Chapter 9

NIKOLAI KOZYREV: HIS THEORY OF TIME AND THE TRUE POSITION OF STARS

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ABSTRACT

The life and work of Nikolai Kozyrev is a mystery to most people. A description of Kozyrev's theory of time, including a discussion of the different interpretations of his theory of "Causal Mechanics" is intriguing as being outside of the Standard Model. For instance, Znykin holds that Kozyrev's theory is best explained by reference to the phenomena of noise and the zero-point fluctuations of the physical vacuum. Zhvirblis and Korotaev's group interpret it under the hidden variable theories or theories of non-locality effects. The experimental work of Kozyrev and the confirmations of it after Kozyrev's death make his discoveries worth examining. The astrophysical experiments compare to our own experimental work, which mainly was an attempt to reproduce the measurements of true star position as Kozyrev had done [122]. An 8 inch Schmidt-Cassegrain reflector was used to measure the true position of nearby stars, maximum distance was 150 light years. A Wheatstone bridge made of four matched 100 kOhm resistors was used as a

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detector. Three resistors were embedded in aluminium to protect them from the purported Kozyrev time impact and a resistor was placed in the focus of the telescope and therefore exposed to this influence. The surrounding minutes of arc of the visible position of nearby stars was scanned. Some promising signals were detected. No conclusive reproducible result was achieved. The calibration with possible Kozyrev time impact wave from evaporation of acetone also showed no clear results with our detector. Also a description of our reproduction of Kozyrev's torsion balance is given.

Keywords: Kozyrev, time, star position, torsion, zero-point energy, aberration, Wheatstone bridge

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INTRODUCTION

The Russian astrophysicist Nikolai A. Kozyrev occupies a unique place in the history of science. First of all, his works and writings about him are only rarely translated into Western languages and even in the original Russian, there are also not many of them. His main work, the theory of "Causal Mechanics", suffers from the terminology he uses for the main parameters of his theory, particularly "time". Therefore, it is no surprise that mainly non-orthodox authors take up his theories, like, for instance, Ostrander & Schroeder [24] and Wilcock [47].

In addition, the lack of discrimination into different periods of his work does also not help with the understanding of his work. We suggest that his work is grouped into the early, middle, and late phases, the first phase comprising his work on cause and effect, the middle phase his work on the "Causal Mechanics", and the last phase his experiments with entropy and stars. For these reasons, he belongs to the neglected scientists that have not been adequately appreciated by the history of science.

The initial reason why we took up this work was Kozyrev's belief that the sun derived its energy by another process than by the Bethe-Weizsäcker cycle. All Planets, Suns and celestial objects function differently according to Kozyrev. Confirmation was his famous prediction and discovery of lunar volcanism.

Nomenclature

μ	star velocity	V_τ	tangential speed component
π	parallax	c	light speed
$\Delta\alpha$	angle between true and apparent position of star		
c_2	velocity of cause and effect		
$\Delta\alpha_\Theta$	angle between true position of star and sun		
c_3	information velocity	A	aberration
A_Θ	aberration from position of sun	β	liquid thermal expansion coef.
ly	light-year (~10 trillion km)	α	fine structure constant
e	elementary charge	γ	gravitational constant

NIKOLAI A. KOZYREV

The Russian astrophysicist Nikolai A. Kozyrev (1908-1983) was the discoverer of moon volcanism and the originator of the theory of *"Causal Mechanics"* which included a new theory of the nature of time.

Kozyrev distinguished himself already in his youth by scientific achievements. At the age of 17 he published his first scientific work, which astonished the Russian scientists by its depth and the clarity of its logical conclusions. His field of inquiry were the atmospheres of the sun and the stars, sun eclipses, and the radiation equilibrium. At the age of 20 years he had already a final degree of the University of Leningrad in physics and mathematics, and with 28 he was widely known as a competent astronomer and was member of a group of young and very talented astrophysicists at the Pulkovo observatory in Leningrad, among them Victor A. Ambartsumian (1908-1996), one of the founders of theoretical astrophysics, and Dmitri I. Eropkin, and had already taught at several universities throughout the Soviet Union [1].

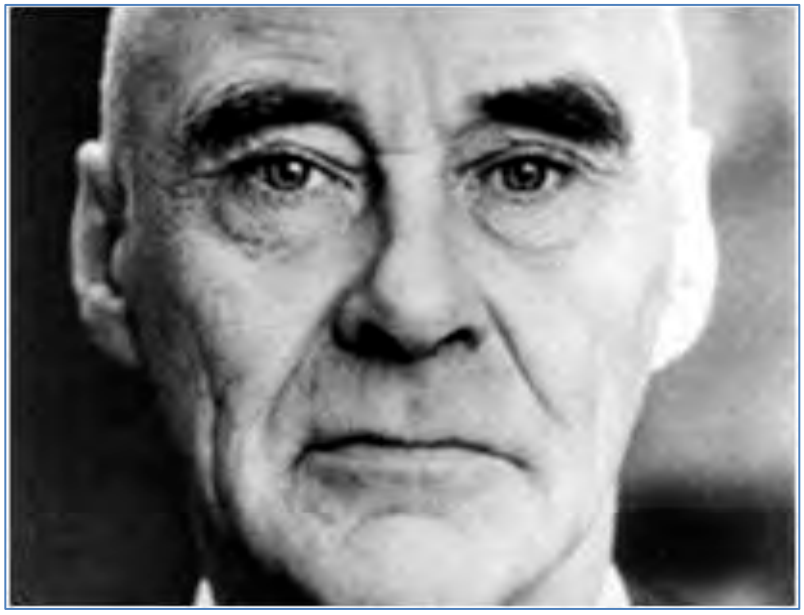

Figure 1. Nikolai A. Kozyrev (1908-1983)

In the year of 1936, when Kozyrev was 28 years old, Kozyrev's life took an unfortunate turn. He was arrested by Stalin's henchmen and spent the nine years from 1937 until 1946 in one of Stalin's infamous prison camps. This time he used for fundamentally questioning the basic questions of nature and its laws.

After his release from the prison camp and his rehabilitation at the end of the year of 1946, he was able to continue his scientific career at the Pulkovo observatory. In this time he made a name for himself in his original field of work, but he also began to elaborate on the insights of his prison time and to test them experimentally, which led him into a totally novel field of inquiry.

Concerning the former field, he made a series of predictions about the moon, Venus, and Mars which were confirmed more than a decade later by Soviet space probes. This made him one of the pioneers of the Soviet venture into space. 1958 his hypothesis that there was volcanic activity on the moon in the Alphonsus crater created a worldwide controversy among astrophysicists [2]. The American Nobel laureate Harold Urey was among a little group of Western colleagues who believed that Kozyrev's hypothesis was correct, and convinced NASA to carry out an investigation. The *"Moon Blink Project"* of the NASA, originating from this initiative, continued later Kozyrev's conjecture by finding significant gas emission on the moon.

Not all the works of Kozyrev from this time met with such a ready acceptance by his physicist colleagues. In the winter of 1951-52 Kozyrev started the work on a new physical theory based on the insights from his prison time. Today being called *"Causal Mechanics"* [3, 4, 5, 6, 7], it was based on a series of experiments which kept Kozyrev and his collaborators busy for 33 years.

KOZYREV'S THEORY OF TIME

In his area of expertise, Kozyrev was confronted with the question why the stars and the sun shine, i.e., can emit optical radiation. Obviously they are in a thermodynamic non-equilibrium with their surroundings; they must dispose of an energy source in their interior.

In the 1960's and '70's astrophysics followed to a large extent the view of Hans Bethe (1906-2005) according to which the energy of the stars originates from thermonuclear processes in the interior of stars [8]. Bethe got the Nobel prize in Physics in 1967 for his theory of the energy production in the sun and other stars published in 1937 (today known as "Bethe-Weizsäcker cycle"). But already in the 1950's arose the first doubts about this dogma, when astrophysicists began to ask the question if in stars the necessary conditions for the corresponding thermonuclear processes exist at all.

The thermonuclear stellar energy paradigm got its first appreciable blow from the first Brookhaven experiments performed by Raymond Davis, Jr. (1914-2006) and aimed at discovering solar neutrinos, indicators of the thermonuclear nature of solar energy [6]. In his research at Brookhaven National Laboratory that spanned from 1967-1985, Davis consistently found only one third of the neutrinos that Bethe's theory predicts. His results threw the field of astrophysics into an uproar, and, for nearly three decades, physicists tried to resolve the so-called "solar neutrino puzzle". Experiments in the 1990's using different detectors around the world eventually confirmed the solar neutrino discrepancy.

The researchers had to admit that *"we understand worse than we used to believe even the structure of main-source stars* [9] and *"that other energy sources can also exist in stars"* [10]. There appeared other suggestions concerning stellar energy sources, see e.g., papers cited in the article by E. S. Meksi [11].

Other significant discrepancies in stellar structure and evolution theory based on thermonuclear reactions became known. They are connected with many modern data of geology and paleoclimatology and also with the discovered 160-minute oscillations of the sun [12].

However, the most recent results obtained by the group of Raymond Davis, jr., although indicating the solar neutrino flux 3 or 4 times smaller than that predicted by theory, did not encourage the physicists to perform the necessary revision of the idea of the thermonuclear origin of solar energy [13, 14, 15].

Now Kozyrev postulated that this energy source in the interior of stars was the "flow of time" by whose absorption the stars maintained their state of non-equilibrium and who was responsible for saving them from "entropy death" [16].

For Kozyrev time is a form of energy, but simultaneously a kind of substance which connects all objects and processes in the universe.

Sheila Ostrander and Lynn Schroeder who devote a whole chapter of their famous book "Psychic Discoveries behind the Iron Curtain"[1] to Kozyrev, quote the Russian scientist whom they interviewed in Pulkovo in the summer of 1968, as follows:

"Time is the most important and most enigmatic property of nature. Time is not propagated like light waves; it appears immediately everywhere. The altered properties of a certain second of time will appear instantly everywhere at once, just as time is everywhere. Time links us all and all things in the universe" [17].

Time is a *"mighty flow which comprises all the material processes in the universe and which is fed by every process in these systems"* [18]. The flow of time is for Kozyrev also responsible for the causality in physics, because every physical effect originates through the activity of this flow from its cause.

Kozyrev assumed that time possesses a series of properties that can be investigated experimentally.

"Time is a phenomenon of nature which possesses a number of properties that can be investigated through experiments in laboratories and astronomical observations" [19]. Time possesses besides its conventional (passive) property of duration still other, "active" properties, like, e.g. density, velocity, or the manner of interaction with different materials. Kozyrev called the science of these active properties of time "Causal Mechanics" [18, 19, 20, 21, 22, 23, 24]. In his Causal Mechanics he postulated three physical properties of time [25]:

[1] **Ed. Note**: Ostrander, Sheila, et al., *Psychic Discoveries Behind the Iron Curtain*, 1971, electronic download (print-disabled) or to "borrow" available from https://openlibrary.org/books/OL21237372M/Psychic_discoveries_behind_the_Iron_Curtain

Postulate 1: Time possesses a specific property which discriminates causes from effects; it can be called "directionality" or "sequence". This property determines the difference between past and future.

Postulate 2: Causes and effects always are separated in space. Therefore there exists an arbitrarily small spatial difference between them, but not equaling zero.

Postulate 3: Causes and effects are also separated in time. There exists always an arbitrarily small time difference between them, but it never equals zero.

According to Kozyrev, time is a form of energy which is always in motion and is present at different locations and at different points in time in varying concentrations ("time density"). The density of time is supposed to be higher near the receiver of an action and thinner near the sender [17]. The density of time is supposed to be also geographically different: in the far north the time density is supposed to be higher than in the south. It is also supposed to be dependent on the geographical latitude. Gravity is supposed to have an effect on time density, as well as the density and the composition of matter.

Time, thus can be conjectured from the statements of Nikolai Kozyrev, has a negentropic effect – because it feeds the stars energetically which otherwise strive towards entropy – although to our knowledge Kozyrev nowhere states it explicitly like this.

The Russian physicist Pavel Aleksandrovich Znykin, today employed at the Belgorod Technical University in Central Russia, near the Ukrainian border, has written a contribution to the volume *"Time and Stars: for the 100th Birthday of N. A. Kozyrev"* [26] in which he looks back on his meeting with N. A. Kozyrev in February 1972 when he was a student of physics at the Kuban State University in Krasnodar in the Northern Caucasus region. On the occasion of a visit of Kozyrev he repeated Kozyrev's experiments with torsion balances. After the experiments which he had ample occasion to discuss with Kozyrev himself, he concluded that the answer for the questions which arose from the work with the torsion balance, might be best found in the investigation of the phenomena of noise, i.e. in phenomena in which the statistical nature of entropy was best observable.

What was it that was observable in the measuring instruments of Kozyrev? [26]. Was it the entropy flow – did the Kozyrev indicator react in some way to the change of entropy? The German physicist Walter H. Schottky (1886-1976), a pupil of Max Planck, after visiting the lectures of Einstein on statistical mechanics, became interested in 1918 in fluctuations and understood that even after the complete elimination of all possible sources of noise there must remain in an amplifier a certain noise level. The cause for this is the statistical character of the

emission of electrons by the vacuum tube cathode. This phenomenon Schottky called “shot noise” [27].

V. E. Zhvirblis, S. E. Shnol’, A. G. Parkhomov, A. I. Veinik as well as many other researchers found a correlation between the noise of electronic devices and the processes where Kozyrev observed them the first time [28]. Therefore they conclude that Kozyrev’s “time” is somehow related to the physical vacuum.

V. E. Zhvirblis writes about the properties of the vacuum:

“Macro-fluctuations of cosmic origin were also observed in the results of the analysis of the precise physical measurements by means of various photoreceptors [29]*. In this case the effect is explained by the change of the emission of electrons, i.e. as well by the fluctuation of the potential barrier height. A similar phenomenon can occur accompanying the emission of energy from the zero-point fluctuations of the physical vacuum, as has been observed experimentally”* [30-34].

The originality of Zhvirblis’ thoughts is not far from Kozyrev’s opinions, but Kozyrev knew about the energy of zero-point fluctuations in these days. Remarkable is according to Znykin that Aleksander Georgievich Parkhomov [35-39] used as a generator for (1/f) noise a device with low frequency which was based on the transistor MP102, already in the time when Kozyrev worked with measuring bridges. Albert I. Veinik built in the 1980’s noise generators for the investigation of the properties of time on the basis of microchips of the series K531 [40]. All the more remarkable that Kozyrev obtained his results without support and only with the equipment he possessed.

Znykin proposes that one could use as a source of noise an entire amplifier or a generator especially built for this purpose, or that one could try to look for the correlations between the Kozyrev phenomena and the noise with a common photomultiplier. *“I need the inherent noise of the weakly noisy transistor… There is no noise of one’s own… The noise in every electronic device is the noise of the virtual electron-positron interaction in the vacuum that penetrates the whole world, all of space…”* [41]. Kozyrev once wrote to Zhvirblis: “For time spreads not out, but appears immediately in all space, and a changing property of its quality will appear everywhere at the same moment as in the locality of change. And that is the reason that an immediate impact is only possible by means of time [42]. This changing property is noise! It’s the noise which in the entire fractal threads of the Peano curve of Zhvirblis crashes through the energy of the zero-point fluctuations [43]. Why is there a correlation between noise and the cosmic processes? For instance because noise is a property of space, and not of a specific device?” [44].

According to Kozyrev, matter shows an interaction with energy. His theory suggests that we can consider all material objects in the universe as a kind of sponges which are submerged in water (i.e., energy) and are soaked completely with water (i.e., energy) [45]. If such sponge now is squeezed, cooled, or rotated fast enough, then it yields something of the water (energy) in its interior to the surroundings and this diminishes his mass. But as soon as one leaves the sponge alone, the pressure on its pores decreases and it absorbs again water and expands to its normal initial capacity. It is also possible to pump still more water into such a sponge, for instance by heating it or vibrating it, and thereby to induce its pores to expand and absorb still more water. As soon as this influence stops, the sponge yields the surplus water by itself and shrinks back to its normal initial capacity.

Kozyrev demonstrated in his experiments that by shaking, rotating, heating, cooling, vibrating, or breaking of physical objects their weight can be reduced or increased to a minimal, but significant degree. Time energy, according to Kozyrev, can be absorbed, shielded, and reflected by matter. Different materials do this in various degrees. In some substances time is stored for a longer time than in others, as for instance in aluminum it is two times longer than in lead, in wood it is five times longer than in lead [46]. Aluminum and polyethylene films, as for instance PVC foil, are supposed to act as shielding for the flow of time.

Kozyrev also believed he had discovered that the flow of time moves not in a straight path through space, but performs a rotational movement [47]. *"Time possesses not only energy, but also a rotation (...) that it can transfer onto a system"* [48]. According to Kozyrev, right-handed molecules, as for instance sugar, absorb the flow of time and slow it down, while left-handed molecules, like for instance turpentine or salt, increase the flow of time and accelerate it. On this principle rests also the shielding property of certain substances for the flow of time.

Kozyrev identified also, besides the well-known speed of light in the vacuum which he called c_1, other speeds of propagation of signals in the universe [49]. According to Kozyrev c_2 is the cause-effect conversion velocity.

$$c_2 = \frac{\alpha e^2}{\hbar} = \alpha \cdot 350\ km/s$$

$$c_2 / c_1 \approx \alpha \approx 1/137 \tag{1}$$

where α = fine structure constant and c_1 = velocity of light in the vacuum [50]. To this constant Kozyrev relates all self-organizing and evolutionary processes in

the animate and inanimate worlds that are accompanied by macroscopic violations of spatial symmetry and non-locality effects [51].

C_3 is, according to Kozyrev, the signal propagation velocity in the time flow, which is infinite.

"Time does not carry momentum and does not propagate, emerging at once in the whole universe. Therefore organization and information can be transferred by time immediately to any distance. The possibility of instantaneous signal propagation is not at variance with the Theory of Relativity since such a transmission is not accompanied by a material motion" [52].

Zhvirblis [53] understands Kozyrev's "hidden logic" of "Causal or Nonsymmetrical Mechanics" as follows. According to Kozyrev's publications [54, 55] the Sun and the stars were to be considered not as isolated systems tending to thermodynamic equilibrium, but rather as open systems exchanging energy with the environment and capable of self-organization, that is, as somewhat similar to living organisms.

"Kozyrev approached the problem of irreversibility in a very original manner. He assumed that irreversibility by itself is a fundamental property of any real system and that reversibility occurs only if interaction of these systems with the flow of a special substance is disregarded that defines objectively the direction of the 'time arrow', penetrates all at once the universe, and therefore can cause what today would be called non-locality effects".

Kozyrev called this substance 'time', thereby causing much terminological misunderstanding. Had he called the substance 'physical vacuum', there would have been no problem, but by the middle of the 20th century, the quantum electrodynamics was not yet so much developed to allow that. From today's point of view Kozyrev's 'Causal or Nonsymmetrical Mechanics' should be ranked with the theories of hidden variables.

If interpreted in this way, Kozyrev's research turns out to lie (by its essence, not by its form) along the mainstream of the ideas of modern thermodynamics of irreversible processes that deals just with the manifestations of non-locality" [56].

In recent times, this latter approach was mainly followed by Sergey M. Korotaev from the Geoelectromagnetic Research Institute of the Russian Academy of Sciences in Troitsk and collaborators have interpreted Kozyrev's "Causal Mechanics" as implying macroscopic nonlocality in the universe [57-64]. The generalization of Kozyrev's experimental results had shown a similarity of the properties of the transaction by active time with the ones of quantum non-locality

[57-61]. Up to recent times, it was generally believed that quantum non-locality exists only at the micro level. But during the last years of the 20th century, theoretical considerations evolved on non-locality in the macroscopic region [65-67]. The idea of Korotaev's group was to bring "Causal Mechanics" into connection with the interpretation of quantum non-locality by the Wheeler-Feynman electrodynamics formalism [68] which they used in a modern quantum treatment [69]. This theory considers particle fields as a superposition of retarded and advanced fields. The advanced field is unobservable and manifests only through radiation damping, which is the dissipative process. According to Korotaev, many experiments by the Korotaev group that were performed with modern rigor have confirmed the existence of Kozyrev's transaction of dissipative processes by the action of active time as a form of macroscopic non-locality [70]. This opens, according to Korotaev, not only the possibility of the use of "Causal Mechanics" for the explanation of the interaction of dissipative processes, but also for the forecasting in geophysical and astrophysical applications [62, 63].

According to Zhvirblis, if the energy of the stars is fed by the surrounding physical vacuum instead of thermonuclear reactions within the stars, then one can compare them with artificial objects that feature the same properties and can be studied in laboratories [71]. Zhvirblis describes such artificial objects in the form of the "koltsars" discovered by M. F. Lazarev, closed ring-shaped vessels with porous partitions in which volatile liquids continually circulate [72]. Zhvirblis concludes these considerations by stating

"Thus any real object is metastable, and has definite form and structure only as far as it continuously exchanges energy with the environment. If sometimes this energy still does not undergo any noticeable transformation and, therefore, remains unobservable, in the bistable systems it causes processes accompanied by useful work. If systems of this sort exist among non-quantum macroscopic objects (koltsars), it can be assumed that the Sun and the stars are such objects, and that, similar to Kozyrev's original assumption, the energy they produced has no direct relation with thermonuclear synthesis processes" [72].

If we assume that instead of a vessel containing liquid (koltsars) we consider a liquid sphere of radius R and mass M that has formed under the action of its natural gravity forces, and assume that R=H, and if the inequality

$$R < \gamma \beta \frac{M^2}{C} \tag{2}$$

With γ for the gravitational constant, is also satisfied, we see that the sphere will radiate energy like a star.

"This fact implies that the star energy comes mainly from the energy introduced by the gravity forces combining all the bodies of the universe into one, rather than from thermonuclear synthesis" [72] – that is, from a sort of "Mach's Principle".

The editor of the only collective work devoted to Kozyrev's work in the West, concedes: *"In general, the effects observed by Kozyrev could be explained by more prosaic factors than the 'time flow' – for instance, by convective flows, cooling or heating effects, induced electric or magnetic fields etc."* [73]. N. A. Kozyrev himself tried to analyze the possible role of alternative factors in his experiments, for instance, he dedicated a whole article to possible mechanisms causing different effects in vibrating bodies being weighted at a beam balance.

At any rate, by now neither a concrete disproof of Kozyrev's experimental results exists, nor their consistent explanation by common physical factors.

EXPERIMENTAL WORK OF KOZYREV

Kozyrev's "flow of time" which accompanies dissipative processes manifests itself in many mechanical phenomena [74]. According to Kozyrev, irreversible processes rotate the beam or disk of a torsion balance when they emit or absorb Kozyrev's flow. The irreversible processes include body deformations, encounter of an air flow with an obstacle, sandglass operation, light absorption, friction, burning, some observer's actions, body heating and cooling, phase transitions in substances, their dissolving and mixing, and non-electromagnetic radiation from astronomical objects. Inelastic processes in rigid bodies change their weight while elastic bodies change their elastic characteristics. Whipping tops change their weight when involved in an additional process, such as vibration, heating or cooling, or electric current transition [75].

The flow of time causes also responses of non-mechanical detectors such as the resistance values of resistors,

Mercury level in thermometers, quartz crystal vibration frequencies, the electric potentials of thermocouples, water viscosity, electronic work function in photoelectric cells, chemical reaction rates, and bacteria and plant growth parameters [76].

Correspondingly Nikolai Kozyrev and his collaborators performed experiments with torsion balances, resistors, photocells, piezoelectric elements, mercury thermometers, thermocouples, different substances for instance water viscosity and liquid nitrogen evaporation, chemical reactions, elastic bodies, inelastic bodies, rotating bodies, and organisms.

The effect magnitudes depend on the energy characteristics of the initiating processes, on the geographic latitude of the experiment site (for mechanical experiments), on the season, on additional active non-equilibrium processes occurring in the neighborhood of the detectors, and on some other irregular and sometimes unclear conditions of the experiment [77].

In I. A. Yeganova's opinion numerous phenomena observed by other researchers apart from N. A. Kozyrev exhibit the influence of background non-equilibrium processes on detectors, similar to those observed by N. A. Kozyrev [78]. The so-called kinetobaric effect [79], Giorgio Piccardi's experimental results – 25-year observations of the bismuth chloride precipitation rate [80] –, and those due to S. W. Tromp – observations of erythrocyte precipitation rate [81], flicker noise [82], the observation of torsion balance oscillation period increase during the 1970's total solar eclipse [83], and the similar results of metrologists V. S. Kazachok, O. V. Khavroshkin and V. V. Tsyplakov [50] who repeated these experiments during the 1976 solar eclipse, the results of A. Shapovalov's [85] three-year observations of the dark current of a photomultiplier (see also a discussion of some of these effects in N. A. Kozyrev's works [86,87]).

Levich adds that Kozyrev's flows may turn out to be the universal cosmophysical cause leading to correlations between macroscopic fluctuations which show itself by equally shaped histograms describing quite different processes, from biochemical reactions to radioactive decays, in simultaneous experiments separated sometimes by thousands of kilometers [88]. Moreover, the experiments carried out by Kozyrev and his colleagues were to a large extent dedicated to direct detection (and application for astronomical measurements)

of non-electromagnetic flows from planets, stars, galaxies, stellar clusters, and nebulae.

CONFIRMATIONS AFTER KOZYREV'S DEATH

After the death of Nikolai A. Kozyrev (1983) in Russia a series of research programs were carried out in order to test or extend various aspects of Kozyrev's theoretical, laboratory and astronomical discoveries [89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99,100].

One report from the Polytechnic University of Tomsk in the Ural region reported about a research project which lasted from 1983 to 1996 in which 19 scientists collaborated [99]. Another researcher, Ivan M. Shakhparonov, noted that his results were based upon a 30-year collaboration by eight different laboratories [100]. Many of these results were only published after the Glasnost period since 1991, when the safety regulations in Russian science were relaxed.

On the one hand, there are authors who have performed a long series of laboratory experiments using N. A. Kozyrev's procedure and have obtained results confirming and amplifying Kozyrev's data on the distant action of irreversible processes on the status of ambient bodies [101-103]. They are mentioned in a paper by L. S. Shikobalov [104].

Additionally, there are publications that describe the results of astronomical investigations using Kozyrev-type detectors and those of biological type [105-108]. The reception of signals not only from the visible (i. e., past) positions but also from the true (present-day), and future positions of stars and other astronomical objects was confirmed in complete accord with the results of N. A. Kozyrev and V. V. Nasonov's papers [109-111].

The paper by M. I. Arushanov and S. M. Korotaev [112] on the other hand explained a number of geophysical facts on the base of Kozyrev's theory that have not found an explanation in conventional terms, e .g., asymmetries of the shape of the Earth, the atmospheric circulation and distribution of the Earth's physical fields.

Japanese researchers Hideo Hayasaka and Sakae Takeuchi carried out a weighting of right- and left-rotating gyroscopes with a vertical axis and revealed that when the rotational speed increases, there occurs a decrease of the weight of the right-rotating gyroscopes, close to that observed by Kozyrev, but without referring to his works [113]. Later, this result was tested and allegedly not

confirmed by American and French researchers [114-115]. An analysis of these publications, however, carried out by R. Ya. Zul'karneev at the JINR in Dubna, Russia, shows that in reality these papers are in agreement with N. A. Kozyrev's data [104]. The point is that, in accordance with the view of "Causal Mechanics", to change a gyroscope weight, it is necessary to subject it to an irreversible influence, e.g., vibrations. The latter were indeed present in the experimental setup employed by Hayakawa and Takeuchi [113] due to using a spring suspension of the gyroscope, and are lacking in the setup described by Faller et al. [114] and Quinn and Picard [115].

A large number of correlations between lunar and terrestrial events as well as solar and terrestrial ones, unexplainable in the context of conventional physics, have been revealed by now [115-117] which makes N. A. Kozyrev's hypothesis on the interconnection of all the World's phenomena by the physical properties of time be treated with attention.

Since about 1995 the *"Russian Interdisciplinary Temporology Seminar"* [118] serves as a platform for the followers of Nikolai A. Kozyrev. It is hosted by Alexander P. Levich at the Moscow State University, Faculty of Biology, Division of General Ecology. Among them A. P. Levich and Sergey M. Korotaev seem to be most active.

Finally, in the year 2008 on the occasion of the 100th birthday of N. A. Kozyrev, a collective work on *"Time and Stars – to the 100th Birthday of N. A. Kozyrev"* was published in St. Petersburg [119], which contains a detailed biography of the centenarian, various works on the experimental, theoretical and philosophical aspects of the work of N. A. Kozyrev, five articles by N. A. Kozyrev himself not included in his *"Selected Works"* [120], and archival records and recollections.

ASTROPHYSICAL EXPERIMENTS

From the mid-1950s to the late 70s, Nikolai Kozyrev, together with his collaborator Victor V. Nasonov, conducted astronomical observations using a receiving system of a new type [121, 122].

When the telescope was directed at a certain star, the detector, designed by N. A. Kozyrev and V.V. Nasonov, positioned within the telescope, registered the incoming signal even if the main mirror of the telescope was shielded by metal screens. This fact indicated for Kozyrev that electromagnetic waves

(light) had some component that could not be shielded by metal screens. When the telescope was directed not at the visible, but at the true position of a star, the detector then registered an incoming signal that was much stronger. The registration of the true positions of different stars could, according to Kozyrev, be interpreted only as registration of star radiation that had velocities billions of time greater than the speed of light. N. A. Kozyrev also found that the detector registered an incoming signal when the telescope was directed at a position symmetrical to the visible position of a star relative to its true position. This fact was interpreted by Kozyrev as a detection of the future positions of stars.

TRUE POSITION OF THE STARS

In this work we will present the experimental approach to verifiy the famous Kozyrev experiments where he measured the true position of stars, planets and the sun [121, 73]. The true position is the position were the object is in this moment, the apperent position is the position were the object is seen now, also called visible position. The distance to the sun is 8 light minutes and therefore the true position of the sun is where the sun will be seen in 8 minutes from now. So the true position of the sun is 2° ahead of the visible position. The true position for sun and the planets is calculated straight forward from their distance in relation to the earth rotation velocity.

The true position of the stars is much more difficult to calculate.

Since the stars are at least a few light years away, the true position is not calculated in relation to the earth rotation. Like for the sun and planets the true position of stars is calculated relative to the apparent position. In case of close stars, with distances up to 300 ly the relative motion of the stars towards the background stars is used. Other major factors are the parallax π and the aberration A. The parallax or trigonometric parallax is the change of relative position of the near stars toward the far away background stars due to the different position of the earth due to its rotation around the sun. The near stars have a slightly different position in winter and summer, the two extreme positions in the movement of the earth around the sun,

The angle $\Delta\alpha$ between true and apparent position is calculated in following way:

$$\Delta\alpha_{\odot} = \Delta\alpha - A \tag{3}$$

with $\Delta\alpha_\odot$ = Angle between true position and sun, A = annual Aberration.

$$A_\odot = \frac{V_T}{c} \tag{4}$$

where V_T = tangential projection of star velocity, $A_\odot$ = Aberration from the position of the sun, c = speed of light, $\pi = 3.26\ \mu / \Delta\alpha_\odot$, μ = proper motion of a star, and π = trigonometric parallax.

Aberration is the difference of position of a star due to the relative motion of the earth. There is a daily aberration due to the rotation of the earth around its axis and an annual aberration that changes during the cource of the year due to the motion of the earth around the sun. It is like watching rain fall in a moving car or train. If the car is moving then the rain appears to come from a different direction then when the car is standing still or moving in the opposite direction. Stars on the zenith of the ecliptic are making a circle due to the aberration, stars on the ecliptic a horizontal line and all other stars an ellipse during the year [123]. So the Aberration is a relation between the light speed and the velocity of the earth relative to the observed star. So the speed and direction of the moving star and the speed and direction of the solar system, the speed course of the earth rotation around the sun and the earth rotation around its axis all go into the aberration.

EXPERIMENTAL SET UP AND MEASURED DATA

Figure 2. The set up with reflector telescope, instruments and laptop in the field

Selection of the Telescope

According to Kozyrev it is necessary to use a reflector type telescope. Kozyrev pointed out, that his time waves are reflected on a mirror surface in the same way as light is. So as in the law of reflection the angle of incidence equals to the angle of reflection. A refractor telescope will not work because the glas-air boundary does not bend the time wave. A reflector with an aluminum coating will focus the time wave. Kozyrev emphasized that about 50% of the intensity is lost at each reflection. In order to have enough intensity a reflector with 8" diameter was selected. A Celestron NexStar Evolution 8 with an 8-inch Schmidt-Cassegrain optical tube and computerized GoTo mount was used in these experiments. The telescope makes it easy to find the current visible position. First the telescope has to be aligned. The telescope uses the SkyPortal and SkyAlign technology. In order to align the telescope three bright stars have to be centered. After centering the first star the position is entered into the app. Than the up and down buttons have to be used to direct the telescope at the second star. After precise centering the position is saved. The third star can be selected in the star map on the smart device. Then the third star is accurately

centered and saved. After that the telescope is aligned with the current position of the stars. The resolution of the telescope is 0.77 arc seconds.

Calibration to Kozyrev Time Impact Procedure

Kozyrev tested his detectors with evaporating acetone [121]. We don't have a comprehensive and clear description of his testing procedure. Levich gives some description in [73] on how the testing might have been done. But the important facts like precise distances in meters, quantity of the evaporated acetone in milliliter, exact durations in minutes and ambient temperature is not given. That makes it very difficult to reproduce these important experiments. Without a successful test it is not clear if the whole system is really detecting Kozyrev's time influence.

Another problem that Kozyrev pointed out is that the influence of time is traveling through material and therefore it is difficult to maintain the necessary difference of influence and no influence zones in the detector. This difference is the basis for detecting the impact of time.

Detector used in this work:

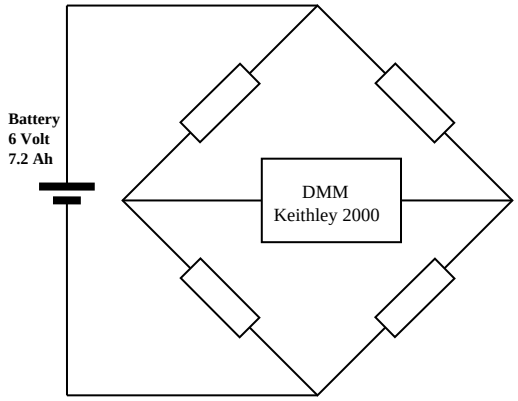

Figure 3. Electric cuircit of the detector

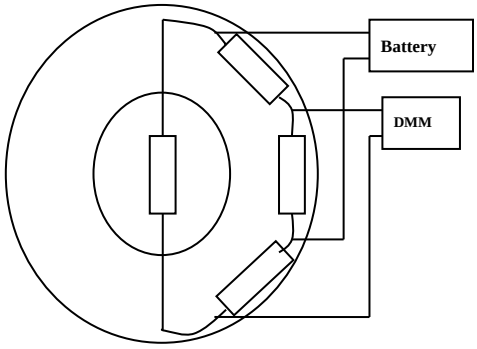

Figure 4. Arrangement of the resistors in the aluminum cylinder in the optical element.

R1 to R4 are 100 kOhm precision metal film resistors. The diagram of the electric circuit is shown in Figure 3.

Figure 5 and 6. The detector, a 100 kOhm resistor is in the line of sight /in the focus, the other 3 resistors of the Wheatsone bridge are in the aluminum ring. The ring is placed in a a 1.25 inch optical element replacing a Barlow lens

The Wheatstone bridge is built into a solid cylinder made of aluminum. In a notch ring are 3 of the 4 resistors. The resistor that acts as the detector and is suppose to be influence by Kozyrev time impact is seen in the center of the center aperture of the astro-optical 1.25 inch element (see Figure 4). The 100 kOhm resistor was part of a balanced Wheatstone bridge built with selected resistor. The resistors were selected to be of closest value, to make the bridge as sensitive as possible. A 6 Volt, 7.2 Ah battery from Conrad Energy was used as a stable power source. To measure the voltage of the Wheatstone bridge as well as the battery voltage and temperatures of the detector and the ambient air

a Keithley 2000 digital multi meter was used with a scanner card. The data was recorded on a laptop with a LabView program via GPIB to USB.

Measurement Data

The procedure to detect the true position was to centre the telescope on the star, than to bring the focus onto the resistor by defocusing slightly and tan to scan around the visible position using the rotation and azimuth drives of the telescope. Scan area was around plus minus 3 minutes of arc.

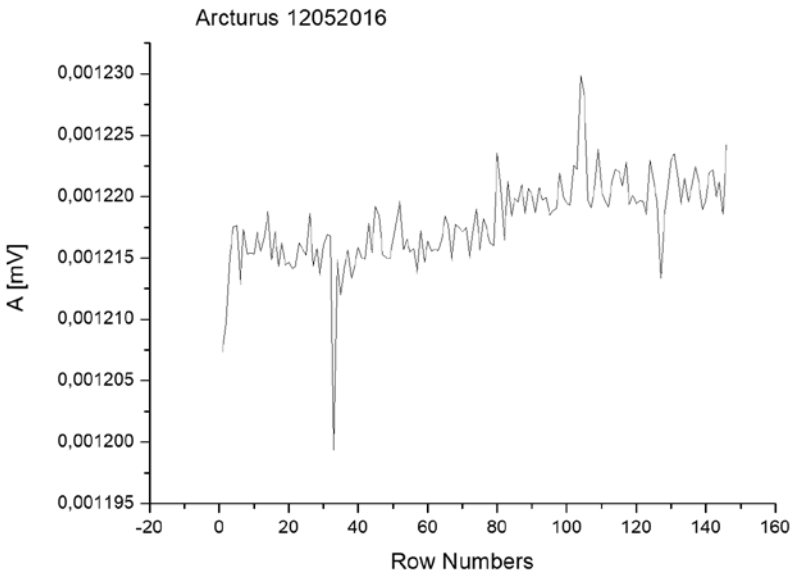

Figure 7. Scan around the visible position of the star Arcturus , distance 36.7 ly

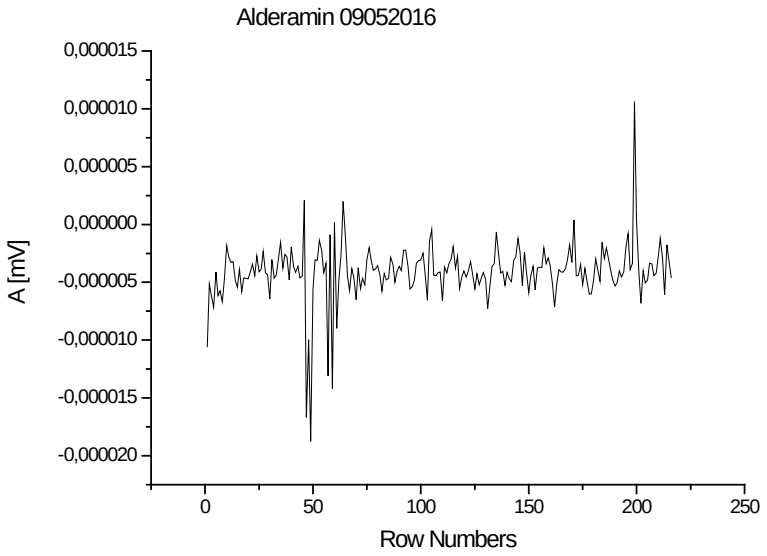

Figure 8. Scan around the visible position of the star Alderamin, distance 49 ly

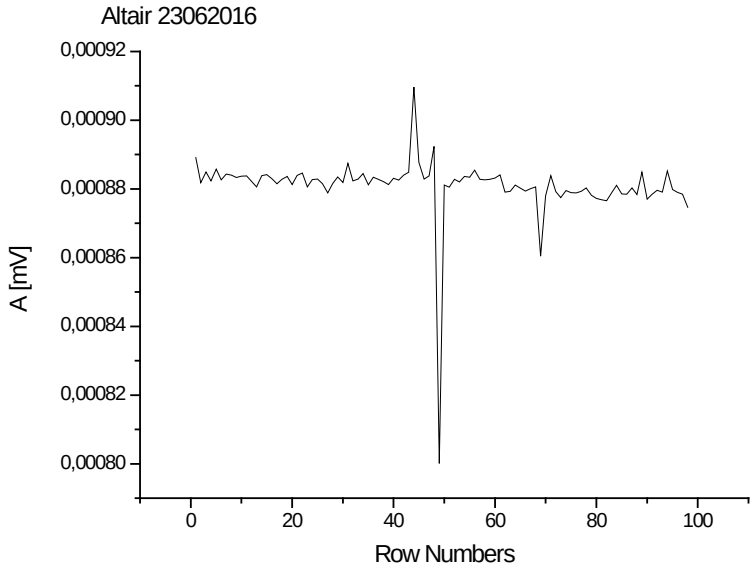

Figure 9. Scan around the visible position of the star Altair, distance 16.7 ly

Small variations in detector voltage were observed from time to time. Good scans are shown in Figures 7 to 8. The 20 µV peak on a 1.2 mV base signal in Figure 7 is change of approximately 1.6 %. It is possible that the detector is influenced by Kozyrev time waves. There were no conclusive repeatable results.

Also the temperature of the detector and of the air were recorded and showed no similar response, so a temperature effect can be excluded.

TORSION BALANCE

The most important detector for Kozyrev was the torsion balance. After consulting with Kozyrev's son Fyodor Kozyrev the following points became clear.

The torsion balance should be made out of non conducting material. The balance should have a great asymmetry. As seen in Figure 10, the asymmetry is created by placing a ball of modelling clay on one side of the white fibre rod. The counterweight is simply the rod itself. The tip of the rod is coloured to improve automated tracking and recording of the angle. The rod is suspended by a thin nylon thread. The construction is fragile but sensitive.

Figure 10. torsion balance of the 3rd generation

If left alone and protected from air currents by the casing the rod spins with speed of around 30 degrees per hour. The speed can vary. The direction of rotation changes over time, creating a random like signal. If the angle is recorded over time, an unusual long continues rotation in one direction followed by a similar long counter rotation appears to look like a peak. Kozyrev used this as a sensitive detector for his time impact that is related to torsion [73].

CONCLUSIONS

Kozyrev's theory describes mathematically the velocity of cause and effect, light speed and information velocity. Based on his theory Kozyrev made observations on stars, planets and in laboratory experiments. He became well known for predicting lunar volcanism and was recognized for that even in the west. He deduced from his theory and experiments, that the stars, including our sun, derive their energy much differently and not by thermonuclear reactions. It is therefore very relevant for our time and our search for new energy sources and new energy technologies. Furthermore Koyzev's findings give new possibilities for communication technologies. His theory that time is not just a clock but is an energy as well, would have a great impact in many parts of physics.

The detector showed no clear signal during calibration. Kozyrev calibrated and tested his detectors with evaporation of acetone. Our detector and the detector telescope system (when our detector was mounted in the telescope) never showed a clear signal when acetone was evaporated near by. We don't have a comprehensive and clear description of his testing procedure. We therefore conclude that the detector was probably not capable of detecting Kozyrev-like time waves/signals. One of the problems that Kozyrev describes is that it is very difficult to create a space where the time influence does not reach, so to create a detector were one resistor is exposed to the influence of time and the other resistor is shielded from this influence. It is possible that our efforts to create this difference were not enough and we therefore did not detect Kozyrev-time-waves.

Another problem was the angle resolution of the telescope. A larger telescope would enhance the effect. It would be advisable to repeat the experiments in a larger telescope, an aluminum reflector of at least 0.5 meter in diameter. The larger telescope would make it easier to resolve small distances between real an apperent

position and would give a greater signal amplitude as it should collect more Kozyrev time impact/flow. The 8 inch reflector reached its limits.

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