

# Experimental Study of Properties of Time

Review of Nikolay A. Kozyrev's articles  
by Alexander V. Frolov

*Editorial: Since Time is the most important and mysterious property of Nature, it is always a very important research topic. Below there is a review of Kozyrev's articles, which are devoted to this problem.*

**Time** brings us to the most profound and completely unknown properties of the World that hardly ever can foresee a bravest flight of human idea. Kozyrev asserts that the causality is the most important property of the real World. The **concept of causality** is the basis of natural science, while the exact sciences deny existence of any other properties of time besides of "duration" or time intervals, which can be measured by clock [1].

There is an idea to introduce the principles of natural sciences into the exact sciences. In other words, the tendency is to attempt introducing the principle of causality into the theoretical mechanics and determine the direction of time. Kozyrev named such sort of mechanics as "**causal**" or "**asymmetrical**" mechanics. It is quite natural that in statistical mechanics, based on the conventional mechanics of the point, the direction of time does not appear as a property of time itself but it is just a property of the state of the system. In the case of objective direction of time and other objective possible properties of time, they should be included in the system of elementary mechanics of unity processes. The statistical generalization of such mechanics can lead to a conclusion on the impossibility of the equilibrium conditions. Really, the direction of time means a continuous existent course of time, which is acting on the material system and **prevents its transition in the equilibrium state**. By this consideration, the events should occur not only in time but by means of time as well. Time becomes an active participant of the Universe that eliminates the possibility of its "thermal death". Then, we can understand harmony of life and death that we perceive as the essence of our World. Basing on these possibilities only, one should carefully examine the question on introduction of the time direction concept or time course concept into mechanics of elementary processes.

Kozyrev represents the mechanics in the simplest form of the classical mechanics of point or the mechanics of a material points system. In tireless quests for causes, the naturalist is guided rather by his own intuition than by certain procedures. It was stated by Kozyrev that the causality is related with the properties of time by the closest way, in particular with the difference in principles between the future and the past. Therefore, Kozyrev formulated the following postulates:

I) Time has special property, which create a difference between causes and effects that can be named as the

direction of the time course. This property determines the difference between the past and the future.

Kozyrev asserts that the necessity in this postulate is indicated by the difficulties associated with the development of the Leibnitz's idea on definition of the direction of time by means of the causal relationships. The studies by H Reichenbach [2] and G. Whitrow [3] indicated that one could never develop this idea strictly, i.e. without tautology. Just causality provides us with a concept of the existence of direction of time and it concerns the certain properties of this direction, but at the same time, it is not the essence of this phenomenon, but it is its result only.

Utilizing the simplest properties of causality the scientist provides a quantitative expression of the Postulate 1. Basing on the following states, i.e. 1) cause is always outside of the body where is the realization of the effect and 2) the effect is coming after the cause, we can formulate the next two axioms:

II) Causes and effects are always separated by space. So, there is an arbitrarily small, but non-zero spatial difference  $\delta x$  between them.

III) Causes and effects are different in time. Therefore, between their appearances there exists an arbitrarily small, but non-zero time difference  $\delta t$  of some certain sign.

Axiom II is the basis of classical Newtonian mechanics. It is contained in the third law, according to which a change in a momentum cannot occur under any action of inner forces. In other words, an external force cannot appear in the body without the participation of another body. Hence, based on the impenetrability of matter,  $\delta x \neq 0$ . Due to the complete reversibility of time, the axiom III is absent in the Newtonian mechanics:  $\delta t = 0$ .

In atomic mechanics, just the opposite one takes place. The principle of impenetrability of matter loses its value in atomic mechanics, and due to the possibility of the superposition of fields, it is assumed obviously that  $\delta x = 0$ . However, in atomic mechanics there is the irreversibility of time that does not exist in the Newtonian mechanics. The influence upon the system of a macroscopic body (the equipment) introduces a difference between the future and the past, because the future is proved to be predictable, while the past is considered not to be predictable. So, there is  $\delta t \neq 0$  in the temporal environs of the experiment, although it can be an arbitrarily small. By this way, the classical mechanics and the atomic mechanics are included into our axiomatics as two marginal systems. This fact becomes especially clear if the ratio is introduced by Kozyrev:

$$\frac{\delta x}{\delta t} = c_2 \quad (1)$$

In the real World is most likely a finite value. However, in classical mechanics  $\delta x \neq 0$  and  $\delta t = 0$  and hence

$c_2 = \infty$ . In atomic mechanics,  $\delta x = 0$  and  $\delta t \neq 0$  and so  $c_2 = 0$ .

In the case of the critical approach the condition of non-superimposition is determined as the symbols  $\delta x$  and  $\delta t$ . So, these symbols mean the limit of the infinitesimals under the condition if they never equal to zero. These symbols determine the point distances or dimensions of an "empty" point, situated between the material points of the causes and effects. In the calculation of entire cause-effect chain intervals, they should be considered to be equal to zero with any degree of accuracy. If they are infinitesimal of one order, their ratio  $c_2$  can be a finite value and it can qualitatively express a physical property of the cause-effect connection. This physical property is the course of time, formulated qualitatively by the postulate I.

Really, the **value  $c_2$  has the dimensionality of velocity and means a value of speed of the transition from the cause to the effect.** This transition is accomplished through the "empty" point, where there are no material bodies but space and time only. **Hence, the value  $c_2$  can be associated only with the properties of time and space, not with the properties of bodies.** Therefore,  $c_2$  should be a universal constant, which describes the course of time in our World. The transformation of the cause into the effect requires the overcoming of the "empty" point in space. This point is the abyss and the transition through it can be realized by means of the course of time only. It results from this that it follows directly the active participation of time in material systems process by Kozyrev.

The basic theorem of causal mechanics follows from the pseudo-scalar property of the time course, i.e. a World of an opposite time course is equivalent to our World, which is reflected in a mirror.

Let us clarify this Kozyrev's idea. In a reflected, mirror World the causality is completely remains as the same. Therefore, in a World of opposite time course the events should be developing just as regularly as in our World. This is not to say that if we run a movie film of our World in a reverse direction, we would obtain a pattern of the World of an opposite time direction. It is impossible to change the sign of the time intervals formally. This leads to violation of causality, i.e. to an absurdity, to a World, which cannot exist. If the direction of time is changed, there should also be changed the influences, which the time course produce in the material systems.

We can say that changes of time course velocity physically is the change of the matter existence conditions, i.e. its physical properties. The mirror World also should be different from our World in its physical properties. However, classical mechanics state the identity of these Worlds. Up until recent times this identity has also been assumed in atomic mechanics. It was named as **the law of the parity conservation**. However, Kozyrev wrote that the studies by Lie and Young on nuclear processes for the weak interactions led to the experiments, which demonstrated the

erroneous of the law. This result is quite natural for actual existence of the time direction that is confirmed by the direct experiments described below. At the same time, it is impossible to make an opposite conclusion. Numerous researches on the observed phenomena of nonconservation of the parity have demonstrated the possibility of other interpretations. Moreover, we can remember the experiments of Professor Hayasaka's, Japan.

The difference between the World and mirror reflection World is graphically demonstrated by a certain way in the biology. Kozyrev noted the morphology of animals and plants provides many examples of asymmetry, distinguishing right from left, independently of what hemisphere of the Earth the organism is living in. Asymmetry of organisms is demonstrated not only in their morphology. The chemical asymmetry of protoplasm discovered by Louis Pasteur demonstrates that the asymmetry is the basic property of life. The tenacious heritable asymmetry of organisms cannot be an occasional fact. This asymmetry can not be only a passive result of the laws of nature, which reflect the time direction. Most likely, certain inner structural asymmetry, which is corresponding to the given time course in our Universe, provides the biological organism with additional viability, i.e. the organism can use the real phenomenon of time course for the reinforcement of the vital processes. In addition to this Kozyrev's idea it can be said that any element of matter, for example an elementary particle, exists in space time as some process, i.e. it is senseless to consider that any element of matter can exist without its oscillation parameters. Moreover we can add that in biology the most remarkable example is DNA molecule structure, which is double helical spiral. The matter element as a resonance process was described in details [4].

Then Kozyrev derives from the fundamental theorem that in a World of the opposite time course, the heart of the vertebrates would be located on the right side, the shells of mollusks would be mainly turned leftward, and in protoplasm there would be observed an opposite qualitative inequality between the right and left molecules. Perhaps, if the life really use the time course as an additional source of energy then it can be directly proved by specially organized biological experiments.

According to the researcher, for causal connection of the spinning top (gyroscope) it can be expected the appearance of additional forces, which will act along axis of rotation of the top. It was experimentally proved by Kozyrev that the forces are really generated by axial action and depend on a direction of the rotation. It was found out that the course of time in our World is positive in a levorotary coordinate system, so by this way it is possible to determinate left and right by the objective method, i.e. the left-hand system of coordinates is system of positive time course, while the right-hand system is system of negative time course. By this way, the course of time in our Universe is the material connection between all bodies in the Universe, even during their isolation. Physically this means that one

four-dimensional state of the Universe includes all existent three-dimensional objects. It allows develop instantaneous telecommunication technologies, teleportation, antigravitation and other technologies.

Kozyrev explains the appearance of the additional forces by the following way. The time inflows into the system through the cause to the effect. The rotation changes the possibility of this inflow, and, as a result, the time course can produce additional mechanical stresses in the system. The additional stresses change potential and full energy of the system. These changes are produced by the time course. So, it follows from this that the time has energy. Since the additional forces are equal and oppositely directed then the momentum of the system is unchanged. So, the time has no momentum, although it has the energy.

According to Kozyrev's calculations the additional forces are disappearing, as it should be occurring in this mechanics. Naturally, the infinite course of time cannot be violated by any way. Therefore, time seems to be a fate of unconquerable power. The real time has a finite value of the course and, in principle it can be reversed. It should be demonstrated sometime by experiments studying the properties of time how it is possible to realize these phenomena in reality.

The properties of time must be discovered gradually by the physical experiments, and Kozyrev proves that it is possible to experimentally study the properties.

The experiments were made in the laboratory of Pulkovo Observatory, St.-Petersburg, Russia. During the time of these researches, it was accumulated numerous and manifold information, which allow make a number of conclusions concerning the properties of time.

The theoretical considerations indicate that the experiments on causal connections and the course of time may be organized with the rotating bodies, i.e. the gyroscopes. The first experiments were made in order to verify that the law of the momentum conservation is always true, and it is independent of conditions of rotation of the bodies. These experiments were made on the beam balance. At a deceleration of the gyroscope, which is rotating by inertia, its moment of rotation should be transferred to the balance, causing an inevitable torsion of the suspensions. In order to exclude the difficulties, the rotation of the gyroscope should be held with constant velocity. So, Kozyrev used aviation automation gyroscopes with rotation velocity, which was controlled by a variable 3-phase current of frequency about 500 Hz. The gyroscope's rotor had the same frequency. It appeared possible to supply current to the suspended gyroscope by means of three very thin naked wires without significant decrease of the suspension precision. During the suspension of the gyroscope was placed in a hermetically sealed box that completely excluded the air flows effect. The accuracy of this suspension was of the order of 0.1 - 0.2 mg. The readings of the balance with a vertical arrangement of the axis and various rotation velocities remained

unchanged. For example, proceeding from the data of one of the gyroscopes (average diameter  $D$  of rotor is equal to 4.2 cm, rotor weight  $Q$  is equal to 250 g), Kozyrev concluded that with a linear rotational velocity  $u = 70$  m/sec, the force, which is acting upon the balance will remain unchanged with a precision higher than sixth accuracy character. In these experiments, it was introduced the following interesting theoretical complication. The box with the gyroscope was suspended from an iron plate, which attracted the electromagnets connected together with a great mass body. This entire system was suspended on the balance by means of an elastic rubber. The electric current was supplied to the electromagnets by two very thin wires. The system of the current breaking was established separately from the balance. When the electric circuit was disconnected, the box with the gyroscope fell down up to a limit stop connected with the electromagnets. The amplitude of these subsequent motion of drops and risings could reach 2 mm. The experiments on weighting was organized for various directions of suspension and rotation velocities of the gyroscope, at different amplitudes, and at an oscillation frequency ranging from units to hundreds Hz. According to Kozyrev's publications, for the rotating gyroscope the readings of the balance remained unchanged as well as for an immovable one.

**In the process of the experimenting it was noted that transmission of the vibrations from the gyroscope to the support of the balance there are variations in the readings of the balance, and it depends on the velocity and direction of the gyroscopes rotation.** Strictly to say, when there are the vibrations of the balance, the box with the gyroscope is not a closed system. However, the balance can break the equilibrium state if the additional effect of the gyroscope (resulting from the rotation) is transferred from the frame of the gyroscope to the balance support. From these observations, a series of experiments with these gyroscopes was developed by Kozyrev.

In the first variant, the vibrations were produced due to the energy of the rotor and its vibrations in the bearings, depending on its clearance. Surely, the vibrations prevent the accurate weighing process. Therefore, it was necessary to decline the precision analytical type balance and to work with engineering balance, which has ribs of the prisms in contact with platforms having the shape of wings. Nevertheless, in this version the accuracy of the order of 1 mg in the differential measurements was obtained. A gyroscope suspended on a rigid support can transmit its vibrations to the balance support through the beam. **Some vibration type produces a considerable decrease in action of the gyroscope to the balance, when it was rotating in a counter-clockwise direction (looking from above).** For clock-wise rotation under the same conditions the readings of the balance remained practically unchanged. Kozyrev's measurements with gyroscopes of different weight and rotor radius, at different angular velocities, demonstrated that a reduction in the weight really is proportional to the

weight and to the linear velocity of rotation. For example, at a rotation of the gyroscope ( $D = 4.6$  cm,  $Q = 90$  g,  $u = 25$  m/sec), it was obtained the weight decrease  $\Delta Q = -8$  mg. With rotation in a clockwise direction, it always turned out that  $\Delta Q = 0$ . However, with a horizontal arrangement of the axis, in any azimuth, it was found the average value  $\Delta Q = -4$  mg. Kozyrev concluded from this that any rotating and vibrating body under the conditions of these experiments should demonstrate a reduction in weight.

The experiments with vibrations of a gyroscope on the balance also yield a new basic result. It appeared that the additional force of action and reaction are situated in different points of the system, i.e. on the support of the balance and on the gyroscope. So, there is the pair of forces rotating the balance arm. Hence, after these experimental results Kozyrev came to the following conclusion: time has not only the energy but also it has a rotation momentum, which it can transfer to the system. The development of modern antigravitation technologies is related with the conclusion. For example, Faraday Lab Ltd has filled the Russian Federation Patent Claim # 2002128658 of October 25, 2002, which describes method and device for generation of propulsion force by means of transformation of rotational motion into translational motion. It declared that it is possible to generate thrust without any reactive mass flow. Experiments demonstrated that it is impossible to obtain unidirectional linear motion only. However, both translational motion and rotational motion appear in the system that is related with Kozyrev's notion of possibility to use rotational momentum of time course. Technically it is not a problem to compensate the rotation by application of two systems which counter-directly rotate and generate co-directed linear thrust.

Basing on the analysis of known astrophysical information Kozyrev demonstrated that the energy expense decreases as well as the density increases, and formation of energy increases as well as the density of stars does. He concluded that the assumption about the existence of energy sources inside of stars does not correspond to the reality. So there are no special sources inside the stars and the stars emit energy according to Helmgoltz – Kelvin mechanism, i.e. they are gradually cooling and compressing. Nevertheless, if the age of the stars is significantly more than the duration of the cooling, we should admit that there is a process, which compensates this waste of energy. **There is Kosyrev's conclusion that the star is the machine, which produces energy by means of transformation of some type of energy into heat.**

From the point of view of the theory of star structure the received conclusions are very strange and unexpected. However, they prove **our main thesis that in the World there are constantly acting causes, which prevent the transfer to the equilibrium state.**

Kozyrev demonstrated that the stars energy is produced in result of some electrodynamic processes. However the principle that the closed system can produce energy

should be so deep to contain simple laws of mechanics. That is why Kozyrev formulated the following issues: **how the closed mechanical system can produce energy and what is the source of this excess energy, i.e. at the first time it was made an attempt to ground an energy source of mechanical and other perpetuum mobiles.**

The asymmetry of the mechanic laws introduced by Kozyrev means the only thing that the time has some asymmetric feature, which is connected with the inequality of real World and its mirror image. This property of time was called as the direction or time course. **Since this direction the time can make the work and produce the energy.** Thus, the star is only apparent **perpetuum mobile, it is an energy transformer**: the star derives its energy from the time course. According to analogous physical phenomena, for example plasma oscillations, we know about the transformation of longitudinal waves into transverse waves, i.e. into heat electromagnetic radiation [5], [6]. Thus, according to Alexander V. Frolov, the consideration of physical properties of time becomes investigation of longitudinal wave processes in aether.

Possibility to use the course of time, i.e. the unequally of the past and the future to produce the work is an interesting, but it is not the most principal effect of the causal mechanics by Kozyrev. As we could see it from the experiments on vibrations of gyros, very small vibrational actions in the system of rotating bodies can establish the additional cause-effect connection, which can produce the noticeable mechanical effects. This possibility to interfere into existing cause-effect connections means that it is possible **to control the course of time to amplify the processes, which act against the entropy increase, i.e. to amplify the vital processes in biosystems or to increase entropy in any material system.** The phenomena described by Kozyrev [7], when he studied the wave of time density, which is generated by any irreversible process, for example, melting of crystallization, fading or growing of plants, dissociation etc. If we consider this wave as oscillations of energy density in space then the longitudinal-wave nature of time phenomenon is obvious, and we can start making experiments on the real control of time.

## References

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