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On the 75th Anniversary of Boris Kuznetsov

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ON THE 75TH ANNIVERSARY OF BORIS KUZNETSOV

In our time of specialization, in science as well as in other branches of human activity, it is difficult to find such a variety of interests, so many branches of research and such diversified results which are characteristic for the half a century of scientific work of Boris Kuznetsov. The late twenties witnessed the appearance of Kuznetsov's articles about the subject and method of political economy; 1929-1930 gave birth to schemes of electrification of different areas and, also, to the first scheme of high tension electrical transmissions in the USSR which formed the economic, technical and scientific forecast for several tens of years. Later came his books on the history of energetics; still later, after prolonged study of theoretical physics, there appeared a number of Kuznetsov's books on relativity, on history of physics, on general history of science, on history of Renaissance culture, on history of philosophy and on strictly philosophical, mainly epistemological, problems. But in spite of such thematic variability there is a general tendency binding together all fundamental works of Kuznetsov which allows one to perceive in them the successive stages of integral investigation of some central problems. The most basic problem of his work is an attempt at generalization of Relativity and non-classical physics. It is a philosophical generalization, but conveyed on a wider scale than it is commonly understood, the generalization including the elaboration of physical problems in the strict sense, the forecast of their future solutions, and the transformation of a number of epistemological, historico-philosophical, logical and axiological notions. It is also the analysis of the new structure of science and of future perspectives of its branches, and (what is very characteristic for Kuznetsov's work) it yields the forecasts of a general transformation of technology, economics—the whole civilization in fact. In this very complicated but essentially united complex of investigations the fundamental role had always belonged to the history of science, but the nature of that branch has changed. First of all, non-classical retrospection has become evident in works on the history of science. In the trilogy on the evolution of physics in the 17th-20th centuries¹, and still more, in the *Galilei*² and in the monograph on the

¹ B. Kuznetsov, *Evolution of Scientific Conception of the World in Physics of 17-18th Centuries*, Moskva 1955 (Russ.); *The Principles of Classical Physics*, Moskva 1958 (Russ.); *Fundamental Principles of Relativity and Quantum Mechanics*, Moskva 1957 (Russ.).

² B. Kuznetsov, *Galilei*, Moscou 1973 (French).

principle of relativity from antiquity till our times³, Boris Kuznetsov investigates some concepts of classical science and some antique and medieval ideas in the light of modern science; in that light the principle of relativity of Galilei—Newton and even the “clinamen” of Epicurus receive a new, unexpected meaning.

This method of viewing the past through the insights yielded by modern science was first started by Kuznetsov at the time of his investigations in the field of energetics in the early thirties. In his scheme of high tension electrical transmissions he estimated the possibility of transmission taking into consideration some new tendencies in the domain of electronic apparatus only newly born at that time⁴. Retrospection in that field definitely pointed towards future ways of development; what determined the point of view on the past of the energetics had at the same time permitted seeing the fundamental direction of its evolution. Kuznetsov's book on the history of energetics contained not only the forecast but an analysis of the new principles and perspectives of the united system of energetics, and the future confirmed the contents of the whole book⁵.

Those early works of Kuznetsov had much in common with his first little book which connected the philosophical analysis of science with physical and technological forecasts⁶.

As has been mentioned above, several Kuznetsov's works on the history of physics were written in the 1960ties. They were crowned by the book which received the greatest circulation, was published many times in dozens of countries, invited numerous comments everywhere and is perhaps known to every physicist and to many thousands of other professional men.

It is the biography of Einstein⁷. As a matter of fact, however, it is not a biography in the traditional sense. It includes a new interpretation of Einstein's method (the conception of the “external justification” and “internal perfection” introduced by Einstein in his autobiography in 1949 has been developed in Kuznetsov's book to embrace a very large circle of scientific and philosophical problems), a new analysis of the perspectives and of historical meaning of the united theory of field (in connection with modern collisions of the theory of elementary particles), and a new conception concerning the relation between Einstein's ideas and the fundamental direction of philosophical thought. That relation is observed in “Parallels”, (“Einstein and Aristotle”, “Einstein and Descartes”, “Einstein and Mach”, “Einstein and Mozart”). Among such parallels the most well known is a confrontation of Einstein's ideas and Dostoyevsky's images which Kuznetsov presented in a separate book⁸. It was given by the publishing house the subtitle of “Relation of modern physics to the main ethic and aesthetic problems of 19th century”. The book shows the role of the 20th century physics in solving the problem of whether there exists a universal harmony which preserves the value and autonomy of individual elements of the group, and, in particular, the value and autonomy of the “negligeable” which is the term

³ B. Kuznetsov, *The Principle of Relativity in Antique, Classical and Quantum Physics*, Moskva 1959 (Russ.).

⁴ B. Kuznetsov, *United High Tension Net of the USSR*, in: *Reports of the 1st Conference on Electrical Transmission*, Leningrad 1931 (Russ.).

⁵ B. Kuznetsov, *History of Energetics*, Moskva 1937 (Russ.).

⁶ B. Kuznetsov, *Dialectics, Science and Technological Reconstruction*, Leningrad 1931 (Russ.).

⁷ B. Kuznetsov, *Einstein. Leben—Tod—Unsterblichkeit*, Berlin 1977 (German).

⁸ B. Kuznetsov, *Einstein and Dostoyevsky*, Hutchinson Educational, London 1972.

Dostoyevsky uses in relation to the personality of man, crushed by the statistic laws of being.

It is just this particular problem which becomes the central point of focus of many books of Kuznetsov dealing with the value and perspectives of knowledge and with the connection between perspectives of physics and of economic and social evolution⁹. Of the economic and econometric ideas that these books contain one can mark the following problems: (1) the formula of the economic effect of science, connecting the "layers" of science (degrees of its generality) with the order of time derivative of labour productivity, (2) the use of mathematical apparatus of the theory of relativity and topological notions to determine the effect of fundamental science.

Yet, in the main, these books are philosophical. The notions of optimism, the value of Being, the value of Cognition, relations of Good, Beauty and Truth, the connection of the individual and the group, are raised there in a very broad sense, including the main problems of epistemology, axiology and aesthetics. That is why *The Value of Cognition, Philosophy of Optimism* and other Kuznetsov's works which contain a great degree of forecasting of future trends and reactions form an attempt to analyse the history of philosophy and its forecasts in the light of modern science. This has also been carried out in his other three books: *Reason and Being*¹⁰, *History of Philosophy for Physicists and Mathematicians*¹¹, *Modern Science and the Future of Philosophy*¹².

In the first book the author analyses the classical rationalism of the 17th century, its evolution in the 18-19th centuries and the modern situation in connection with non-classical science. He introduces the notion of Ultrarationalism which does not limit the prerogatives of Reason to the created nature (*natura naturata*) but transforms them to the creating nature (*natura naturans*). The second book mentioned above is not a simple survey of the history of philosophy, but contains the new conception of the evolution of philosophical thought in the light of modern science. The third one is a piece of original philosophical futurology where Kuznetsov introduces the notion of the "invariant of cognition" which will remain in the anticipated transformations of science. The book deals with the relation of the scientific transformation and the epistemological invariants.

Analysing the modern quanta-relativist science Boris Kuznetsov sees there a radical transformation of the very logic of scientific cognition. A large article published in 1959 dealt with this problem¹³. There and in a number of subsequent works¹⁴ on quanta-relativist logic he has introduced the conceptions of

⁹ B. Kuznetsov, *Value of Cognition. Essay on Modern Theory of Science*, Moskva 1975 (Russ.); *Physics and Economics*, Moskva 1970 (Russ.); *Philosophy of Optimism*, Moscow 1977 (English).

¹⁰ B. Kuznetsov, *Reason and Being. Essays on Classical Rationalism and Non-classical Science*, in: *Boston Studies in the Philosophy of Science*, Boston—Dordrecht—Holand (English, in print).

¹¹ B. Kuznetsov, *History of Philosophy for Physicists and Mathematicians*, Moskva 1974 (Russ.).

¹² B. Kuznetsov, *Modern Science and the Future of Philosophy*, Moskva (Russ., in print).

¹³ B. Kuznetsov, *Evolution of Quanta-relativist Logic. Transactions of the Institute of the History of Science of the Academy of Sciences of the USSR*, v. XXII, Moskva 1959 (Russ.), B. Kuznetsov, *Physics and Logic*, Moscow 1965.

¹⁴ See in particular: *Einstein's Criterion of the "Internal Perfection" of the*

variable valency logic and monovalency logic, connected with the idea of quantized space-time. In connection with the historical process of transformation of logic in transition from Aristotle's logic to the logic of classical science and in course of later transitions, Kuznetsov analyses the relation of logical and intuitional cognition and the meaning of aesthetic criteria in science in various historical epochs.

In the 1970ties Kuznetsov concentrated on the research of the problem of the irreversibility of time. His conception of irreversibility connects some notions of relativistic cosmology with irreversibility and non-commutativity of processes in microworld¹⁵. From the irreversibility of cosmic evolution that conception infers the irreversibility of cognition¹⁶. The idea of irreversibility of cognition and, in particular, of "strong irreversibility" (the term was coined by Reinchenbach) forms the fundamental idea of Kuznetsov's works dealing with the connection between scientific knowledge and the aesthetic ideas of the 14-17th centuries. The book dealing with the Renaissance culture is the most essential one among them¹⁷.

Concluding, it is well worth mentioning a very original result of the above investigations which was published three years ago—a book which was understood as a very personal confession of the scientist. Under the guise of a rather loose fantasy, it conveys profound and strict essence. The book in question appeared under the title of *Travels through Epochs. Memoirs of Count Cagliostro and Notes of his Conversations with Aristotle, Dante, Pushkin, Einstein and many other Contemporaries*¹⁸. Identifying himself with Count Cagliostro who owned the time-machine, Kuznetsov exposes his philosophical, historical and physical credo in the form of free and easy conversations with the thinkers of the past. But it is a real, true credo, thought over, well grounded, suffered through, worked out before in a series of very complicated books; the result of intensive, very diverse and searching thinking, spanned over half a century and united by fundamental ideas.

Physical Theory and the Conception of Discrete Space-time, in: B. Kuznetsov, *Essays on Einstein*, Moskva 1970, pp. 191-216 (Russ.); also B. Kuznetsov, *Complementarity and Relativity*, in: "Philosophy of Science", 33 (1966) No 3, (English).

¹⁵ B. Kuznetsov, *The Quanta-relativist Conception of Irreversibility of Time*, *Acta of Louis de Broglie Foundation* (French, in print).

¹⁶ B. Kuznetsov, *On the Problem of Irreversibility of Cosmic Evolution, of Cognition and of Historical Evolution of Culture*, "Philosophical Sciences" (1976) No 6, pp. 43-55; (1977) No 1, pp. 43-54.

¹⁷ *Ideas and Images of the Renaissance; Science of 14-16th Centuries in the Light of 20th Century Science*, Moskva 1978 (Russ.).

¹⁸ Moskva 1975.