

*Chapter 1*

**Kozyrev Causal Mechanics and Its  
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## 1. Kozyrev Causal Mechanics and Its Application

### 1.1. Kozyrev's Idea and Results

Any naturalist, not limiting himself artificially by bounds of his peculiar tasks and thus not passing over the difficult universal physical problems, must fall to thinking on concordance of time reversibility in the basic physical theories and visible, one can say flagrant irreversibility of the real World. Any solution of this problem gets into one of two classes, namely: 1) irreversibility is the property of the system, and 2) irreversibility the property of time. The solutions from the former class are inevitable particular at variance with universality of the really observed irreversibility. However the most custom modern views are such exactly: irreversibility arises owing to incomplete description, *i.e.* it is the property of the system, including an observer. The solutions from the latter class on the strength of Nother theorem, lead automatically to violation of the energy conservation law. If we interpret this violation as expanding of the low bounds, then the energy of time arises. It is just the heart idea of causal mechanics suggested by Nikolay Kozyrev [1].

So Kozyrev's construction of time was based on its fundamental asymmetry. However, not only general logic of a naturalist had led him to the problem of time, but also reflection on the concrete astrophysical problems. The most important problem of such kind is the question on the energy sources of the stars. Having computed the parameters characterized state of star's interior (the temperature, density and energy emission), Kozyrev has statistically reliable shown, that in the state space almost the all stars are on the free cooling surface. It means that there are no any mechanisms of energy emission independent of the heat relinquishing. In particular (this question has especially been considered) the thermonuclear reactions can not be the energy source. The Kelvin-Gelmgolts mechanism has proved to be useful, but it is not acceptable, because of too short time scale. Kozyrev conclusion is in full contradiction with the conventional theory of thermonuclear mechanism of star fire, but it has nowhere been refuted. It has also been shown by Kozyrev, that planetary energy source is close to the star one. As a result he concluded that only time itself might be the energy source. Preventing stars to come in the equiponderant state, the course of time is the source of their energy. Therefore, time, in addition to the known geometric properties has some active ones. But it was found extremely difficult to obtain these properties by solving the inverse problems, and Kozyrev had suggested development of his concept by usual deductive way.

He had formulated the following 3 axioms:

1) Time has a specific property that distinguishes the causes from the effects and can be called the directionality or the course. This property defines the distinction between the past and the future.

2) The cause and the effect are always separated in space. Thus, there is as much small as is wished  $\delta x \neq 0$  between them.

3) The cause and the effect are always separated in time. Thus, there is as much small as is wished  $\delta t \neq 0$  between them.

Then Kozyrev had introduced a fundamental conception of the course of time  $c_2$ :

$$c_2 = \delta x / \delta t = ae^2 / \hbar. \quad (1.1)$$

It has sense of the velocity of causal-effect transition at the level of an elementary link, that is, at the microlevel. It has been proven that  $c_2$  is a pseudoscalar, that is,  $c_2$  is the linear velocity of a rotation. Kozyrev also related  $c_2$  with Plank constant and the elementary charge, where  $a$  is a dimensionless coefficient. Note than the classical limits of causal and quantum mechanics coincide:

$$\delta t \rightarrow 0 \Leftrightarrow |c_2| \rightarrow \infty \Leftrightarrow \hbar \rightarrow 0. \quad (1.2)$$

Next, Kozyrev has proved the theorem, according to which in the gyroscope, excited by any irreversible process of the enough energy, with the cause  $Y$  and effect  $X$ , there are new (unknown in classical mechanics) additional forces  $\Delta F_X$  and  $\Delta R_Y$ , acting along the axis of rotation  $j$ :

$$\Delta \mathbf{F}_X = -\mathbf{j} \frac{u}{c_2} |\mathbf{F}_X| \cos \mathcal{G}, \quad (1.3)$$

$$\Delta \mathbf{R}_Y = \bar{\mathbf{j}} \frac{u}{c_2} |\mathbf{F}_X| \cos \mathcal{G} = -\Delta \mathbf{F}_X. \quad (1.4)$$

They were called the forces of causality.  $u$  is the linear velocity of gyro rotation,  $\mathbf{F}_X$  is the inelastic force of the cause, affecting on the effect:  $\mathbf{F}_X = \mathbf{F}_Y - \delta \mathbf{p}_Y / \delta t = \delta \mathbf{p}_X / \delta t$ ,  $\mathbf{F}_Y$  is the force applied on the point  $Y$ ,  $\mathbf{p}$  is momentum,  $\mathcal{G}$  is the angle between  $\mathbf{j}$  and  $\mathbf{F}_X$ . For the force of causality to be measured in the macroscopic system it is necessary that cause and effect had a finite arm relatively the axis of the gyro. The momentum of the system does not change, but the energy of the system changes! In addition, if there is cross space of the points  $X$  and  $Y$ , the angular momentum of the system emerges.

Kozyrev had performed series of the experiments with the excited gyros, really discovered the forces of causality and confirmed the theoretical estimation of course of time value (and determined it's *a priori* unknown sign)  $c_2 = +(2.2 \pm 0.1) \cdot 10^6$  m/s. The experiment repeated many times at different performance (vertical and horizontal orientation of the gyro axis), different positions the cause and the effect, different kinds of the exciting dissipative process (providing inelastic interaction the gyro and the support).

He also had performed other series of the experiments in which the forces of causality of the rotating Earth were revealed. These forces proved to be parallel to the Earth axis and dependent on the latitude, with the change of the sign near  $73^\circ$ . Kozyrev supposed that asymmetrical figure of the Earth was formed namely by the forces of causality.

On the next stage, Kozyrev had conducted another series of experiments on correlation of any irreversible that is dissipative processes through the active time. The theoretical background of these experiments was weaker, rather intuitive. Nevertheless this background had convincing predictability. Shortly, Kozyrev had invented several types of detectors, included some probe dissipative processes, respondent to the artificial lab and natural astrophysical source-processes. The sign of detector response dependent on the sign of the entropy change in the source. It means, by Kozyrev, that processes progress not only in time, but and with help of time. Specifically, his experimental results can be formulated in the following statements:

- 1) A new type of transaction between the dissipative processes of any nature exists;
- 2) This transaction transmits the energy, the spin, but not the momentum;
- 3) The energy of transaction directly related with the entropy production and inversely related with the squared distance;
- 4) The transaction is screened by the matter, but the screening properties of the matter do not coincide with such properties for the electromagnetic field;
- 5) The transaction can have positive, zero and symmetrical negative time lapse.

The last point says on the possibility of observing the future as the existing reality! This statement is explained as follows. As the Universe is projected on to the time axis in a point, the transaction via time is interaction through a spacelike interval. Formally it admits the time shift equal to  $\pm$  classical retardation. Combination of the retarded and advanced signals may lead effectively to the instantaneous interaction.

The statement (5) directly concerning the main topic of this book was late, final Kozyrev result, so was not contained in his single paper on causal mechanics in English [1]. The relevant astrophysical experimental results [34,35] and their theoretical explanation [36] were published only in Russian. There is a review of these works in English in Reference [37]. Kozyrev elaborated [36,37] that time interaction in actually occurs through zero interval, while both time directions are allowed. In particular it can lead to effectively instantaneous correlation of some processes without invoking of the superluminal speed. At this point he independently and exactly converged with the explanation of instantaneous (through zero