragraph on the ‘ideological opposition’ of the ‘unprincipled’ department faction and the ‘academy’ physicists: “... This group pretending to lead a struggle against idealistic notions, tries to sully the names of the outstanding physicists of the country and at the same time supports people who have no knowledge of modern physics, for instance, the engineer A P Znoiko...”. The authors continued: “Instead of joining in the work on the most important problems of modern physics, some members of the group reigning at the Physics Department have been resisting for the fundamental parts of physics (theory of relativity, quantum mechanics, etc.) over a period of years” [*ibid.* p. 257].

The letter recommended replacing the administrative heads of the department, the use in the teaching process of the leading ‘academic’ physicists, mostly those occupied with the atomic project: I E Tamm, M A Leontovich, L A Artsimovich, L D Landau, E K Zavoiskii, M D Millionshchikov, M G Meshcheryakov and others, and the creation of a number of ‘atomic and nuclear’ chairs instead of the ‘small-time’ chairs. The plan was to use the students and their teachers in the research within the SredMash Ministry and the Academy of Sciences. The letter also included a paragraph about improving the training of students in philosophy. It ended with stating that this and other proposals were worked

out as a result of discussion with the most respected scientists of the land: Kurchatov, Sakharov, Tamm, Leontovich, Artsimovich, Meshcheryakov, Blokhintsev, Sobolev, Lavrent’ev (mostly leaders of the atomic project) and also Fock and Skobel’tsyn, who were closely connected with this group. The letter specially stressed that “Kurchatov is currently on vacation” but that he “completely agreed with our proposals” [*ibid.*].

The outcome of this letter was the *ad hoc* commission, mentioned above and created on December 7, 1953, which included: V A Malyshev (chairman), S V Kaftanov, I V Kurchatov, A N Nesmeyanov, I G Petrovskii, plus two representatives of the department of science and culture of the Communist Party Central Committee, A Rumyantsev and G Alekseenko (who signed the conclusions formulated by the commission). I will quote several sentences from a somewhat less severely worded conclusion: “However, the level of teaching and research (at the department — V V) in the backbone fields of physics falls short of the demands of the moment... The leading Soviet physicists, who successfully solve the most important problems in modern physics, take no part in the work of the Moscow State University Physics Department... The scientists of the faculty are hardly involved in the work on the most significant problems of physics at specialized institutes of the Academy of Sciences of the USSR and the SredMash Ministry of the USSR. Group politics create negative phenomena in the research and teaching processes at the department... (Akulov, Korolev, Nozdrev, Shushpanov), which creates hurdles for attracting outstanding scientists from the Academy of Sciences to work at the department ... etc.” (quoted from Ref. [10, pp. 261, 262]).

The recommendations’ part of the conclusions (“it appears expedient to...”) consisted of two groups of proposals. The first concerned the Ministry of Culture and contained important proposals to “strengthen the leadership” of the physics department, to dramatically improve the academic level of the teaching corps (by inviting “leading specialists in novel fields of physics”), to improve the teaching of philosophy-related subjects, etc.

The second group of recommendations was aimed at the three ‘caretakers’ interested in the outcome: the SredMash Ministry, Academy of Sciences and Ministry of Culture. The recommendation was to “widely use the expertise of the scientists of the Physics Department of Moscow State University in research programs in the forefront of modern physics”, to eliminate “the currently existing alienation of the scientists of the Academy of Sciences of the USSR and Moscow State University”, to involve students, post-graduates and postdocs of the physics department in the research within academic and SredMash institutes. There was also a suggestion to close Laboratory No. 15.

On the strength of the conclusions of the Malyshev commission, the Communist Party Central Committee passed a resolution of 5/08/1954, “On measures to improve the training of physics students at Moscow State University”, whose items often repeated the key points of the commission report but contained additional specific steps (e.g., on relieving Akulov and Nozdrev of their duties, on warning Sokolov and Korolev that their attitude vis-a-vis “the inclusion of leading scientists of the Academy of Sciences of the USSR in the teaching process at the department” needs serious modification). The resolution removed A A Sokolov from his position of department head and replaced him with a

²⁷ There were narrowly defined chairs of the physics of channelled flow, the physics of combustion, atmospheric physics and so forth, but there were no chairs of atomic structure, the atomic nucleus, or of elementary particle physics.

'Kurchatov's man' V S Fursov (it was stipulated that Fursov be allowed to continue his research work at the SredMash Ministry).

The concluding additional 'Remarks' to the draft resolution, signed by Kurchatov and Nesmeyanov, deserve special attention. They specify the causes of the unsatisfactory situation at the physics department.

The new head of the department, reporting in December 1954 on the progress in implementing the resolutions of the CPSU Central Committee, stated (in the 'top secret' section) that Academicians Tamm, Leontovich, Artsimovich, Kikoin, Landau and professor Luk'yanov had started lecturing to students of the physics department, that Laboratory No. 15 had been reorganized, that A P Znoiko had been sacked and Sokolov and Ivanenko had joined research programs for SredMash Ministry.

The 'academic' scientists had thus used the 'nuclear weapons' again to somewhat 'tame' the most reactionary faction of university physicists who attempted to use, at the end of the 1940s and beginning of 1950s, the 'philosophy-cosmopolitan' arguments in their struggle for the control over the physics department of Moscow State University and over physics in general in the USSR. Obviously, the positions of the participants of the conflict in relation to philosophy were in this case as if 'behind the scenes', but the 'nuclear mechanism' had done its job in almost the same manner as in 1949 and 1952–1953.

3.7 'Nuclear-academic' solidarity in post-Stalin years

Even after Stalin's death, even after the 20th Communist Party Congress, the 'nuclear shield' was not an absolute guarantee of 'untouchability' even for such leading figures of the atomic project as Ya B Zel'dovich, L A Artsimovich, M A Leontovich, A I Alikhanov or the physicists who were earlier connected with this project: I E Tamm, L D Landau and others. Note also that the mid- and late 1950s were the time of rapid progress in the atomic project (which actually grew far beyond the 'project' framework, having become the powerful 'military-industrial complex').

These were years when the First Atomic Power Station started operations at Obninsk (1954), the first full-scale megaton-grade hydrogen bomb was tested (1955), the second nuclear-weapons center was created in Chelyabinsk-70 (VNIITF, 1955), the first Soviet atomic-power submarine and atomic-power icebreaker were built, and Soviet physicists triumphed on the international scene (I V Kurchatov's report in Harwell in 1956, the creation of the Joint Institute for Nuclear Research in Dubna in 1956–1957 with the largest synchrotron in the world, etc.).

It seemed that now when the 'nuclear shield', which was so effective during much more dangerous years (1949–1953), grew even stronger, when the most reactionary wing of the university opponents lost their power within Moscow State University, when the ideological pressure greatly diminished (especially in physics), a relatively safer time had arrived.

To a large extent, this was indeed so. A great difference is obvious in the character of discussion about the theory of relativity and quantum mechanics at the relatively high-level conference on philosophical aspects of modern physics in March 1954 in Kiev²⁸ and at the massive All-Union

Conference on the Philosophical Aspects of Natural Sciences in October 1958 in Moscow²⁹.

In his 1954 extensive talk on the philosophical aspects of the theory of relativity I V Kuznetsov sharply criticized, in the spirit of the recent 'Stalin' years, the attitudes of L I Mandel'shtam, V A Fock and A D Aleksandrov as 'leading to idealism', and insisted on reworking the theory of relativity in the spirit of dialectical materialism into a theory of 'rapid motions' (he meant not a philosophical reinterpretation but rewriting the theory itself) and so forth.

There was nothing of the sort at the 1958 conference. Omel'yanovskii reminded the audience of the 'serious errors' of the antirelativists V F Mitkevich and A K Timiryazev and also that "Lenin had referred to Einstein as the great transformer of natural sciences" [83, p. 79]. A D Aleksandrov said that even very recently "some of our authors, mostly from the materialistic positions... attributed idealism to the results following from the theory of relativity and consequently denounced this theory as 'Machian', as 'reactionary Einsteinianism'" [83, p. 99].

In 1955, P L Kapitza was allowed to return to his post of director of the Institute for Physical Problems. Shortly before this, he wrote a popularizing article "Nuclear energy", which he sent, together with an accompanying letter, to Nikita Khrushchev. However, the Science Department of the CPSU Central Committee found a number of reasons not to recommend its publication.

Here are some of the arguments: "The article ... creates the impression that the Soviet Union is taking an active part in the race of atomic weapons and was even leading this race between August 1953 and March 1954" [84, p. 129]; "The article discusses in pseudo-objective manner ... the aspect of damage done by classifying nuclear research to the advancement of science" [*ibid.*]; "As some of the directions of research discussed by Kapitza may have practically significant consequences, it is hardly advisable to write about them openly" [*ibid.*]. Finally, a 'philosophy-based argument' came up: "A serious drawback of the article ... is the statement that matter may be converted to energy. The author ... chooses to ignore important work done by Soviet physicists and philosophers who criticized this methodologically incorrect formulation and gave a dialectical-materialism-based interpretation of the relation between mass and energy" [84, p. 131].

The surge of social energy caused by the 20th Communist Party Congress in 1956, intensified during the Hungarian uprising, brought about a certain tension in the scientists' relations with the powers-that-be. The 'nuclear shield' definitely worked here as well. ITEP, where this surge was very pronounced, managed to survive but one of the most belligerent ITEP scientists Yu F Orlov had to leave A I Alikhanov's laboratory and move to Erevan, to work under A I Alikhan'yan [68, 77]. At the same time in Arzamas-16, one of the leading experimenters L V Al'tshuler took part in the young Communist league discussion about Dudintsev's novel *Not by Bread Alone* and, having manifested an excessive flight of free thinking, very nearly had his fingers burnt [85]. Notice that Al'tshuler was at least twice in a situation when the 'nuclear shield' saved him, in 1951 and 1952. The 1952

²⁸ From the group of outstanding physicists, talks were presented by K D Sinel'nikov, I M Lifshits, A I Akhiezer, A S Davydov, S I Pekar and others (mostly from Kiev and Khar'kov); philosophers were represented by M É Omel'yanovskii, I V Kuznetsov and others [82].

²⁹ The main physics-and-philosophy talks were presented by V A Fock, A D Aleksandrov and M É Omel'yanovskii. In the discussions, we find D D Ivanenko, Ya P Terletskii, D I Blokhintsev, M F Shirokov, É Kol'man, N F Ovchinnikov et al. [83].

case became a classic one³⁰. As for the 1951 collision, Al'tshuler was threatened with expulsion from Arzamas-16 (in the same boat with the 'cosmopolitans') for his defense of genetics and for other careless statements; however, V A Tsukerman, E I Zababakhin and A D Sakharov persuaded A P Zavenyagin and B L Vannikov that this would be undesirable [85].

Judging by the "USSR KGB report on Academician L D Landau" (published in 1993), which was sent from the KGB to the CPSU Central Committee secretariat, this outstanding physics theoretician who made an important contribution to the implementation of the atomic project was kept under unceasing surveillance by KGB agents [12, 13]. He was suspected of cosmopolitan views (at the end of 1940s and the beginning of 1950s), being on the side of the 'Hungarian revolution' of 1956, a critical attitude regarding the Soviet system, etc. Thus KGB agents recorded the following words said by Landau in relation to the 'nuclear shield' (in January 1953): "Were it not for the '5th point' (the ethnicity item in work application forms), I would not be engaged in classified work (i.e. would not take part in the atomic bomb project — V V) but would only do science in which I am now falling behind. The classified work I'm now doing gives me some sort of power" [12, p. 155].

An especially eloquent document dates from May 1958. It is a report from the instructor of the Science Department of the Communist Party Central Committee A S Monin (who later rose to the position of a Corresponding Member of the USSR Academy of Sciences and Director of the Institute of Oceanology) in connection with the approaching elections to the Academy in June 1958 [15]. The text shows that in 1958 physicists were classified into party-members, 'good' (docile, preferably of Russian ethnicity), 'philosophically compliant', as against non-party-members, unreliable (stubborn, often Jewish and therefore 'nationalistic') and 'philosophically suspect'. The latter group included those who occupied leading positions in the Division of Physico-Mathematical Sciences of the USSR Academy of Sciences: L A Artsimovich, L D Landau, I E Tamm, M A Leontovich, A I Alikhanov; their former students elected to corresponding member status in 1953, I Ya Pomeranchuk, A B Migdal, V L Ginzburg, M A Markov; those planned to be elected — Ya B Zel'dovich, Ya A Smorodinskiĭ, I M Lifshits and E M Lifshitz, S I Pekar and some others. Communist party members D I Blokhintsev, N A Dobrotin, V L Levshin, A P Komar and V P Peshkov, who were close to the 'academic' team and worked in the P N Lebedev Physics Institute, Institute for Physical Problems and JINR, and the 'university physicists' A A Sokolov, Ya P Terletskiĭ, D D Ivanenko et al. gravitated to the former group.

A special target of this report was the triple Hero of Socialist Labor, one of the principal theoreticians of the Soviet atomic project Yakov B Zel'dovich, for whom "I V Kurchatov, contrary to the opinion of the Department of Science, Educational Institutes and Schools of the

Communist Party Central Committee, provided an additional position for election to a full member for physics". This was followed by a very unflattering characterization of Zel'dovich; it was mentioned in this connection that "his contribution to the defense potential is outstanding, and he was *already* (italicized by me — V V) properly rewarded for this by three orders of the Hero of Socialist Labor". Rewarded enough! "However, he has no outstanding discoveries or results in nonclassified fields of physics!". The instructor continued: "In his social activities, Zel'dovich is close to the Landau group, is known to be nationalistic, contemptuous of methodological problems and negatively biased towards many Soviet scientists..." [*ibid.*].

Lev Artsimovich, elected in 1956 to the position of the Academician-Secretary of the Division of Physico-Mathematical Sciences and member of the Presidium of the Academy of Sciences of the USSR, was also 'kicked'. "According to KGB data (obviously, similar to those concerning L D Landau — V V), Artsimovich allows himself sharply anti-Soviet remarks and outbursts against the party and state leadership... Artsimovich must be immediately removed from responsible organizational work, etc." [*ibid.*]. The plan was to replace Artsimovich at his secretarial position with Academicians N N Bogolyubov or G V Kurdyumov, who appeared to the party machinery as easier to control.

Monin's reports contained a number of sharp diatribes at I E Tamm "known for his unfairness to, among others, Moscow State University physicists", A I Alikhanov in whose laboratory (later transformed to ITEP — V V) "anti-Party and anti-Soviet activities took place at the time when the Communist Party struggled to overcome the legacy of the personality cult", I V Obreimov for whom the USSR Academy of Sciences President A N Nesmeyanov found a vacancy of full member position for physical optics (Monin also stressed that Obreimov was not a party member, that he "was arrested in the past", "works little" and that his election "will not strengthen the Academy and will not help to enhance the party influence").

The report prepared by the instructor of the Department of Science, Educational Institutes and Schools of the Communist Party Central Committee thus implied that the leadership of the Division of Physico-Mathematical Sciences and to some extent of the Academy of Sciences of the USSR as a whole was in some sort of agreement with the scientific leadership of the atomic project and this union tended to determine the electoral and personnel policy of the Academy of Sciences, not necessarily heeding the opinion of the party. In 1958, some party bosses may have had the impression that now when nuclear weapons had been created, the scientific leaders of the atomic project and physicists close to them are not as required as earlier and should move over in the distribution of academic seats.

However, the 'nuclear-academic' solidarity that the author of the report has obviously underestimated, was still sufficiently powerful so that the authorities again (by the way, days before the tests of the most powerful hydrogen bomb) preferred to be pragmatic and left the internal matters of the Division of Physico-Mathematical Sciences alone. I will remind the reader that Ya B Zel'dovich and I V Obreimov were elected full members of the Academy in June 1958, and Artsimovich kept his position as Division secretary until his death in 1973. True, the same elections of 1958 saw V I Veksler become a full member, and D I Blokhintsev and B M Pontecorvo become corresponding members; the Landau – Tamm –

³⁰ Here is how the 'victim' himself described it: "A year later, in 1952... Yu B Khariton phoned me one evening and said: "Do not come to work tomorrow. We'll tell your group that you are on sick leave" ... I 'rested' for two days... On the third Yu B Khariton called and said that I can come to the lab. This resulted from an HF-line telephone conversation between Yuliĭ Borisovich and L P Beriya. The conversation was limited to a single question of the all-powerful Beriya ...: "Do you need him [Al'tshuler] badly?" The answer was affirmative, Beriya responded with "All right" and hung up. That was the end of the confrontation" [85, p. 322].

Artsimovich – Alikhanov – Leontovich ‘group’ and Kurchatov who ‘sided with them’ obviously had no objections against them. We can add that E I Zababakhin, one of the directors of Chelyabinsk-70 (VNIITF), was also elected then as a corresponding member of the Academy. I M Lifshits and E M Lifshitz, Pomeranchuk, Migdal, Ginzburg, Markov and Shklovskii, undesirable by Monin’s criteria, were elected as full or corresponding members to the Academy in 1960, 1964 and 1966, while Sokolov, Terletskii, Ivanenko, Peshkov and Levshin, whose election was so insistently advocated by Monin’s report, never gained Academy titles³¹.

Quite clearly, as in the situation with the Malyshev commission and in some other cases, the main nerve of the conflict has almost no ‘philosophical undercurrent’, while the well-pronounced oppositions are party members against non-party-members, compliant against uncontrollable, university-based against Academy-based, and also unmasked anti-Semitism which seems to have been quite acceptable at that time among party functionaries. Only once was there a ‘quasi-philosophical’ denunciation of Zel’dovich (“contemptuous of methodological problems”). Contrary to its intentions, this document demonstrates quite conclusively, even if somewhat indirectly, the role of the ‘nuclear-academic’ solidarity and ‘nuclear shield’ in the struggle for physics and the normal life of the scientific community of physicists.

4. Conclusions

A discussion of this almost ‘thirty-year war’ of physicists against ignorant philosophy- and ideology-based interference from administrative and party authorities, philosophers and philosophizing physicists with science establishes the important relation of this ‘war’ to the atomic project and the problem of developing and building the Soviet nuclear weaponry. It was found that the key element was the theoretical foundation of 20th century physics, namely the theory of relativity and quantum mechanics. These theories became, on the one hand, targets for constant ‘philosophy

attacks’: they were declared idealistic (and under the same breath too abstract and devoid of practical significance), while those who created and practiced these theories, were denounced as ‘physics idealists’ and, in the 1940s and 1950s, as ‘cosmopolitans without kith or kin’ too.

On the other hand, quantum-mechanical and relativistic theories did become the foundation of the physics of atomic nuclei and of methods for studying them (such as accelerators of charged particles). Consequently, military and peaceful uses of intraatomic (nuclear) energy, which became possible after the discovery of fission of uranium nuclei irradiated by neutrons, were essentially based on these theories.

In the pre-war period, in the 1930s (before and after uranium fission was discovered), physicists led by their leaders (Ioffe, Mandel’shtam, Vavilov, Frenkel’, Tamm, Fock and others) were able to defend relativism, quanta and nuclear physics from the philosophy- and ideology-based pressure and thus ensured the required initial conditions for the progress of the atomic project.

Then in 1940s – 1950s physicists used the ‘nuclear shield’ to beat off a new wave of philosophical attacks on physics (this time they contained a pronounced anti-cosmopolitan component) and thus saved physics from a pogrom along the lines of the session of the Academy of Agricultural Sciences (VASKhNIL) in 1948, which resulted in irreparable damage to Soviet genetics and biology.

A paper was published recently by G E Gorelik and A B Kozhevnikov, written as a dialogue, in which each author argues for his own version of the cause of the ‘1949 conference that failed to happen’ (Gorelik promotes the nuclear, or rather fusion scenario, while Kozhevnikov, the cadre scenario) [93]. A number of additional important details relevant for the topic at hand can be found in the recently published book by E L Feinberg [94].

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³¹ The point of view presented in Monin’s report had roots that go back a long time. The report of the Science Department of the Communist Party Central Committee said this in relation to Academy elections in October 1953: “These elections demonstrated that certain groups of scientists tend to occupy monopolist positions in science. This became especially clear in the course of elections in the Divisions of physico-mathematical and biological sciences. At the division of physico-mathematical sciences a group of this type, headed by Landau L D, includes Academicians Leontovich M A, Landsberg G S and Ioffe A F. This group was supported by Academicians Alikhanov A I, Bernshtein S N, Kapitza P L and Fock V A. As a result of active measures taken by the group, Ginzburg, Markov, Migdal and Pomeranchuk, not recommended by the Academy Presidium, were nevertheless elected as corresponding members for physics. At the same time, the group succeeded in blackballing the election to full membership for such outstanding physics theoreticians as the professors of the Moscow State University, comrades Blokhintsev D I and Tikhonov A N, and to corresponding membership, such talented scientists as comrades Levshin, Dobrotin, Panov, Nikol’skii and some others. The group behaved tendentiously when discussing the candidacy of Blokhintsev D I, who frequently criticized the work of the scientists in Acad. Landau’s group” (quoted from Ref. [86, pp. 10, 11]. It will be to the point to remark that in 1953 the undoubtful leaders of the atomic project Yu B Khariton, A D Sakharov, I K Kikoin, A P Aleksandrov, L A Artsimovich, I E Tamm became full members of the Academy, while the already mentioned V L Ginzburg, I Ya Pomeranchuk, A B Migdal and some others, who contributed heavily to the solution of the nuclear-weapons problems, became corresponding members.

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