

relativity). Besides, substance has certain physical properties. It is supposed in the given model that substance and fields, which form our world, are not independent physical realities, but specific structures of such substance (like concentrations, vortexes, etc.) and as a whole our World is a single wave like solitary wave, which propagates through substance in the direction from the past to the future. In frames of the given model we can immediately solve the question formulated above: how the time substance transfers its properties to the physical matter? Since substance and fields are particular states of substance itself, then there is no requirement of special transfer of properties from substance to matter and fields. These objects initially have properties, which are common with substance. In such model the notions of the course of time and its direction get a clear sense, it is easy to prove the statement on symmetry of the World, which is analogous to the known CPT-theorem of quantum theory of field. We have a possibility to show that mirror asymmetry of the World and asymmetry of it regarding particles and antiparticles can be the consequences of spatial-time substance acting upon the World. Development of the given notions was a construction of a model of electron as a structure formed by such substance [6,7]. This model describes the electromagnetic field of arbitrarily moving charge in details (without an application of Maxwell's equations).

Up to the present time many results of theoretical, laboratory and astronomical researches by N.A. Kozyrev found a confirmation and development in the works by other specialists, which used different approaches. Some of these works were published in the collective monograph [8] and in two special issues of "Galilean Electrodynamics" journal [9]. The work of Russian interdisciplinary seminar on temporology permanently acting on the base of Moscow State University (head of this seminar is A.P. Levitch) is devoted to the studying of time phenomenon. Materials of the seminar are placed at: [www.chronos.msu.ru/SEMINAR/rindex.htm](http://www.chronos.msu.ru/SEMINAR/rindex.htm).

A flow of information on researches, which work out Kozyrev's ideas has been growing during last years; and it is the evidence that this direction of studying of time founded by this outstanding scientist has perspectives. At the same time we should recognize that many problems concerning time are not solved yet, and time remains the mystery of the Universe.

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## N. A. Kozyrev's Ideas Today

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*(Editor's notes by Alexander V. Frolov)*

### Introduction

Nikolay Alexandrovich Kozyrev's ideas amaze our imagination. They are full of optimism. For the first time in physical constructions we can see vital, creative principles of the World, which are able to oppose to its heat death foretold by traditional physics to be inevitable.

N.A. Kozyrev came to his ideas by the analysis of the observed data about luminance, masses and sizes of

stars. This analysis brought him to a conclusion that the processes of thermonuclear synthesis cannot serve as a main source of stellar energy. **The scientist made a hypothesis that Time is a source of stellar energy.** According to N.A. Kozyrev, Time has active (physical) properties besides its passive property of duration. Time effect the events in the World due to these active properties. These properties manifest in cause-effect relations and express themselves in the counteraction to the usual course of processes, which lead to the destruction of systems organization. Time influence is very small in comparison with usual destructive course of processes, however it is dispersed everywhere in Nature, therefore **there is a possibility of its accumulation.** Such possibility is provided in living organisms and massive cosmic bodies, in stars at first. **Active properties of Time can provide the interrelation of objects, when there are no usual physical effects between them. Time joins the entire**

**World in a single whole. It is the organizing beginning and the source of vital possibilities of the World.** [1-7].

For development of his hypothesis, N.A. Kozyrev had been developing his theory more than 40 years and had been carrying out his experimental research more than 30 years. He made a conclusion that in cause-effect link, which contains rotating bodies, the active properties of Time calls the appearance of small additional forces, which are able to change the momentum of the system. The notion about deep genetic relation of Time and causality is a basis of N.A. Kozyrev's ideas. Exactly due to conviction in the presence of such relation, the scientist called his theory of physical properties of Time **the causal mechanics**. N.A. Kozyrev together with his colleague Victor V. Nasonov, who had been helping him to make all experiments during 20 years, created several types of sensors (detectors), which allowed to make distance research of physical processes. During astronomic observations made by means of these sensors they registered signals, **coming from visual, real and future locations of stars** and other astronomic objects [7-11].

We suppose that the reader had already got acquainted with the works by N.A. Kozyrev, and now we will start discussion on the results got by his followers.

During Kozyrev's life, in scientific literature there were no reports on the works of other researchers in the direction founded by him. Such publications began to appear only after the untimely death of the scientist on February 27, 1983. Up to the present time, many results of theoretical, laboratory and astronomic research by N.A. Kozyrev, which recently could seem to be too fantastic, had already got the proof and development in the works of independent specialists.

### **Laboratory experiments**

V.M. Danchakov, the scientist from Novosibirsk, was the first to publish in 1984 the results of laboratory research made as a development of Kozyrev's works [12]. He studied the distance effect of evaporation process of liquid nitrogen on the living objects (microorganisms, seeds of peas and others) and also on some substances of abiocoen.

The experimental system made by V.M. Danchakov is a special chamber of elliptic shape with the distance between focuses about 0,5 m, the inner surface of this chamber is covered with aluminum foil. An active source (a bulb with liquid nitrogen as process of evaporation) is placed in one of the focuses of the chamber, and an investigated object is placed in another focus. If it is necessary, a screen made of aluminum is placed between the focuses. This screen prevents the direct effect of the process to the investigated object. Elliptic shape of the chamber and aluminum as its covering were chosen to study the effect of reflected influence of the process to the object, when hypothetical carrier of influence gets to the investigated object passing over

the screen by the periphery of the chamber reflecting from its walls (that corresponds to Kozyrev's results on focusing of influence by means of aluminized parabolic mirror).

It was found that evaporation process of liquid nitrogen has a distance influence on the condition of investigated objects, and living being has a particular sensibility to such an influence. In particular, it was registered that **influence on microorganisms, which is made in the mode of reflection, stimulates their development, while direct influence depresses this development**. The objects of abiocoen subjected to the mentioned influence during 15-60 minutes keep their changed properties during several hours after the end of the influence. At that time they themselves become the sources of the same influence on other objects.

*(Editor's note: It is similar to magnetization or structure changes of matter)*

V.M. Danchakov and I.A. Eganova developing the described research in 1984-85 made a detailed study of distance influence of evaporation process of liquid nitrogen on the peas seeds (as well as on the range of other biological objects) [13]. They got statistically significant results, which were the evidence of change in biological cycle of plant development after such an effect. Seed, which was subjected to the effect of the process at a distance of 65 cm during three or six minutes retarded from control seeds by germination, growth of stem and crop, though in their crop the average weight of a separate seed as a rule was some higher. It is interesting that in the case of additional 15 minutes influence of the process on seeds the initial retardation of plant growth from the control ones changes by advancing in three-four weeks after the sowing.

Following the given research, the group of scientists from Novosibirsk (M.M. Lavrentiev, I.A. Eganova, M.K. Lutzet, S.F. Fominykh) made a big cycle of experiments on studying of distance effect of irreversible processes on various substances [14]. A system used in these experiments is close in its design to the system by V.M. Danchakov described above. It is a chamber of ellipsoid shape with the distance of 40 cm between focuses. The chamber was covered with aluminum foil inside it. **An initiating irreversible process was provided in one of the focuses, an investigated substance was placed in another focus**. If it is necessary, the screen separates them. Evaporation of liquid nitrogen, dissolution of sugar in water, cooling of hot water and other physical and chemical processes were used as irreversible processes. Distilled water (change of its density was measured), cooper, duralumin, quartz, glass, wood, sugar, coal and other substances were used as investigated substances (change of weight of the sample treated as change of its mass was determined). It was found that after several minutes of process effect the relative changes of masses of the bodies constitute  $10^{-6} - 10^{-5}$ , and relative change of water density constitutes  $3 \times 10^{-4}$  (the effect has different sign for

different processes). Returning of parameters to initial values goes very slow, sometimes 24 hours or more. It was found by special experiments that the obtained result cannot be explained by known phenomena, i.e. changes of temperature, electrostatics, absorption and adsorption, changes of Archimedean force and others. The authors of the research note that "all totality of properties of dynamics of changes in mass and density of substance including the mentioned aftereffect (continuation of density and mass change after the influence was stopped) is significant for the change of mass that is not quantitative measure of substance but mass as a measure of its gravitational (inertial) property".

Japanese researches in the end of 1980-s made experiments on weighing of gyroscopes with vertically oriented axis and found that gyroscopes, which rotate clockwise (if we look on them from above) decrease their weight proportionally to the angular speed of rotation. At the same time gyroscopes rotating counter-clockwise do not change their weight [15]. (*Editor's note: Also it is important to note the following: not a gyroscope only but a falling (moving) gyroscope was investigated in this experiments.*) The given result is very close to the result obtained by N.A. Kozyrev [4-7], though Japanese researches didn't make any references on his works. In two months after the publication of the article by Japanese scientists, the articles by American and French scientists appeared. These articles reported that in analogous experiments made by these scientists there was not registered any changes of gyroscope weight [16, 17]. Analysis of these publications made by Dr.R.Ya. Zulkarneev in physics and mathematics on the seminar "Studying of Time phenomenon" in Moscow University allows making a conclusion that really the results of Japanese scientists as well as the results of their American and French opponents are in agreement with the Kozyrev's data. The fact is that according to the theses of causal mechanics, gyroscope can change its weight only with the condition that it is included in some cause-effect link. In other words, this can be only in the presence of irreversible energy exchange between gyroscope and environment. Such energy exchange takes place, for example, during vibration of gyroscope. So, in the system made by Japanese researches there were the out of control vibrations due to the application of spring suspension of gyroscopes; gyroscopes used by Americans and Frenchmen were close to ideal ones (without vibrations).

The group of experimental physicists of St Petersburg University (V.S. Baranov, M.B. Vinnichenko, M.A. Ivanov, A.M. Selivanov, S.V. Skvortzov, A.Z. Khrustaliov) in 1992 made two experimental systems for distance research of physical processes. Sensors (detectors) of these systems were created by N.A. Kozyrev and V.V. Nasonov: in the first system there was asymmetrical torsion balance, in another one there was measuring electrical bridge (Witstone bridge).

Simply speaking, torsion balance is a light rod (beam) with the loads on the ends, suspended horizontally on

the fine vertical thread. Masses of load were chosen in such a way in order to lengths of arms of beam had the ratio of 1:10. The balance was placed in forevacuum chamber with the air pressure inside it about 2 mm of mercury. It was electrostatically screened and together with the chamber it was leveled on a damping platform. The turn of the balance beam in horizontal plane served as a measuring characteristic. This turn takes place if it is made near the system of investigated process. The system gives a chance to register rotatory moments, which act on the balance beam. They correspond to the force of  $10^{-6}$  length applied to the long arm of the balance beam.

Measuring electrical bridge was assembled on four metal-film resistors. One of them is placed at some distance from others. The value of bridge deregulation during the investigated process made near the distant resistor is studied. This system allows to measure deregulation of the measuring bridge with an accuracy up to  $2 \cdot 10^{-8}$  V by voltage or  $10^{-11}$  A by current due to the usage of special power source and recording apparatus and provision of high extent of protection in heat, electrostatic and electromagnetic aspects.

Thus, sensitivity of both systems almost in two orders exceeds the sensitivity of analogous systems used by N.A. Kozyrev and V.V. Nasonov.

In the test series of experiments made, it was studied a reaction of sensors on the processes of dissolution of various substances in water, cooling of heated body, thawing of ice and evaporation of volatile liquids (evaporation processes were made in a closed retort with a regulated forced pumping of air and diversion of vapors outside the laboratory). A qualitative pattern of observed effects (their sign, presence of initial lag, long being of input system in saturation mode, slow relaxation and others) repeats the characteristic features of experiments made by N.A. Kozyrev. At the same time, the absolute values of effects about an order smaller than it was noted by Kozyrev (with comparable intensities of the processes). Besides, unlike Kozyrev's data, the processes going without temperature changes didn't show the effect more than limits of error. It was found a correlation of effect sign with the sign of temperature difference of sensor and physical system, in which the process was made. The calculations made by the specialists (L.A. Bakaleynicov, M.G. Vasiliev, E.G. Golovnyia) show that heat radiation acting on the sensors makes some contribution in the observed effects. (Heat radiation leads to the heterogeneous change of temperature in fore-vacuum chamber of torsion balance that created a convectional gas flow inside it, which rotate the balance beam. In another system the heat radiation changes the temperature of resistor, near which the process is made. It leads to the change of its electrical resistance, which calls deregulation of measuring bridge). The radiative heat exchange between the sensor and the investigated process is not preventing by the screen made of cardboard, paper, plastic and other materials placed between them, because they are transparent for the

wide spectrum areas of electromagnetic radiation. **However, not all found characteristics of the effects could be easily explained by the influence of heat factor...** (The experiments were discontinued on this the most interesting stage due to the lack of finance).

### Research of biological systems

Studying of living systems by means of Kozyrev's sensors is absolutely interesting. N.A. Kozyrev himself made only separate experiments with biological objects including a man. He didn't make systematic studying of living systems in principle. His has explained his position on this question in reports and articles as follows (I give his argumentation almost literally):

Life is a natural phenomenon, but not unnatural. Living organisms cannot create anything that doesn't exist in nature. They can only collect and use what is laid in general properties of the World. At the same time, living organisms are very complex systems. Tens and even hundreds of various physical and chemical processes takes place in them. That's why during experiments with them we have a lot of chances to entangle in the complex pattern of phenomenon and never understand its essence. To find out the essence, origin of the discovered effects and be able to develop a system to describe them, we should investigate the simplest systems of abiocoen. It will give us a chance to rely on the huge experience of scientific knowledge of exact science during our studies, to use all rich arsenals of its ideas and results.

Kozyrev's followers, however, didn't wait for the results of abiocoen studies and began the research of living systems.

V.V. Nasonov, many-years colleague of N.A. Kozyrev, made a big series of experiments with cut plants. He made this research in 1983-84, after Kozyrev's death, in this laboratory in Pulkovo observatory, where earlier they tried to understand the essence of phenomenon together. As sensors V.V. Nasonov used two torsion systems: asymmetrical torsion balance and light disk, hang horizontally by its center of gravity. He studied branches of apple tree, pear tree, lime-tree, chestnut, and also stems of clover, dandelion, bittercress, growing on the territory of Pulkovo observatory. The cut plant was placed by the place of cut or by the opposite end (top) near the side surface of sensor's casing. With this, another end of the plant was placed as far as possible from the sensor. All plants showed the effect on the sensors, the turning angles of torsion balance and disk constituted from ones up to tens degrees depending on season and other circumstances.

It was found that immediately after the plant was cut, its top and place of cutting call nearly the same reaction of sensors. The effect has the same sign that the effects from such processes in abiocoen, which lead to the destruction of inner organization of the system. In some time the plant passes to another state. On this stage the place of cutting continues to show the effect of the

same sign, as it was earlier, and the top of the plant begins to show the effect of an opposite sign. The plant seems to be struggling for life. This process can continue for a long time for some plants. So, once a bittercress in the periods between experiments with feeding it with water "had been struggling for its life" for 14 days, though during this process its stem looked dried and the place of cutting was rot. However, not all the plants showed such an effect and not always. The plants show the most activity in vegetative period. For example, individual apple-tree branches in blossom on the eve of petal abscission called the turn of torsion systems at the angles up to 300° on the stage of "struggle for life", though the common effect of another sign for apple-tree branches lies in the limits of 10-30°.

V.V. Nasonov reported the results of the given research in December 1985 on the scientific seminar "Studying of Time phenomenon" in Moscow University. Besides, the announcement on this research was made on the scientific-technical meeting "Experience exchange on research of anomalous phenomena in environment" took place in Kiev on May 1986, two month after the sudden death of V.V. Nasonov.

S.P. Mikhailov published the results of research on distance influence of a man on asymmetrical torsion balance on 1992 [18]. A.G. Pakhomov explained the effects discovered by him with sufficient argumentation by the influence of heat factor (the heat from a man heats the nearest part of the chamber with the balance and the temperature difference inside the chamber leads to the convectional flow of air inside it, which turns the balance beam) [19].

N.A. Kozyrev got a lot of letters, in which the enthusiasts announced about their repeat of his experiments and successful application of Kozyrev's sensors to investigate living systems. However, it is not possible to discuss them in this article due to the absence of detailed descriptions of these experiments.

*(Editor's note: Several words on link between time and heat. For more deep understanding it is more useful to apply "density of aether" instead of Kozyrev's notion "density of time". In this case we can assume also that ordered heat process, i.e. heat flow in some direction, can be considered also as aether flow due to gradient of its density. In this case it becomes clean the connection of heat processes and experimenting with time. In some cases it is possible absolutely exclude heat electromagnetic influence but the aether flow will produce some effect.)*

### Astronomical observations

The scientists from Novosibirsk M.M. Lavrentiev, V.A. Gusev, I.A. Eganova, M.K. Luzet, V.G. Medvedev, V.K. Oleynic, S.F. Fominykh were the first who made astronomic observations according to Kozyrev's method. In 1989-91 in Crimea astrophysical observatory they studied the distance effect of stellar processes on physical and biological sensors [20-22].

Physical sensors made by them in their design repeat the sensors made by N.A. Kozyrev and V.V. Nasonov, but they have more sensitivity and have better screening from external effects. The main element of these sensors is a measuring electrical bridge assembled on four metal-film resistors. A value of bridge deregulation called by the influence of star on one of resistors is determined. **This resistor is placed in the focal plane of the telescope. Microorganisms being in anabiosis state serve as biological sensors. The property of microorganisms to form colonies on the solid substrate is used as a test reaction.** The effect of four stars on physical sensors and the Sun on physical and biological sensors was investigated. In the first case the observations were made on 50-inches telescope-reflector, on which Kozyrev and Nasonov worked in their times. In the second case the observations were made on the telescope "MIZAR" TAL-1 (having the diameter of main mirror of 110 mm). In all observations the main mirror of the telescope was fully covered with plastic screen or black photographic paper. It was discovered an effect of three stars and the Sun on physical sensors. With this, according to the results by Kozyrev and Nasonov the sensors react firstly on the **visual location** of stars and the Sun on the sky (i.e. on the places of the sky, where investigated objects were in the past, in the moments of time, when they radiated light reached the Earth during observation). On the other hand, they reacted on their **real location** (i.e. on those places, where the objects though are not observed visually, but really they are located there in the moment of observation). Thirdly, they react on the places of the sky, which are **symmetrical to the visual** ones regarding the real ones (these are the places, where the objects will appear **in future**, in the moments of time, when the light signal from the Earth would come to them, if it was radiated in the moment of observation). The most reaction of sensors was called by real locations of the objects. The weaker reaction was called by visual locations and the less reaction was called by their future locations. Biological sensors demonstrate a strong reaction on the real location of the Sun. After three minutes of projecting of Sun's real location on them, the quantity of microorganism colonies increases in 1,5-2 times in comparison with the case of projecting of neighboring sky areas on them. (There are no statements about presence or absence of biological sensors reaction on visual and future locations of the Sun in this publication).

A group of scientists (A.E. Akimov, G.U. Kovalchuk, V.G. Medvedev, V.K. Oleynic, A.F. Pugach) in 1991 made the astronomic observations by Kozyrev's method in the Observatory of Science Academy, Ukraine and in Crimea astrophysical observatory [23, 24]. By means of Kozyrev's type sensor the registered signals from three cosmic objects: a star, ball congestion and roentgen source (with this a range of other objects had no effect on the sensor). Repeated scanning of the sky area in the vicinity of the observed object proved reliability of the results. The scientists paid attention to the following two factors (both of them took place in Kozyrev's and Nasonov's experiments also). The first is that coordinates of the point on the sky, from which the

sensor takes the signal, are different on several angular minutes from coordinates of the cosmic object, which is considered to be the source of this signal. In this report there is consent with interpretation of this factor accepted by Kozyrev. The second characteristic factor is an absence of full (100%) reproduction of the results: the source, which demonstrates the reliable effect of influence on the sensor in some cycle of observations, sometimes doesn't show the effect in another cycle of observations. In this report there are three hypothetical reasons given without any discussion: variability of the source characteristics; change of the source location (when it is really different from the cosmic object, with which it is identified); **variability of space-time continuum properties in the area between the source and the sensor** (*Editor's emphasis. Also we can assume that average density of aether in space along link between the source and detector is not constant physical value*). A conclusion was made that "Kozyrev's ideas on the possibility on non-electromagnetic influence of stars on resistor, which earlier seemed to be eccentric, found an experimental proof".

In the foreword to the article [23] Morozenko A.V. wrote: "It's not a secret that while reading this work I also had a feeling of aversion. But personal acquaintance with the authors of this work and knowledge of some of them as high-professional astrophysicists-observers made me not to reject this work, but to study it attentively. Having a desire to find a mistake or even a negligence in making of the experiment, I came to an opposite conclusion and made sure in practical perfection of experimental part of the work and was close to believe in reality of existence of interaction effect of possibly unknown energy source with detector. It allowed me to agree working as an editor of this work with an open heart and recommend it to publication. Moreover, I presume to address to the readers not to reject it a priori, at least observational effect, but try to make analogous experiments independently or just answer the question: "What can it be?" We cannot exclude that works in this direction will allow to find a new kind of interaction in the Universe".

### Theoretical research

The scientific interdisciplinary seminar "Studying of Time Phenomenon" (under the head of PhD A.P. Levitch, theoretical physicist, candidate of biological science) has been working from 1984 at Moscow State University. It is without a rival in its breadth of material and presence of participants. During 10 years of its work more than 300 reports were made. Physicists, chemists, biologists, geologists, geographers, geophysicists, mathematicians, mechanical engineers, astronomers, psychologists, representatives of other fields of knowledge including non-traditional ones take part in the work of this seminar [25]. V.V. Nasonov spoke on this seminar in 1985. One of 1990 sessions was fully devoted to N.A. Kozyrev and his research works.

A unique two-volume monograph "Time in natural science: interdisciplinary approach" was wrote on the

basis of materials of this seminar. Author's group of this monograph includes 17 Doctors of Science and Doctors of Philosophy of various specialties. One volume of the monograph is devoted to the analysis and development of Kozyrev's ideas. The monograph is fully prepared for publishing, but financial problems delay it's publishing.

N.A. Kozyrev emphasized the notion of causality. He underlined that causality is one of the main properties of nature. It is related with the Time phenomenon, that's why the notion of causality should be included in basic postulates of mechanics. The scientist began to realize this task in his causal mechanics. Kozyrev's notion about causality and its role in natural phenomena fully match with the modern philosophical views on causality. Besides, **in physics this notion appears only in the form of the so-called principle of causality. According to this principle, the Future cannot have any influence on the past** (taking into consideration the theory of relativity it also means the impossibility of motion of bodies with the speeds, which exceed the speed of light in vacuum). **Thus, physics and then other exact sciences ignore the most part of causality notion aspects.** N.A. Kozyrev also failed to formulate an irrefragable physical definition of causality.

Obviously, the first strictly formalized definition of causality can be found in the article by M.L. Arushanov and S.M. Korotaev [26] and in following articles by S.M. Korotaev (member of Institute of the Earth Physics RAS, Troizk town) [27-29]. Simply speaking, this definition is based on the comparison of conditional probability of events: If we take two events, then the effect is the event with probability of realization higher than analogous probability for another event (if realization of another event was made). With this the second event will be the cause.

*(Editor's note: in first view it seems strange that probability of cause is less than probability of the effect).* Such definition appeared to be consistent with Kozyrev's axiomatics.

The author of this article analyzed the initial postulates of Kozyrev's causal mechanics. In particular, the presence of small additional forces in cause-effect links, which are not taken into consideration by classical mechanics, could be interpreted as a deviation of vectors of usual ("classical") forces from the direction, attributed to them by classical mechanics. Such understanding allowed considering the given thesis of Kozyrev's theory as a natural development of classical mechanics notions [30, 31]. Besides, **the author derived Heizenberg's principle of uncertainty directly from initial postulates of causal mechanics.**

In Kozyrev's work Time is an independent natural phenomenon, which has an active influence on the events in the World by means of its physical properties. **We can say that Time according to Kozyrev is some kind of a substance, which exists along with matter and physical fields** (in philosophy such concepts of Time are just named as substantive concepts).

***Editor's note: Really, it seems that Aether can be most acceptable notion in this case.***

Developing the scientist's ideas, the author of this article creates a substantive model of space-time, which joins Kozyrev's notion on substantive time and fundamental principle of modern physics. According to this principle, space and time form the unified space-time variety. It is shown that the **notion of time course and its direction get a clear sense in the frames of the given model**, symmetry of the World appears to be just like it is dictated by the quantum theory of field, also the observed mirror asymmetry of the World is explained by the interaction of the World with the space-time substance [32, 33]. Results of the research are fully expounded in three articles prepared for the above-mentioned collective monograph "Time in natural science: interdisciplinary approach".

According to the available data, the scientists from Novosibirsk also work on the theoretical understanding of the problem of Time in the manner of N.A. Kozyrev. We have told about their experiments above. However, the results of their theoretical researches were not still published.

#### **Application of causal mechanics in other sciences**

The member of Astronomical Institute of Saint Petersburg University V.V. Orlov in 1993 made a report on the city seminar devoted to the stellar dynamics on the topic "Causal mechanics (according to Kozyrev) in stellar systems: forecasts and estimations". Some observed features of dynamics and evolution of stellar systems, which now have no convincing interpretation, were explained in this report. One of these features is the so-called virial paradox. The essence of this paradox is that there are such velocity distributions of galaxies in the accumulations of galaxies, which can be explained in the frames of known cosmogonical theories only on acceptance of very artificial assumption on existence of some hardly detectable ("latent") mass. This mass many times exceeds the entire observed mass of accumulation. **Introduction of additional force into the calculations, which follows from Kozyrev's theory, allowed obtaining the evaluation of velocity distribution of galaxies, which match the real evaluations. This didn't require engaging the hypothesis of "latent" mass.** Also the observed dependencies of linear speeds of stars rotation on the distance to the center of galaxy were explained for spiral galaxies using Kozyrev's force. These dependences are different from those predicted by classical mechanics. Besides, a similarity of some physical properties of components of double stars was found. This similarity match the analogical data by N.A. Kozyrev, and a number of other results was obtained. The work in this direction has been continued.

M.L. Arushanov and S.M. Korotaev applied Kozyrev's results to the description of geophysical facts, which have no satisfactory interpretation from usual positions. By calculation of the value of Kozyrev's force acting on

the Earth's structures, they particularly explained the asymmetry of geological structure and shape of our planet, asymmetry of atmosphere circulation and some features of distribution of physical fields of the Earth.

#### **Circumstantial data in favor of Kozyrev's theory**

Long-term experiments by R. Davis on registration of solar neutrino lead to a **conclusion that the temperature of the central part of the Sun is lower than the temperature, which is necessary to provide its radiance due to the thermonuclear reactions only [34]. This result fully matches to the conclusion made by N.A. Kozyrev.** He came to this conclusion on the basis of the analysis of observational astronomical data. According to this conclusion, the **processes of thermonuclear synthesis cannot serve as a main source of stellar energy.**

**At present time the presence of numerous and various solar-earth and moon-earth connections, which cannot be explained from positions of traditional physics, is firmly determined [35-41 and others]. The given circumstance makes us to regard Kozyrev's hypothesis on interrelation of all world phenomena by means of physical properties of Time with attention.**

According to N.A. Kozyrev, all planets, which have their own rotation, should be asymmetrical in regard to equatorial plane due to the action of specific forces described by causal mechanics. For the Earth the presence of asymmetry between northern and southern hemispheres is proved by G.N. Katterfield's works and works by other researches (see the article [42] and references in it).

**It follows from causal mechanics that influence of Time on our World can lead to the difference in properties of right and left systems, i.e. to the so called mirror asymmetry of the World.** Mirror asymmetry is really observed in a number of phenomena. One of its examples is nonconservation of spatial parity during  $\beta$ -decay of atomic nucleus [43]. There are numerous manifestations of mirror asymmetry in living substance. It mostly manifests in the presence of only right swirl of nucleic acids molecules and only left swirl of proteins [44]. L. Pasteur began studying of this property of living substance. It is considered to be one of the main signs of life ([45] and others). Now a satisfactory explanation of mirror asymmetry of the World is still not found in spite of numerous attempts made in the given direction. **Causal mechanics is the only theory, in which mirror asymmetry is a regular manifestation of nature properties, but not the result of occasional concurrence of circumstances.**

**In one of his last articles [11] N.A. Kozyrev made a conclusion that results of astronomical observations by means of physical properties of Time [7,8,10] corresponds to geometry of space-time, which is considered by special relativity theory. As we mentioned above, the author of this article derived**

**Heisenberg's uncertainty relations from the postulates of causal mechanics. It was shown that substantial space-time model, which is the development of Kozyrev's notions, leads to the symmetry of the World, which matches the symmetry dictated by quantum theory of field. The given results are the evidence that Kozyrev's causal mechanics is in correspondence with the theory of relativity and quantum mechanics. It is one more argument in favor of its correctness.**

*Editor's note: Really, the experimental data is most powerful argument in repute of Kozyrev's theory.*

#### **On parapsychological research**

Many publications devoted to parapsychological researches contain references on Kozyrev's works. Let's mention only one, the greatest research of such kind.

Scientists from Novosibirsk Institute of clinical and experimental medicine of Siberian Department of Academy of Medical Sciences (V.P. Kaznacheev, A.V. Trofimov and others) in winter 1990-91 investigated **the distance (telepathic) communications** in the systems "man-biosensor" and "man-man" [46,47]. These experiments were made using "the system made according to Kozyrev's ideas", which is a room containing a special system of "mirrors" made of aluminum. It was found that during the allocation of transmitting information operator inside such system and receiving operator inside another system (for distant from the first one at about 100 meters) the effectiveness of perception of transmitted image information increases in 3-6 times in comparison with the case of transmission and reception of information without of these systems.

One of experiments lied in the transmission of image information inside the system, placed in trans-polar village Dixon (North Russia), reception of this information by the group of operators in the same village and by another group at the distance of about 2500 km from Dixon, in Novosibirsk city. There were 14-16 people in each group. They received information without using the mentioned systems. In these experiments the operators of both groups received similar information, which, however, differed from the information sent by transmitting operator and mainly consisted of cosmic symbols. During this, in a number of cases an unusual light effect appeared in the night polar sky above the system, where the transmitting operator worked. This effect looked like a disk with luminous train moving to the north.

Some practical extrasensory individuals express an opinion that a transmitter of distance influence in Kozyrev's effects and transmitter of influence in parapsychological phenomena is the same physical agent. The following facts are given as the ground of such an opinion. At first, the change of temporal parameters in environment takes place in many parapsychological experiments. At second, the

mentioned phenomena have a number of common features. In particular, a characteristic feature of Kozyrev's effects is a sufficiently long stay of the objects in the changed state after they were subjected to the distant influence from irreversible processes. The similar long aftereffect of induced properties takes place also with the "activation" of things made by extrasensory individual. Besides, the sensors used in biolocation look like Kozyrev's asymmetrical torsion balance.

Certainly, the listed facts cannot be ignored. Nevertheless, there is no doubt that these very facts cannot prove the identity of physical transmitters of Kozyrev's and parapsychological effects.

Let's note, that acquaintance with a serious parapsychological literature including those written by physicists and biologists as well as high-grade engineers convinces in the fact that our World is created much more complex than we usually consider it to be [48-55 and others].

### **Near-science situation**

A wide correspondence received by N.A. Kozyrev is the evidence of the interest to his research from many Russian and foreign specialists.

There is information that there was an interest to Kozyrev's works from very specific organizations. For example, a young foreigner visited two Kozyrev's lectures, which he read in 1980 and 1981 in Leningrad (in Geographical Society and in House of Scientists in Lesnoye). He recorded the scientist's speeches on a portable Dictaphone. This man introduced himself as John from Texas and informed that he has a probation period in our country to improve his Russian. Of course, Kozyrev was a good lecturer, but there is a doubt that his speeches devoted to a very special topic really could be interesting to lovers of Russian philology from Texas. And if we take into consideration that this man from Texas recorded also a report made by V.M. Inushin from Alma-Ata devoted to biofields (it was reported in Leningrad House of Scientists named by M. Gorky in 1981), then it becomes very evident that certain foreign organizations watched attentively the new scientific researches in our country. The evidence of the same fact is a publication of two reviews of Kozyrev's works on causal mechanics appeared even in 1960 and 1963. The Institute for the Study of the USSR (Munich city, FRG), i.e. the organization, which in one's time made a contribution in support of cold war spirit [56, 57] prepared these reviews. That's why there are grounds to consider that there were some researches in this direction abroad and may be they are still going now.

Our Russian organizations, which do not like to advertise themselves, also had an interest to Kozyrev's works. They even offered the scientist a material support of his researches. But Kozyrev had to reject this offer since receiving of this support had a condition of security classifying of the works. This condition was unacceptable to the scientist. As a result, the ways of

N.A. Kozyrev and these organizations didn't cross. But it is very evident that such researches were made (and may be still made?) in our country in a secret.

Certainly, the research of physical properties of time, which was began by N.A. Kozyrev, should be made openly. Only in this case we can hope that received results will be used for the welfare but not harmful to Nature and humankind.

In contrast to the mentioned anonymous organizations, USSR Academy of Science didn't support Kozyrev's research, and also periodically put the obstacles on his way. In particular, in November 1959, the year later the book by Kozyrev "Causal or asymmetrical mechanics" was published, three academicians L.A. Arzimovitch, P.L. Kapiza and I.E. Tamm expressed rude attacks on the scientist in "Pravda" newspaper [58]. According to distorted Kozyrev's views made in the article, we can see that its authors were badly acquainted with his works. This article is not a scientific discussion, but a "political shout" for the scientific dissidence. That time it was normal to consider article published in "Pravda" to be a guiding indication. That's why Kozyrev had no chance to publish the results of researches on causal mechanics for a long time.

It is interesting that an article by T. Margerison, which contained a detailed analysis of principles of causal mechanics, appeared in English magazine "New Scientist" just four days after the publication in "Pravda". This article was written in very respectful manner regarding N.A. Kozyrev. It contained the words in witness for the scientist from unfounded accusation made by academicians [59].

One more scandalous example how Kozyrev was persecuted for his dissidence in our country was an order to annihilate an edition of printed collection "Problems of the Universe research. Issue 9" due to Kozyrev's articles included there. Academician-secretary of General Physics and Astronomy Department of AS USSR A.M. Prokhorov signed this order in the end of 1982. An editor of this collection Dr. A.A. Efimov made self-sacrificing efforts to save this book from extermination. (A.M. Prokhorov's order was recently published in the issue 16 of the same collection [60]). We can also cite the other examples of negative attitude to Kozyrev and his research from the direction of USSR Academy of Science leaders. In any case, as the author knows it, none of the researches covered in the present article was initiated or supported by Academy of Science.

A regular result of such an attitude of Academy of Science to the development of new scientific orientations (appeared not only regarding Kozyrev's work) is a remarkable anniversary of 1994. It is a 30<sup>th</sup> anniversary of the date from which Russian physical science hadn't got Nobel Prize! It is a style of work for many academic scientific institutions to polish the background of science and always be in overtaking position, and it's a pity.



Sometimes we can hear from venerable scientists-physicists that now construction of physical science is practically finished. A general theory of field must be finally developed tomorrow or the day after. Some secondary problems, which remained unsettled, will be solved, and the Temple of theoretical physics will be presented to humankind in all its glance of perfect forms [61 and others].

However, it was already so. In the end of the last century, in 1878 or 1879 a known physicist, 70-year old Professor of Munich University Philip Jolli said to the graduating student of the university who expressed a desire to go in for theoretical physics: "Young boy, why do you want to spoil your life, you see that theoretical physics is mainly over... Is there any sense to do this hopeless business?!" This young man was Max Plank [62]. We cannot allow repeating the same mistakes permanently.

Nowadays, when observational astronomical data while accumulating are less and less good to be in accordance with the frames of existing cosmological theories [63], when the number of facts in favor of existing of the so called "fifth force" grows [64], when we fail to register gravitational waves [65] and solar neutrino are difficult to pick up in necessary quantity [34], when **the definitions of life, consciousness, free will are absent in physics** and an essential definition of time was not formulated, when even a consistent theory of electron was not created, a statement on completeness of theoretical physics looks less convincing, then in the times of Philip Jolli. Formerly theoretical physics really described practically all known experimental facts. That time it seemed that even the attempts to develop a model of human organism based on the achievements of mechanics, theory of electromagnetism and chemistry were close to success. Did one really could allow that time that may be such an insignificant fact as unconformity between theoretical and observed radiation spectrums of absolutely black body can lead to revolution in physics, to creation of an absolutely new physical theory, i.e. quantum mechanics? And the first step in development of this science made just the young graduate of Munich University, Max Plank, whom Philip Jolli dissuaded from going in for theoretical physics.

Attempts of individual scientists to convince people in completeness of theoretical physics are actually a tendency to bury physics, to make the building of science to be a monument for their former achievements. Obviously, it is a psychological effect only, a protective reaction of human mind on age-specific property to create new scientific ideas. By this way little by little a man can come to the idea that today there are no new ideas any more.

It is clear that subjective tendency to bury physics is not related with objective course of science development. Nature is infinite, and variety of phenomena, which take place in it, is unlimited. **That's why physics as a science about mechanism of natural**

**phenomena can never be completed.** As distinct from its creators, it is forever young.

### Scientific community opinion

Many scientists (physicists, mechanics, biologists, astronomers, mathematicians, philosophers, representatives of other sciences) consider it necessary to make comprehensive scientific researches in the direction founded by N.A. Kozyrev. Academicians A.D. Alexandrov, V.A. Abarzumyan, V.P. Kaznacheev, M.M. Lavrentiev, a number of members of Russian National Committee on theoretical and applied mechanics, many Doctors of Science and Doctors of Philosophy are among them. Due to the support of these specialists and leaders of Saint Petersburg State University one succeeded to publish a collection of selected Kozyrev's works in 1991. This collection included most of his works on research of physical properties of time [7].

Of course, specialists express some notes during the discussion of Kozyrev's works. These notes concern the organization of the experiments and theoretical developments made by the scientist. **However, not one in the mentioned defects can cancel his theory.** Moreover, some defects can be improved without distortion of general direction of Kozyrev's reasoning. Many of the expressed remarks were born by the incompleteness of his researches. The words by Academician Alexander Danilovich Alexandrov are the best to summarize the results of these discussions. Sometime he was active to assist in edition of Kozyrev's books "Casual or asymmetrical mechanics..." and "Selected works". His words were simple and constructive: "We should investigate!"

Of course, Kozyrev's ideas have both followers and opponents. We should underline, however, that Kozyrev's opponents didn't make verification researches, that's why their negative attitude to scientist's works is a reflection of their subjective position, but not a result of objective analysis.

Let's pay attention to two circumstances concerning Kozyrev's theory.

There are two conceptions of time known in philosophy, which are relational and substantive [66-69]. According to the first conception there are no time in Nature as a separate entity and time is a specific manifestation of properties of physical bodies. The second concept, vice versa, suppose that time is an independent natural phenomenon, as if a substance of a special kind, which exists along with matter and physical fields. Their followers found no indisputable arguments in favor of one of these conceptions during two thousand years.

*Editor's note: If we'll assume the Aether conception of time then both above mentioned conceptions are correlated. The Aether can be considered as substance of some specific properties, which depend on the element of matter. Generally, the matter itself is considered as Aether vortex or other disturbance of Aether.*

Now physics is on a position of relational conception of time, it doesn't consider any temporal substance. With such an approach to description of reality it is principally impossible to determine by the logic way only, if the substance of time exists or not, because it is impossible to determine the presence or the absence of something that was not determined. Therefore, Kozyrev's idea that time is an independent natural phenomenon cannot be rejected from positions of modern physics. It is the first circumstance to note.

**The second circumstance is that Kozyrev's theory, which assumes the presence of additional (physical) properties of time along with the property of duration, cannot appear to be mistaken; its only risk is to turn out to be abundant. Actually, if the real time has no properties except duration, then with assumption of all characteristics, which conform to additional properties, in the equations of this theory to be equal to zero, we will get a theory supposing the presence of the only property of time, i.e. duration. Let's note that the counter statement is wrong: none theory based on the assumption of presence of the only time property of duration will not be able to describe reality, if time really has the other properties.**

#### On the sense of "theory" notion

The term "theory" is used in science in two senses. In a wide sense it means the complex of views, notions, which allow making some conclusions about any phenomena and these conclusions are qualitative in a great extent. In this sense the term "theory" is allied to the term "World view" or "Weltanschauung". In more narrow sense the term "theory" is used in exact sciences, where it means a system of definitions, axioms and theorems and corollaries derived from them according to the rules of logic. They give a possibility to make a quantitative description of some range of phenomena.

Certainly, Kozyrev's ideas form a theory in the wide understanding of this term. They express a certain system of views on the Universe organization and allow making qualitative conclusions about a range of phenomena. As a vision they already influence on our notions about outward things. But for the time present Kozyrev's ideas haven't become a theory in the sense, in which it is understood in exact sciences. They do not form a system of strictly formalized notions and statements, which could allow obtaining quantitative solutions of a wide range of specific problems. That's why we should do a lot on the way of their improvement and development.

#### Possible directions of research

It will be expedient to begin theoretical research from specification of causal mechanics theses, which are not enough comprehensively covered in N.A. Kozyrev's works. In particular, it is reasonable to do the following:

- to analyze, which geometrical model of space and time should be used in the theory (if it should be three-dimensional in essence Euclidian space and scalar time as it is in Newtonian mechanics, or it should be four-dimensional pseudo-Euclidian space-time as it is in special theory of relativity, or some other model. Relating time here we speak only about its geometrical property of duration);
- to specify the notion of cause-effect link used in the theory (because not any two interacting bodies form the cause-effect link. For example, two similar electrical charges interacting by Coulomb forces evidently cannot be subdivided into the cause and the effect. Here we can rely on the results of the works [26-29];
- to work out in details the definitions of basic values in the theory, i.e. the spatial and temporal distances between the cause and the effect (Kozyrev indicated them as  $\delta x$  and  $\delta t$ ) and the course of time  $c_2 (= \delta x / \delta t)$ , namely to specify if they have statistic or determinate character and if they are scalars or pseudoscalars (pseudoscalar character of  $c_2$  postulated by Kozyrev makes us to consider  $\delta x$  or  $\delta t$  to be pseudoscalar, which does not correspond with the natural sense of the notion of distance).

The next steps in development of causal mechanics can be:

- generalization of the expression for additional forces acting in cause-effect links in the case of arbitrary pair of interacting elements (in Kozyrev's works the expression for additional forces is given only for a particular case, when one of the interacting bodies is close to the rotating ideal gyroscope);
- introduction of quantitative characteristic of time density (N.A. Kozyrev determines this property of time as qualitative one only). According to the theses of causal mechanics the entry characteristic should be of such kind that information about time density change will spread in space immediately (as if the process of spreading was described by the equation of parabolic type);
- development of physical model of substantial time;
- continuation of research how causal mechanics interact with the theory of relativity, quantum mechanics and other parts of physics.

The most important research, which is necessary to be realized, is that one should make a detailed analysis of modern astronomical observational data by means of method developed by N.A. Kozyrev in his doctoral thesis [2,3,7]. This method allows making certain conclusions on the nature of stellar energy without using a priori assumptions on the source of this energy. It is surprising that specialists in astronomy still have not made such research and have not checked the scientist's conclusion on the modern observational material though these conclusions have principle significance for

understanding of Universe creation, and the work itself technically is not very difficult.

It is necessary to continue laboratory experiments along all the spectrum of researches made by N.A. Kozyrev including the following:

- to make experiments with rotating gyroscopes on detecting of weight changes;
- to make experiments with oscillating loads using mechanical scales for measuring of additional forces acting on these loads (according to Kozyrev, additional forces registered on these devices gives a total force, which is parallel to the axis of the earth rotation. That's why the results of the given experiments are important not only for the development of causal mechanics itself, but also for application of its results in geophysics and planetary studies);
- to continue the studying of distance influence of irreversible processes on sensors developed by N.A. Kozyrev and V.V. Nasonov;
- to continue the perfection of Kozyrev's sensors and development of sensors for distance determination of physical properties characteristics of a new type.

**Experiments, which use mechanical systems, i.e. systems with rotating gyroscopes or oscillating loads, torsion balance and so on, allow to determine the value of additional forces (moment of rotation) predicting by causal mechanics. Experiments using other systems, as we can hope, will allow finding out a physical mechanism of distance influence of irreversible processes on condition of surrounding bodies.**

It is necessary to organize systematic astronomical observations of the sky according to Kozyrev's method. Obviously, these experiments are the only ones to give a final answer on the question, if the signal registered by Kozyrev's sensors is propagated in space immediately or not.

Also one should continue the work on application of results of causal mechanics to solve the problems of astrophysics, geophysics and other sciences, in particular those, which have no satisfactory solution now.

Of course, the given list of possible directions of research is not irrefragable. Also we can mention other problems, which require solution. It is also clear that a lot of new questions, which require solution, will appear in the process of solution of the listed problems.

The final result of the research should be a completion of causal mechanics development. Only after this we will be able to make an objective judgment in what extent Kozyrev's causal mechanics corresponds to reality and what place this theory fills in the system of our scientific knowledge. To obtain this result, we

should make a complex research on a high professional level and with serious state support.

### On genius

The author happened to hear the opinions about Kozyrev's genius from the followers of his ideas as well as his opponents.

From the near-science epos we know two signs, which differ genius from a talented man. One of them is expressed by the aphorism: "A talented man hit the target, which cannot be hit by anybody else. A genius hit the target, which even is not visible for anybody".

Another sign is described by the following simple model (the author heard about it on one scientific seminar from Prof. Popov L.E., Tomsk). Let's all theses, which meet the generally accepted scientific paradigm, are described by the vectors of some linear space. To be simple, let's consider that this space is two-dimensional (Fig. 1). On the Fig. 1 this space coincides with the plane of the drawing. Letters O with the indexes  $i=1,2,\dots$  indicate the vectors of professional activity of usual specialists. A talented man is able to advance in development of some direction and the corresponding vector T is significantly longer. But a genius can bring principally new ideas in science, which is beyond the existing paradigm. These ideas change our notion about outward things and give a new impulse to the development of science. It is reasonable to picture these ideas as the vector G, which is orthogonal to the pictured plane (see Fig. 2, where the same plane is shown in axonometric projection). Thus, the second sign, which differs a genius from a talented man, is that a talented man advances new ideas in the frames of common paradigm, and a genius generates new ideas beyond these frames.

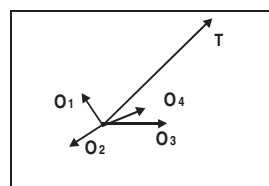


Fig.1

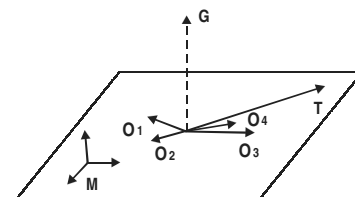


Fig. 2

This model is particularly good with reference to N.A. Kozyrev since it simultaneously illustrates the subject of his research. If we interpret the plane on the Fig. 2 as a space around us, then the vector G will indicate direction of time, which N.A. Kozyrev studied.

The given model also explains some psychological effects. It is known that talented people sometimes are hostile to geniuses. Here is a classical example: Saliery's relation to Mozart (how Pushkin interpreted it [70]). Fig. 2 visually demonstrates one of psychological reasons of this phenomenon. The vector of psychological mood

having the more value is very difficult to be derived from the plane of traditional views and turn it at  $90^\circ$  so that it will take on the direction of the vector G (not in vain they say that human mentality is the very inertial phenomenon of nature). Young people beginning their scientific way are in different situation. They can easily develop their mind in both traditional and new directions (vectors M on the Fig. 2). That's why, however it is sorrowful, but the known aphorism is true: new ideas win in science not by way of making the followers of traditional views to change their minds, but by way of generation change. An old generation, which confesses a settled paradigm, dies. A new generation, which changes an old one, immediately knows that new idea is true.

Geniuses are very rare to be born. We should take care of them and consider their opinion (even when at first glance it seems that they are not right).

Of course, there are some uncertainties in Kozyrev's works, and very often logic is substituted by intuition. However, let's remind: "Intuition of genius is more trustworthy, than deductive proof made by mediocrity". These are the words by Moris Klain, professional mathematician, the former dean of mathematical faculty of New York University and the head of one of the Mathematical Institute departments named by R. Curren. He wrote them in the best book devoted to the history of mathematics "Mathematics: the loss of determinacy" [71, page 195]. If it is true in mathematics, the most exact science, then it even more so true in physics. That's why it is really possible that finally Kozyrev will appear to be right, but not his opponents.

Kozyrev showed a new way in science and outlined a number of key moments by his genius. But a continuous chain of reasoning does not connect these moments. We can say that there are logical gaps between them (that's why we marked the vector G of the Fig. 2 by dotted line). A task for scientist's followers is to eliminate these gaps. Even the first steps in this direction gave positive results.

### Curriculum vitae

Nickolay Alexandrovich Kozyrev was born on September 2 (August 20 according to an old calendar style) 1908 in Saint Petersburg. He graduated physical and mathematical faculty of Leningrad University, then he passed post-graduate course under the direction of Academician A.A. Belopolskiy. From 1931 he had been working as a member of Central astronomical observatory in Pulkovo (this observatory entered the Academy of Science in 1934). Kozyrev wrote the first article in the age of 15-16. A total quantity of his published works is about a hundred (sixteen of them were written together with V.A. Ambarzumian in 1925-1933, two of them were written together with D.I. Eropkin in 1935 and 1936 and two were written together with V.V. Nasonov in 1978 and 1980, the other works he wrote without co-authors). A list of scientist's

publications is given in the collection of selected works [7, page 432-437]. From November 7, 1936 till December 14, 1946 N.A. Kozyrev was subjected to repression (he was rehabilitated in February 1958) [72]. There are four Kozyrev's sons.

N.A. Kozyrev is one of the pioneers of Russian theoretical astrophysics and skillful astronomer – observer. In 1934 he developed a theory of distant photospheres of stars, which was generalized by S. Chandrasekar and got the name of Kozyrev-Chandrasekar theory. N.A. Kozyrev had developed a theory of sun-spots. In 1953 he discovered molecular nitrogen in Venus atmosphere and in 1963 he discovered hydrogen in Mercury atmosphere. He came to a conclusion on high temperature (up to  $200000^\circ$ ) in the center of Jupiter. There are known Kozyrev's achievements in studying of other planets, which belong to solar system. The most significant result in the field of observational astronomy was the receiving of spectrograms of moon crater Alphons on November 3, 1958, which were the evidence of gas outflow from the central hill of the crater and of volcanic phenomena on the Moon. In 1969 N.A. Kozyrev was rewarded with the golden medal by International Academy of Astronautics for his discovery of moon volcanism [73, 74]. In our country this achievement of the scientist was registered as a discovery (#76 of 30.12.69, priority of 3.11.58) [75-77]. A small planet was named after Kozyrev [78-80] and an application for naming of the moon crater after him was submitted.

Kozyrev himself considered determination of stellar energy nature to be the main goal of his scientific activity. On March 10, 1947 he defended his doctoral thesis on the topic "The theory of inner structure of stars as the basis for the research of stellar energy nature". In this work he made a conclusion on the absence of energy sources including thermonuclear sources inside the stationary stars [2, 3, 7, 82]. He put forward a hypothesis that the current time serves as a source of stellar energy. At first the scientist published this hypothesis in the book "Causal or asymmetrical mechanics in linear approach" [4, 7], which appeared in summer 1958 (in the year of his fiftieth anniversary). By that time during twenty years he had been theoretically developing a hypothesis and had been carrying experimental researches for more than seven years. Even his discovery of moon volcanism was not a result of occasional luck, but a result of the purposeful search of signs of inner activity of cosmic bodies (according to his hypothesis, any sufficiently massive bodies should have such activity). While developing his hypothesis, the scientist laid the foundation of principally new science, a **theory of physical properties of time** or, as it was called by its creator, **the causal mechanics**. Kozyrev devoted more than four decades to development of this science. He made a huge theoretical and experimental work. Nevertheless, the scientist had no time to finish the development of the theory.

N.A. Kozyrev died on February 27, 1983. He is buried on graveyard near Pulkovo observatory.

Facts from biography of the scientist are given in reference books and articles [83-86].

### Conclusion

A review of the works, which continue the researches began by Kozyrev, are given in the present article. Certainly, some of the works remained unknown to the author, that's why they are not reflected in this article. The author sincerely regrets about it and will be thankful to anybody who will inform him about these works.

The possible directions of further researches also indicated here as well as some observations in favor of Kozyrev's theory.

Can Kozyrev's ideas appear to be wrong?

Yes, it is possible in principle. Insurmountable obstacles can be met on the way of their further development. Even a complete theory may appear to be not in correspondence with reality (as, for example, appeared to be Ptolemy's system of the World and theory of thermo-substance, which were rejected by the science. It happened in spite of that both of them made a quantitatively correct description of certain natural phenomena). However, the analysis of initial principles of causal mechanics didn't uncover any inner contradictions in it, and even the first attempts of further development of this theory showed that it corresponds to quantum mechanics and theory of relativity. The given facts together with all results obtained by N.A. Kozyrev and his followers allows to state that scientist's ideas are obviously true. But the final answer on the question can be obtained only after the completion of causal mechanics development. That does why in conclusion let's repeat the words by Academician A.D. Alexandrov: "We should investigate!"

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### Some words in addition

S.M. Korotaev, a member of Troizky branch of the Institute of Physics of the Earth named by O.Yu. Shmidt RAS (we mentioned his works above) in 1993 defended doctor thesis on the topic “Causal analysis and its application to processing and interpretation of marine electromagnetic research data”. An incentive to set this research was Kozyrev's works. The following words are the evidence of it. These words were cited in the abstract of the thesis: “The author gives due to blessed memory of N.A. Kozyrev. Acquaintance with his works, direct watching of experiments and discussion of problems of asymmetrical mechanics with him exerted a great influence on scientific ideology of the author and induced to own investigation of cause-effect relations in geophysical processes.” [87, p.5].

A scientific conference “Human ecology, energy information science and Kozyrev's works” took place in Moscow State Technical University named by N.E. Bauman on April 4-6, 1994. In particular, the following results were reported:

Scientists from Novosibirsk (M.M. Lavrentiev, I.A. Eganova and others) reported on continuation of laboratory research of distance effect of irreversible processes on the state of living and abiotic systems as well as continuation of astronomical observations according to Kozyrev's method. The obtained results are in correspondence with the results mentioned above in the present review.

V.S. Barashenkov, M.V. Lyablin (Dubna), Ya.G. Galperin (Moscow) presented the results of investigation of distance effect of sugar solution process (in water) on the density of distilled water. Density of water was

determined by interference method; accuracy of measurements exceeded the accuracy obtained in analogous experiments made by researchers from Novosibirsk. A conclusion was made that the effect of water density change is of thermal nature (the temperature of solution during dissolution of sugar falls at 1,5-3°; compensation of this temperature change by corresponding heating of solution excludes the effect).

A.E. Akimov reported on researches, which have been carrying out during 8 years according to a special state program (signed by N.I. Ryzhkov). About 120 organizations took part in realization of this program; scientific head of this program was the speaker. Generators and recorders of **torsion field**, a field, which is different from all known now physical fields, were created in the frames of the given program. (The speaker didn't inform about the structure of generators and recorders, but he promised that it would be done within the nearest time, after they would be patented).

Numerous examples of torsion field effect on various physical systems were presented. So, the fifteen-minute irradiation of metal melt by this field leads to the fact that the structure of metal becomes not crystalline after its solidification, but it is close to amorphous one. Theoretical description of torsion field [88-90] is based on the identification of it with torsion of affine adhesion space (in analogy that gravitation is identified with the curvature of Riemannian space in general theory of relativity). The calculations predict that torsion field doesn't diminish at a distance; it practically cannot be screened and propagates with a speed, which much exceeds the speed of light. **The speaker underlined that all properties of this field are in correspondence with Kozyrev's theory** and advanced an opinion that effects discovered by Kozyrev are stipulated by the action of torsion field in particular.

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### The following publications were also devoted to N.A. Kozyrev and development of his ideas

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