

economies in the Soviet Union.⁷⁷

Similarly, the parallel social infrastructure of Soviet mathematics was not completely detached from established institutions. Research seminars met in the main building of Moscow University; the results were published in official journals; and mathematicians were employed in government-controlled institutions, even though often in non-academic ones. Their working conditions allowed them sufficient free time to come to seminars, conduct research, and teach at math schools, apart from their regular job duties. The parallel social infrastructure was therefore dependent on the official infrastructure and partly mirrored some of the features of the system that it was created to oppose.

In one sense, however, the line between the official establishment and the parallel social structures in Soviet mathematics was clear: the latter supported an alternative value system, a cultural environment, in which mathematicians not only did good mathematics, but also cultivated a group identity distinct from the officially declared Soviet values. Perhaps this was why they were able to do good mathematics.

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⁷⁷ See G. Grossman, "The 'Second Economy' of the USSR," *Problems of Communism*, vol. 26, no. 2 (September-October 1977): 5–40; G. Grossman, "The Second Economy: Boon or Bane for the Reform of the First Economy?" in *Economic Reforms in the Socialist World*, edited by S. Gomulka, Y. C. Ha, and C. O. Kim (New York: Macmillan, 1989), pp. 79–95; and Alena Ledeneva, *Russia's Economy of Favours: Blat, Networking and Informal Exchange* (Cambridge, UK: Cambridge University Press, 1998).

Between Ideology and Science: Dialectics of Dispute on Physics in 1920s–1930s Soviet Russia

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Abstract

This paper examines the relationship between Soviet scientific community and authority in the Stalin era by investigating how specialists of physical sciences and communist ideologues deal with interpretation of physical theories or concepts in the 1920s and 1930s. Soviet physico-philosophical disputes have often been regarded as a persistent attack on modern physical theories by well allied ideologues or ignoramuses. Minute study of historical documents with a consideration of socio-political context tells us, however, that this view must be radically revised. Attacks on leading physicists were not well formed, except for the comparatively short period of the Great Terror. Physicists also sought to find the way of description of physics, which is compatible with Marxist ideology dialectical materialism. We will suggest that it will be suitable to grasp the process of dispute as one of acquiring "Soviet Newspeak", not as a success on showing the correctness or usefulness of physics by leading physicists.

Key words: Dialectical Materialism, Science in the Soviet Union, Sergei Vavilov, Ideology and Science, Philosophy of Physics

Introduction

Scientism is one of the traits for which the Soviet Union was known. Lenin's famous phrase that "communism is Soviet authority plus electrification" symbolizes Bolshevik's high evaluation of science and technology. The combination of science and technology was seen as the key practical tool in this new state for competing, economically and militarily, with developed countries¹. In the 1920s, scientists and technicians enjoyed political support even when they did not sympathize with Bolshevik ideology and its adopted policy of the dictatorship of the proletariat². The threat of imagined or real wars, which was felt

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¹ On importance of science and technology for the Soviet Union, see, the paper by Alexei Kojevnikov, which is included in the special issue of this volume.

² On relationship between scientific intellectuals and Soviet state in the first days of the Soviet Union, see: Nathan M. Brooks, "Chemistry in War, Revolution, and Upheaval: Russia and the Soviet Union, 1900–1929," *Centaurus*, 39 (1997): 349–367; Alexei Kojevnikov, "Dialogues about Knowledge and Power in Totalitarian Political Culture," in *Stalin's Great Science* (Imperial College Press, 2004), pp. 276–300; esp. 287–291; Gennady Gorelik, *The World of Andrei Sakharov: A Russian Physicist's Path to Freedom* (Oxford University Press, 2005), pp. 24–26.

during the all existence of the Soviet Union, forced authorities of this country to educate and recruit more and more scientists and engineers. Well-known Soviet successes in some fields of science and technology, such as nuclear industries and space development, should be explained—at least partly—by this supportive policy.

Science and technology were important for this socialist state, not only for economical or military purposes, but also as a cultural tool³. The official ideology of Soviet Marxism was said to possess a scientific nature in comparison with other social theories: It was, in Marx and Engels' thought, based on the scientific analysis of humanity or the world around us. Moreover, Engels insisted on that the materialistic (or atheistic) and dialectical worldview have adopted nourishment from the fruits of natural sciences by the nineteenth century⁴.

In spite of the importance of science and technology to official ideology of the Soviet Union and the generosity of the Soviet state in supporting this economic and cultural sector, however, in the 1930s the relationship between the Soviet authority and the scientists' community was far from harmonious. We will in this paper deal with political tension which affected physicists in this period. In the 1930s, as in many other communities, the physicists' experienced political tension. We may suggest the Great Terror (1936–1938), during which several outstanding physicists were executed, as the harshest incident, but even if the significance of this exceptional history is downplayed, it remains that suspicion and political pressure to the scientific community was a common phenomenon during the Stalin period: from the years of the so-called "Cultural Revolution" to the dictator's death in 1953. Soviet authorities paid attention to the practical usefulness of physics and required physicists to actively serve the "construction of socialism," namely, the development of national economy or the empowerment of armed forces. In such circumstances, even established and loyal physicists, such as the academician Abram F. Ioffe (1880–1960), was severely criticized for not making a sufficient effort toward the economic and technical development of the state⁵.

By inquiring how scientific intellectuals settled ideological issues on physical theories or concepts, we will shed light on the process of reestablishment of the relationship between communist ideologues and the physicists' community in the prewar Stalin era. Physico-philosophical disputes of the Stalin era have been investigated by several historians⁶. Although these studies are comprehensive and detailed, they have several defects

³ Cultural impact of science on Soviet society is examined in papers in Loren R. Graham (ed.), *Science and the Soviet Social Order* (Cambridge, Mass: Harvard University Press, 1990).

⁴ See, for example, Helena Sheehan, *Marxism and the Philosophy of Science—A Critical History* (Humanity Books, 1993), Ch. 1, "The Founders".

⁵ We have in mind the March session of Academy of Science in 1936, in which physicists, bureaucrats, ideologues widely discussed the way of contribution of physics on the development of Soviet industry. See V. P. Vizgin, "Iavnye i skrytie izmereniia prostranstva" sovetskoi fiziki 1930-kh gg." in M. Heinemann and Eduard I. Kolchinsky (eds.), *Za 'Zheleznyim Zhanesom': Mify i Realii Sovetskoi Nauki* (St.-Petersburg, 2002), pp. 112–129; Paul Josephson, *Physics and Politics in Revolutionary Russia* (Berkeley: University of California Press, 1991), pp. 295–305.

⁶ Josephson, *Physics and Politics in Revolutionary Russia*, pp. 247–275; Andrew Cross, "The Crisis in Physics: Dialectical Materialism and Quantum Theory," *Social Studies of Science*, Vol. 21 (1991): 735–759; A. S. Sonin, "Fizicheskii idealizm": *Istoriia odnoi ideologicheskoi kampanii* (Moscow: Fizmlit, 1994); V. P.

in their approaches: First, they rely on dichotomy in classifying actors of the disputes as "vulgar ideologues" and "leading physicists"; second, they overlook the changes in actors' attitudes that occurred in the 1920s and 1930s; third, they tended to find the reason for the relaxation of disputes in the late 1930s to be the success of appealing to the practical usefulness of physics on industry, especially in the realm of nuclear energy: as we will later see, compromise by the side of physicists was made already before the discovery of using energy of nuclear fission; and last, contents of disputes were regarded as no more than "labeling new physical theories as idealism": although it was the most striking feature, we can't foresee that disputes handled serious philosophical matters such as contradiction between continuity and discontinuity, or reductionism and holism. We must then consider the dynamics of conflict in detail, giving attention to concrete content and to the relationships among participants in each phase.

Struggle of the 1920s

Philosophical disputes in Soviet Russia of the 1920s mainly consisted of struggles between so-called mechanists and Deborinites. This controversy will not be detailed in this paper—it was well explored by Joravsky's classical work published already half a century ago⁷. We will then, focus our attention on the attitude of communist philosophers toward the views of leading physicist on the theory of relativity.

On January 1, 1927, in the official party newspaper, *Pravda*, Ioffe, academician and Chief of Leningrad's Physico-Technical Institute, presented a paper on the relative theory. Supporting the theoretical and experimental correctness of this new theory, Ioffe wrote: "In our country sometimes relative theory is argued in relation with a question on materialism or idealism. Yet it seems clear that theory which is based on material phenomenon and physical process in matter cannot contradict materialistic world understanding, if the theory seeks to describe property of matter correctly as possible"⁸. Apparently, here, Ioffe had in mind Arkadii K. Timiryazev (1880–1955), a party member and son of a famous Darwinist, as a target of his criticism. Timiryazev, a member of the mechanist faction, regarded the theory of relativity as being incompatible with materialism and was therefore notorious among physicists as an opponent to relativity⁹.

In response to Ioffe, Timiryazev published a paper 2 months later, also in *Pravda*¹⁰. Based on an experiment of Dayton-Miller, who, in the 1920s, had stated that the experiments of Michelson-Morley did not prove the non-existence of ether, Timiryazev maintained that the theory of relativity, which premises the constancy of the velocity of light had not yet been supported by experimental results.

Vizgin, "Iadernii schit v tridsatiletne voine fizikov s nevezhestvennoi kritikoi sovremennykh fizicheskikh teorii." *Uspekhi fizicheskikh nauk*, Vol. 169, No. 12 (1999), pp. 1363–1389; Alexander Vucinich, *Einstein and Soviet Ideology* (Stanford: Stanford University Press, 2001), pp. 56–88.

⁷ David Joravsky, *Soviet Marxism and Natural Science* (New York: Columbia UP, 1961).

⁸ A. F. Ioffe, "Chto govoryat opyty o teorii otositel'nosti Einsteina," *Pravda*, January 1, 1927, p. 1.

⁹ See, A. V. Andreev, *Fiziki ne shuryat* (Moscow: Progress-Traditsiya, 2000), pp. 33–35.

¹⁰ A. K. Timiryazev, "Podtverzhdaui li opyty teorii otositel'nosti Einsteina?," *Pravda*, February 26, 1927, p. 6.

This debate attracted the attention of Deborinites. Party philosophers Boris M. Hessen (1883–1936) and Vasilii P. Egorshin (1898–?), who were studying at the Institute of Red Professors¹¹ under Abram M. Deborin (1881–1963), wrote a paper in which they strongly criticized Timiryazev¹². According to these authors, mechanists such as Timiryazev had lost flexibility in evaluating new theories of physics.

It must be noted that Ioffe's purely empirical attitude was not sufficiently compatible with the Deborinites' philosophical ideas because philosophers insisted on the value of dialectics in understanding the natural world and, subsequently, following the statements of Engels: in his manuscript, Engels considered the philosophical standpoint leads study of nature, even when natural scientists are not aware of it and consider himself as a pure empiricist¹³. Yet, Deborinites prioritized victory over mechanists to pointing out the relatively little incompatibility with Ioffe's standpoint. As a result, at that stage in the 1920s, relationships between leading physicists and the majority of philosophers was moderate, if not harmonious.

Controversy between the mechanists and Deborinites ended in 1929 with the latter's triumph¹⁴. But Deborinites could revel in their victory for only one year.

The Great Break and Philosophy

The year 1929, which was called the "Year of the Great Break" by Stalin, was indeed a turning point for Soviet society, since this was the year in which the Soviet Communist party switched their policy to rapid industrialization and the collectivization of agriculture. From that point on, Stalinist administrative way to obey political life to single party line became prominent in political decision making, and accordingly, began to form a cultural policy.

The philosophical community also seriously suffered in this storm. Deborinites were the targets of attacks by communist youths, such as Mark B. Mitin (1901–1987), who had just finished a course at the Institute of Red Professors. Supporting remarks of Stalin in meeting held in December 1930 made the Mitin group aggressive—they condemned Deborinites for ignoring the philosophical legacies of Lenin and paying less attention to the concrete problems of "the socialist construction." In January 1931, the Central Committee of the Communist Party stated its protocol "On the journal *Under the Banner of Marxism*," reorganizing the editing committee of this representative party monthly journal, in which many discussions on the natural sciences had taken place¹⁵. Deborin was removed from the position of chief editor, and militant ideologues, such as Mitin and Ernest Kol'man

¹¹ Institute of Red Professors was established in the 1920s and educated many Marxist ideologues. On such institutions, see: Michael David-Fox, *Revolution of the Mind: Higher Learning Among the Bolsheviks, 1918–1929* (Ithaca: Cornell University Press, 1997).

¹² B. Gessen and V. Egorshin, "Ob otnoshenii tov. Timiryazeva k sovremennoi nauke," *Pod Znamenem Marksizma* (PZM), No. 2/3 (1927): 188–199.

¹³ Engels' manuscript on the problems of natural sciences had been left unpublished for thirty years after author's death – it was first published in the Soviet Union in 1925, titled as *Dialectics of Nature*.

¹⁴ Joravsky, *Soviet Marxism*, ... Ch. 14, "Closing the Controversy, 1926–1929".

¹⁵ "Postanovlenie TsK VKP(b) o zhurnale Pod Znamenem Marksizma," *Pravda*, January 26, 1931, p. 1.

(1892–1979) assumed positions as editors.

Deborinites were forced to criticize themselves. Indeed, Egorshin dismissed his own recent book as the sample of "menshevizing idealism"¹⁶. Although Hessen was more sustainable—he criticized himself little in public sphere—the fact that themes of his works in the 1930s (including "Socio-economical Roots of Newton's *Principia Mathematica*,"¹⁷) were far different from those of his previous works suggests that pressure placed on him to obey the general party line was severe¹⁸.

However, it must be noted that the decline of Deborinites in the early 1930s did not at all mean the revival of mechanists. The mechanical world view, or total denial of scientific meanings of the theory of relativity or quantum mechanics, continued to be a target of attacks by mainstream ideologues. This paradoxical relationship will be discussed later in this paper.

In the meantime, in the Soviet public sphere more literatures were came to be assigned to the calling for interpretation (or critic) of scientific theories and concepts from the Marxist philosophical view. Of course many scientists didn't regard dialectical materialism as a basis of modern scientific views and in the beginning of the 1930s they sometimes even stated their own viewpoint. For example, Yakov I. Frenkel' (1894–1952), theoretical physicist at the Leningrad Physico-Technical Institute, in his speech in 1931 proclaimed that he could not accept dialectical materialism as a true leading principle in investigating natural phenomenon, no matter how great Engels and Lenin were as social theoreticians¹⁹. Anyway as ideological pressure came to be harsh, established physicists were compelled to make or master the official line in the realm of philosophy.

Ontological Problem of Ether

At the beginning of the Stalin era, not all of the Soviet philosophical debates on physical sciences were part of the agenda within the ideological-political conflict. A theme of dispute between noncommunists, e.g., old electric technicians and leading theoretical physicists, also were widely discussed in the pages of party journals during the 1930s: The problem of action at a distance was one such theme.

From 1929, Vladimir F. Mitkevich (1872–1951), contributor to the GOELRO (State Commission for the Electrification of Russia) and newly elected academician, urged Frenkel' to respond to the questions of whether modern theoretical physics would accept

¹⁶ V. Egorshin, "Peresmotr v ponyatie samokritiki," *PZM*, No. 11/12 (1931): 251–257.

¹⁷ This work is Hessen's internationally best known one as the first attempt of so-called 'external' approach to the history of science, which he presented at the Second International Congress of the History of Science in London in 1931. Hessen was the member of delegation from the Soviet Union to London headed by Nikolai Bukharin. Kol'man, who also attended to this group, many years later in responding to interview with historian Loren Graham confessed that he was ordered to watch Hessen's presentation was accorded with the party line. See Loren R. Graham, "The Socio-Political Roots of Boris Hessen: Soviet Marxism and the History of Science," *Social Studies of Science*, Vol. 15, No. 4 (1985), 713.

¹⁸ Hessen in the 1920s made his efforts mainly on themes such as basic principles of statistics or special theory of relativity.

¹⁹ Citation from Yu S. Vladimirov, *Mezhdru fizikoi i meta-fizikoi*, Book 1 (2-nd ed.) (Moscow: "URSS", 2012), p. 227.

the concept action at a distance. At that time, Frenkel' took the position that the nature of electro-magnetical action can be defined as "delayed action at a distance" and did not suppose the medium of action. Mitkevich, on the other hand, taking a realist standpoint, stated that one should not accept action at a distance as a real representation of physical phenomenon²⁰.

The community of theoretical physicists did not take Mitkevich's insistence seriously, partly because they considered continuous medium, as supported by Mitkevich, as a mere relic (or, mechanical) ether of the nineteenth century. Mitkevich's repeated phrase that one must rely on representations of Faraday-Maxwell also led Soviet physicists to regard that he was eager to deny the fruits of the theory of relativity. For example, Igor' E. Tamm (1895–1971), professor at Moscow University and one of the most best known theoretical physicists in the Soviet Union, while not mentioning Mitkevich explicitly, maintained that the mechanical representation of the field or the medium of electro-magnetical phenomenon was outdated. He regarded the ether in modern meaning as the medium of property of space and considered it as matter²¹. But this response did not satisfy Mitkevich, who was eager to support some physical reality as a medium of action.

Increasing anxiousness and a sense of isolation caused Mitkevich to turn to communist ideologues. From 1933, starting with the publication of a short paper reacting to Tamm's condemnation in *Under the Banner of Marxism*, he began to correspond with one of the editors, Alexandr A. Maksimov (1891–1976), later known for his denial of the theory of relativity in the post WWII period²². The relationship between communists and academicians who belonged to older generations was, however, far from harmonious from the beginning. Correspondence between Maksimov and Mitkevich, which are collected in the former's personal archival fond of the Russian Academy of Sciences²³, indicate that by 1937 there was no progress in reaching agreement on political and philosophical issues. For example, Maksimov was not pleased that Mitkevich did not seem to give obvious approval to the party line, and criticized Mitkevich when the academician referred to the names of mechanists, such as Timiryazev, in a positive way²⁴. Meanwhile, Mitkevich was annoyed with the communist who required using "red words (*krasnoe slovtso*)"²⁵.

Paradoxically, communists also pointed out Mitkevich's ignorance of the results of modern physics and severely criticized it. Kol'man, who, though sufficiently educated in mathematics and natural sciences, was infamous for his attacks on outstanding mathematician Nikolai N. Luzin²⁶, in 1933 stated that, in modern physics, the electro-magnetical

²⁰ On detail of dispute between Mitkevich and Frenkel', see A. S. Sonin, "Sovetskie fiziko-filosofskie diskussii nachala 30-kh godov," *Issledovaniya po istorii fiziki i mekhaniki* 2006 (Moscow: Nauka, 2007): 264–289.

²¹ I. E. Tamm, "Rukovodnyashchie idei v tvorchestve Faradeya," *Uspekhi Fizicheskikh Nauk*, No. 1 (1932): 1–30.

²² See S. S. Ilizarov, L. I. Pushkareva, "Beriya i teoriya otnositel'nosti," *Istoricheskii arkhiv*, No. 3 (1994): 215–223. On details of Maksimov's life, see, Sonin, "Fizicheskii idealizm", pp. 27–32.

²³ Archives of the Russian Academy of Sciences (A RAS), f. 1515, op. 1, d. 248 (from Maksimov to Mitkevich); d. 333 (from Mitkevich to Maksimov).

²⁴ A RAS, f. 1515, op. 1, d. 248, l. 6.

²⁵ A RAS, f. 1515, op. 1, d. 333, ll. 15–16.

²⁶ On 'Luzin affair', or political blame on Luzin in the pages of party newspaper and journals in the summer of 1936, see, S. S. Demidov, B. V. Levshin eds., *Delo akademika Nikolaya Nikolaevicha Luzina* (St.-Petersburg,

action is perceived as an immediate action and that Mitkevich's insistence on the concept of mechanical continuous medium did not lead to a fruitful result²⁷. In sum, in the mid-1930s, the faction regarded by previous studies as "vulgar opponents" to modern physics was far from well-established, and communists were cold—not to say opposed—to the old engineers. This may have helped keep discussions on modern physics from "heating up" beyond a certain limit.

Realistic Concepts of Space and Energy

As ideologues' offensiveness in such areas as physics education grew more apparent as a result of Stalinization, among leading physicists fears have arisen that the ideologues' discourses were not based on a proper understanding of physics. Tamm's article "On philosophers—Marxists' work in the realm of physics" in *Under the Banner of Marxism*, severely criticized the ignorance of basic physical concepts by Soviet ideologues, especially Egorshin²⁸. Previous studies emphasized such statements of leading theoreticians as the brave opposition to ideological pressure²⁹, but treating only one side may lead us to overlook the main arguments of the dispute. Let us investigate the response of Egorshin to Tamm, which appeared in the same issue of the same journal³⁰.

Part of Egorshin's article is dedicated to the political blame of Tamm, intimating that the physicist belongs to the opponents to the Bolshevik rule (we have to remember that Tamm was indeed a member of Menshevik party before the October Revolution), but arguments in most parts of the article are sufficiently philosophical. He handled the concept of space and energy from a realistic point of view, denouncing phenomenological attitudes of physicists toward these concepts. According to him, Tamm's definition of the ether as "the medium of physical properties of space" is problematic because if ether was such a medium, we must regard space as nonmaterial empty substance. For materialists, Egorshin insists, space is nothing but a form of existing matter³¹. In regard to energy, he tries to insist on the importance of this concept and grasp a history of physics as the process of forming this concept and reducing the importance of the concept of force³².

In sum, the dispute between Egorshin and Tamm was not only the exchange of political blamings, but also the result of some philosophical debate. At this stage, philosophical arguments or definitions of physical concepts like the ether or energy, which could satisfy both physicists and communists, had not yet been formed.

1999); A. E. Levin, "Anatomy of a Public Campaign: 'Academician Luzin's Case' in Soviet Political History," *Slavic Review*, No. 1 (1990): 90–108.

²⁷ E. Kol'man, "Pis'mo v redaktsiyu Pod Znamenem Marksizma," *PZM*, No. 4 (1933): 230.

²⁸ I. E. Tamm, "O rabote filosofov-marksistov v oblasti fiziki," *PZM*, No. 2 (1933): 220–231.

²⁹ René Zapata, *La philosophie russe et soviétique* (Paris: Presses Universitaires de France, 1988), p. 104; Vucinich, *Einstein and Soviet Ideology*, p. 68.

³⁰ V. P. Egorshin, "Kak I. E. Tamm kritikuets marksistov," *PZM*, No. 2 (1933): 232–260.

³¹ Egorshin, "Kak I. E. Tamm..." p. 235.

³² Egorshin, "Kak I. E. Tamm..." p. 247.

The Law of the Conservation of Energy Must be Conserved

One of the most actively discussed issues in the theoretical physics in the first half of the 1930s was Bohr's hypothesis on the breaking of the conservation of energy. Around 1930, regarding the balance of energy in the process of beta-decay of an atomic nucleus, Bohr suggested that the law has only a statistical character in micro process³³. This assumption was widely discussed in the physicists' community. In the Soviet Union at that time, talented young pupils of Bohr, such as Georgii (George) A. Gamow (1904–1968), Lev D. Landau (1908–1968), were attracted by this radical assumption³⁴. But it was finally denied by Fermi's theory in 1934, which took into consideration the energy charged in the newly assumed particle neutrino³⁵.

While Bohr's hypothesis had not been accepted by the majority of physicists, Soviet ideologues' negative reaction to this hypothesis was quite harsh because Engels, in his *Dialectics of Nature*, treated the law of the conservation of energy as the foundations for a materialistic worldview. For Engels, this law meant that matter did not vanish or create, and that the whole amount of matter in our world was constant.

In 1934, Ioffe, in his lecture on the history of atomism, handled the conservation of energy. His view was empirical, as well as in 1927: namely, Ioffe sought not to allow philosophical standpoints to lead the investigation of natural science. "Any law of nature, especially law of the conservation of energy, is not *a priori*. It is not anything similar to the category of our consciousness, but the result of synthesized experiences and wide practices," Ioffe said³⁶. Though not a sympathizer with Bohr, it seemed to him that Soviet ideologues' denial of the breaking of the law of the conservation lacked proper arguments.

Marxist philosophers' reactions to Ioffe's empirical statement were not the same as in 1927; Kol'man, in his lecture at the same meeting, insisted on the leading role of the materialist philosophy in choosing a way to develop scientific theory. He argued that idealists, "for whom law of the conservation is no more than a mathematical invariant and therefore product of our brain," would deny this law more easily than "those who see in this law in any case the representation of firm position of non-destructiveness and solidness of motion, although this representation may be non-complete and approximated—and may need changes"³⁷.

Ironically, the fact that Bohr's idea had been immediately rejected, later gave Soviet ideologues a reason to blame leading physicists, such as Ioffe, as sympathizers of nonscientific, idealistic ideas.

³³ Bohr talked about this hypothesis publicly in Rome in 1931. N. Bohr, "Atomic Stability and Conservation Laws," *Reale Accademia d'Italia* (Rome, 1932): 119–130. in Sir Rudolf Peierls *et al.*, eds., *Collected Works*, vol. 9 (North-Holland, 1986), pp. 99–114.

³⁴ See, Gennady E. Gorelik and Victor Ya. Frenkel (translated by Valentina M. Levina), *Matvei Petrovich Bronstein and Soviet Theoretical Physics in the Thirties* (Verlag: Birkhäuser, 1994), pp. 63–74.

³⁵ E. Fermi, "Versuch einer Theorie der β -Strahlen," *Zeit. für Physik*, Bd. 88 (1934): 161–177.

³⁶ A. Ioffe, "Razvitie atomisticheskikh vozzrenii v XX v.," *PZM*, No. 4 (1934), 60.

³⁷ E. Kol'man, "Problema prichinnosti v sovremennoi fizike," *PZM*, No. 4 (1934), 82.

Attacks on Reductionism of Physicist

As we have seen, mechanistic understanding of natural world has been subject to severe criticism by mainstream ideologues even after the defeat of mechanists' rival Deborinites. In 1933, editors of *Under the Banner of Marxism* now allowed mechanist Timiryazev to submit an article on the meeting of the editing committee, but at the same time discussed the contents of the submitted article and condemned this aged physicist for denying all the fruitful results of modern physics³⁸. Although Timiryazev's article was accepted for publication, Maksimov also published long paper, in which he represented views of the majority of editors, in the same issue of the journal³⁹. This situation, along with the case of Mitkevich, clearly indicates that prominent ideologues and previous mechanists were not at all allies.

Those who could not escape from being condemned as a mechanist were not only party members, but also leading physicists. One of such target of criticism was Sergei I. Vavilov (1891–1951), a modest but authentic academician and chief of the newly formed Institute of Physics of the Academy of Sciences⁴⁰. In 1935, *Under the Banner of Marxism* published Vavilov's manuscript of the article, "Physics," which was to be dedicated to the first edition of the *Great Soviet Encyclopedia*⁴¹. The editor requested the readers' comments on this manuscript, and several months later such comments were in fact published in the journal⁴². Several figures, including Vavilov's pupil, Sergei M. Rytov, stated that the phrase "physics is regarded by several scientists as the leading science, which seeks to principally explain by its foundation more complex and partial property of nature"⁴³ is too permissive toward the mechanist (or reductionist) world view. Rytov wrote: "One should not take this (in principle *mechanistic*) view into physics, not giving any evaluation and not refraining from open approval of this position"⁴⁴. Phrases of Vavilov regarding attempted physico-chemical ways of understanding vital phenomena were also criticized.

As a consequence, Vavilov's article appeared in the *Great Soviet Encyclopedia*, as a coauthored with Maksimov, in a radically changed form⁴⁵. In his unpublished autobiography, Maksimov reminds us that Vavilov almost lost his temper in the process of revising his article, seeking to protect his own view from criticisms⁴⁶. This case tells us that, at that time, Vavilov did not totally concede to the official ideology of Soviet Union and did not know yet how to protect himself from ideological attack.

³⁸ Stenography of this meeting is collected in personal file of Maksimov. A RAS, f. 1515, op. 1, d. 181, ll. 1–35.

³⁹ A. K. Timiryazev, "Volna idealizma v sovremennoi fizike na zapade i u nas," *PZM*, No. 5 (1933): 94–123; A. Maksimov, "O mekhanitsizme i marksizme v estestvoznanii," *PZM*, No. 5 (1933): 124–172.

⁴⁰ On social and political life of Vavilov, see, for example, Kojevnikov, *Stalin's Great Science*, Ch. 7, "President of Stalin's Academy: The Mask and Responsibility of Sergei Vavilov".

⁴¹ Vavilov, "Fizika," *PZM*, No. 1 (1935): 124–136.

⁴² "O stat'e 'Fizika' S. I. Vavilova (iz pisem v redaktsiyu)," *PZM*, No. 4 (1935): 191–196.

⁴³ Vavilov, "Fizika," p. 124.

⁴⁴ "O stat'e 'Fizika,'" p. 191.

⁴⁵ *Bol'shaya Sovetskaya Entsiklopediya*, Vol. 57 (1936), pp. 343–347.

⁴⁶ A RAS, f. 1515, op. 1, d. 153, l. 62.

Dispute Grows Heated

The Great Terror, in which a vast segment of the Soviet population suffered from 1936 to 1938, victimized a number of physicists and philosophers, including Hessen⁴⁷. The suspicious and aggressive atmosphere during this period also had a radical effect on the tones and battle formations of the dispute: attacks on "idealism" became harsher and the previously modest order became unstable.

As we have seen, attitudes of leading physicists and communists frustrated the old electro-technician, Mitkevich. His question about action at a distance had not received satisfactory response from Frenkel' or Tamm, and communists such as Maksimov or Kol'man also did not seem to support him. At the beginning of 1937, Mitkevich turned to the presidium of the Academy of Sciences, requesting to hold a special meeting for the discussion about the nature of the electro-magnetical medium. Although this meeting had not been held for several reasons⁴⁸, *Under the Banner of Marxism* came to be a stage for the dispute took place between Mitkevich and leading physicists, such as Ioffe or Vavilov. Their battle was heated especially at the end of 1937 and at the beginning of 1938, when the chaotic Great Terror reached the peak of its harshness.

Vavilov responded to Mitkevich, writing a paper which, without his intention, came to be published in *Under the Banner of Marxism*⁴⁹. Here the physicist tries to prove, without using political rhetoric, that Mitkevich's concept of ether is outdated and that modern physics understands space as material substance, as had shown by the idea of field of gravitation in the general theory of relativity. Yet his stance on Marxism itself was not clearly shown in this article, although Vavilov approved the Marxists' negative attitude toward the Copenhagen interpretation of quantum mechanics.

It was at this stage when the alliance between the old electro-technician and militant communists was formed. In Maksimov's article in the seventh issue of *Under the Banner of Marxism* (1937), Mitkevich was still a target of criticism (his materialism was evaluated as "still primitive"), but leading physicists, such as Ioffe, also were targeted⁵⁰. The idealistic tendency, or "the track of capitalist ideology," had been contained among Soviet physicists by that time, Maksimov says. He now, along with Mitkevich, condemned Tamm and Frenkel', and Vavilov and Ioffe were blamed as sympathizers with Bohr in their views on the law of the conservation of energy.

⁴⁷ On arrest and execution of Hessen and the following unrest physicists' community, see: G. E. Gorelik, "Moskva, fizika, 1937 god." *Voprosy Istorii Estestvoznaniya i Tekhniki (VIET)*, No. 1 (1992): 15–32.

⁴⁸ Gorelik, who studied this meeting, suggests that main reason of the cancelation is a letter of famous theoretical physicist V. A. Fock (1898–1974) to the presidium of the Academy, in which Fock cautioned the level of the discussion would remain low. G. E. Gorelik, "Natura-filosofskie problemy fiziki v 1937 godu." *Priroda*, No. 2 (1990): 93–102. In addition to this factor, we suggest that part of the reason was busyness of Maksimov, the assumed organizer of the planned meeting. In October 28, 1937, in his letter to Gleb M. Krzhizhanovsky (1872–1959), the vice-president of the Academy of Sciences, Maksimov complains he has no time and physical power to do more than the work of editing *Under the Banner of Marxism*. A RAS, f. 402, Op. 1–1937, d. 12, l. 106.

⁴⁹ S. I. Vavilov, "Po povodu knigi akad. V. F. Mitkevicha *Osnovnye fizicheskie vozzreniya*," *PZM*, No. 7 (1937): 56–63.

⁵⁰ A. Maksimov, "O filosofskikh vozzreniyakh akad. V. F. Mitkevicha i o putyakh razvitiya sovetskoi fiziki," *PZM*, No. 7 (1937): 25–55.

Understandably enough, Maksimov's discourse upset physicists. Frenkel', in his unpublished letter to the editing committee of *Under the Banner of Marxism*, maintained that physicists can not be non-materialists as far as they observe and interpret the world around us⁵¹. Ioffe sought to show that it was he and leading physicists who stood along with orthodox party line. Timiryazev or Mitkevich were, Ioffe wrote, reactionaries who did not know and were not eager to know the real world. Otherwise, Tamm or Frenkel' are, even though not evaluating precisely the role of dialectical methods, accepted the existence of the phenomena of real external world, Ioffe maintained⁵². His previous empirical stance which we have already examined, thus, had been kept at that stage.

Physicists' reaction did not moderate the attitudes of Maksimov and Mitkevich, who now begun to act as allies. Mitkevich maintained that he respected the results of modern physics; he was simply seeking to grasp the physical substance behind mathematical description⁵³. Maksimov also accused Ioffe of not attending to the attacks on idealism. Ioffe's attitude on the law of the conservation of energy was also an object of Maksimov's accusation⁵⁴. It was this stage that philosophical dispute had acquired a character of political accusation between participants. From then on, Ioffe ceased to publicize his view on philosophical problems, probably because he felt that could not satisfy a wider range of readers of the Soviet Union in the realm of Marxist philosophy.

Dispute Calmed Down

Political struggle did not persist long, however, as had happened in the field of biological science⁵⁵. We can point to several reasons for this moderation. First, there was a person who tried to mediate between leading actors, such as Leonid Slepian, who was a pupil of Mitkevich and strived to show point of his teacher's argument by using terms of philosophy, not politics⁵⁶. Second, Maksimov did not seem to have sufficient time and power to continue the dispute. In his letter to the editing committee of *Under the Banner of Marxism*, dated July 30, 1938, Maksimov complained that he spent too much time on the problems of the works of the journal and asked for another person as chief [*zavedyvanie*] of the sector of non-biological sciences⁵⁷. Last but not least, Kol'man, one of the most aggressive ideologues in the realm of mathematical or physical sciences by the mid-1930s, did not actively attend to the ideological campaign at the time of the Great Terror⁵⁸. In 1937

⁵¹ A RAS, f. 1515, Op. 1, d. 393, ll. 1–13.

⁵² A. F. Ioffe, "O polozhenii na filosofskom fronte sovetskoi fiziki," *PZM*, No. 11/12 (1937): 133–143.

⁵³ V. F. Mitkevich, "Po povodu akad. A. F. Ioffe "O polozhenii na filosofskom fronte sovetskoi fiziki,"" *PZM*, No. 11/12 (1937): 144–156.

⁵⁴ A. Maksimov, "O fizicheskome idealizme i zashchte ego akad. A. F. Ioffe," *PZM*, No. 11/12 (1937): 157–191.

⁵⁵ On the situation of biology in the 1930s, see the paper by Hirofumi Saito, which is included in the special issue of this volume.

⁵⁶ L. Slepian, "Po povodu osnovnykh fizicheskikh vozzrenii akad. V. F. Mitkevicha i ego oponentov," *PZM*, No. 1 (1938): 173–182.

⁵⁷ A RAN, f. 1515, Op. 1, d. 191, l. 3.

⁵⁸ Kol'man insists in his autobiography that he was also a victim of Stalin's Terror. Brother of his wife was shot in 1937 and in relation to this he was fired from the job of Moscow party committee, he writes. E. Kol'man,

and 1938, Kol'man published several articles regarding the idealistic, or Pythagorean, tendencies, but the targets of these writings were limited to physicists of Western countries (e.g., Arthur S. Eddington, Paul A. M. Dirac).

A meeting at the Institute of Philosophy, which was dedicated to the thirtieth anniversary of the publication of Lenin's *Materialism and Empirio-Criticism*, illustrates that the struggle in physico-philosophical issues had totally calmed down by November 1938. This meeting, held on November 16, 1938, was perhaps organized by Maksimov, who was at that time working at this institute⁵⁹. The most striking aspect of this meeting is that Maksimov, Mitkevich, Vavilov, who had—in previous years—had an inharmonious relationship, gave lectures on the relations between physics and dialectical materialism in the same evening. To add to this, *Under the Banner of Marxism* quickly published these lectures, without a comment titled “material for discussion,” which was attached to most of the papers on physico-philosophical issues in the 1930s.

In his paper, Maksimov weakened his political blame of Soviet physicists, and apparently softened his attitude. “[...] all of physicists of USSR are more and more deeply mastering theory of Marxism-Leninism. Many attacks on materialism seeking to organize physical idealism in USSR, were refuted and are refuted by overwhelmingly majority of Soviet physicists”⁶⁰.

Sergei Vavilov also gave lip-service to the role of philosophy. He stresses that “[...] by investigating concrete scientific work, even shallowly, always appears a philosophical foundation, on which work exists and consequences are given. In this the most important thing is that philosophical prerequisites are far from indifferent to the consequences and the direction for further work: they can work as incentive and as well as obstacle for progress of science”⁶¹. Though it seems that he regarded philosophy as less meaningful in his mind⁶², it was still a concession that Ioffe had not been to give to the status of philosophy.

Vavilov “corrected” his previous mechanical views, which had drawn criticism in 1935. In the lecture presented in late 1940, Vavilov, considering the reductionist view, stated, “We think that such hopes [to explain every physical phenomenon by motion of more elementary particles] are exaggerated and simply wrong. And physicists approach things too mechanistic and simple”⁶³. The fact that, since 1942, the editing committee of *Under the Banner of Marxism* recruited Vavilov as a member (even though he had never joined the communist party) also indicates that Vavilov's “ideological correctness” came to be recognized by communist ideologues.

My ne dolzhny byli tak zhit' (New York: Chalidze Publications, 1982), p. 197. If that is right, we can suggest that reason of Kol'man's reluctance to attend the ideological campaign at that time may have been his awareness of danger of the Terror, in which accusation may lead to even someone's ruin.

⁵⁹ Invitation card of the meeting is collected in archival file of institute of philosophy. A RAS, f. 1922, Op. 1, d. 68, ll. 1–2.

⁶⁰ A. Maksimov, “*Materializm i empiriokrititsizm*—materialisticheskoe obobshchenie dannikh estestvoznaniya,” *PZM*, No. 11 (1938), p. 67.

⁶¹ S. I. Vavilov, “*Novaya fizika i dialekticheskii materializm*,” *PZM*, No. 12 (1938): 32–33.

⁶² In his diary in August 1940 Vavilov writes down that “science has, of course, only practical ends and after all, dispute on “foundations” is meaningless”. S. I. Vavilov, “*Mysl' ob evoliutsii mira—edinstvennoe absol'yutnoe, za chto eshche mozjno derzhat'sya soznaniem*” (*Dnevnik 1939–1951 gg.*)” *VIET*, No. 2 (2004), 6.

⁶³ S. I. Vavilov, “*Razvitie idei veshchestva*,” *PZM*, No. 2 (1941), p. 112.

From 1939 to 1949, in the Soviet Union, harsh philosophical controversy had fallen from the public concern⁶⁴. We should pay attention to the fact that the meeting which formed the official line of the philosophy of physics was held *before* the discovery of nuclear fission. The description of Vucinich, “At that time [end of the 1930s], Marxist philosophers gave wider compass to their recognition of the power of modern physics: undoubtedly, that impulse came in the wake of the news that the physicists had made key discoveries in nuclear fission”⁶⁵, therefore, must be revised. Philosophers recognized the discourse of physicists, not the power of physics. The official line on the problem of modern physical theories had been well-formed before the beginning of the War against Nazi Germany, and in a way that satisfied both physicists and communists.

Conclusion

The 1920s and 1930s saw radical changes in politics and society in the Soviet Union. The Great Break, a harsh political campaign, and chaotic massive terror, made not only scientists but also communist ideologues nervous. From time to time, communists should change attitudes toward participants of disputes on ideological problems, and as in the similar case of European diplomacy in the 1930s, “yesterday's friend” was no longer “today's friend.” Ideologues such as Maksimov, who, in the first half of the 1930s, seemed to cooperate with leading physicists and criticized old-minded scientists and engineers, changed their attitudes in the days of the Great Terror and placed harsh blame on physicists such as Ioffe.

If we had considered only the period between 1937 and 1938, we would have concluded that physico-philosophical disputes of the Soviet Union were no more than political suppression that labeled representative Soviet physicists as idealists. However, this characterization does not cover all aspects of the disputes. Many issues that arose during the process of the 1930s' discussions were not merely the labeling of physicists or a denial of new physical theories, but efforts to establish an official discourse on interpretations of newly formed physical concepts or theories, with an eagerness to make the discourse compatible with dialectical materialism.

At the end of 1938, when the Great Terror calmed down, a new political order appeared in Stalin's Soviet Union. Physicists did survive the difficult time of Stalinism, not by succeeding in appealing their forces, insisting on correctness or usefulness of new physical theories, but by suggesting a way to explain the meanings of new physics from the standpoint of the official ideology of the Soviet Union. This way was far from straightforward, but in the process of disputing many physical concepts, such as energy, field, and matter, physicist Sergei Vavilov finally succeeded in mastering “Soviet newspeak.” This process was so important for the community of this field because, thanks to the experi-

⁶⁴ In 1949 there had been the sign of revival of political-ideological struggle among physicists community. See, for example, Kojevnikov, *Stalin's Great Science*, Ch. 9, “Modernist Science, Ideological Passions” Ethan Pollock, *Stalin and the Soviet Science Wars* (Princeton: Princeton University Press, 2006), Ch. 4, “We Can Always Shoot Them Later”: Physics, Politics, and the Atomic Bomb”.

⁶⁵ Vucinich, *Einstein and Soviet Ideology*, p. 79.

ence of getting deal with official ideology, they could make a stable relationship with the authoritative state in most difficult time.

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Soviet Physicists during the War: Jealousy, Discord and the Ideological Dispute*

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Abstract

Around the beginning of "the Cold War," a series of philosophical "discussions" began in various fields of science in the Soviet Union. An intense dispute arose also in the field of physics. We must not, however, exaggerate the ideological aspect of this issue. Using the newly declassified documents, the author tries to shed a new light on the material and emotional factors behind the ideological guise of this dispute. During the war the majority of the institutes of the Academy of Sciences continued scientific research mainly for military purposes. Significant results were achieved in various fields of science. At the same time, the wartime experience deepened "rift" between scientists inside and outside of the Academy. Particularly the wartime evacuation of the scientific research institutes and the institutions of higher education to the different places resulted in strengthening the tendency of the functional separation between the Academy of Sciences and universities. The initiation of this assumingly ideologically-motivated campaign in the field of physics rekindled jealousy and hatred accumulated on the side of university professors and lecturers towards some of their "colleagues" with a record of splendid academic and scientific achievements.

Key words: Soviet Physicists, Soviet Ideology, the Academy of Sciences, Moscow State University, Wartime Research, Wartime Evacuation

1. Introduction

Taking the opportunity of an ideologically charged campaign under the guise of a series of academic "discussions" in various fields of science in the Postwar Soviet Union initiated first in the field of philosophy in 1947, Vladimir N. Kessenikh (1903–1970), Vasilii F. Nozdryov (1913–1995) and several other professors and teachers in the Faculty of Physics (Fizicheskii fakul'tet: Fizfak) of the Moscow State University (MSU), who later called themselves "patriotic and materialistic physicists," launched an attack on

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