KOZYREV'S TIME

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Starting from Kozyrev's idea about the time currency I propose a new cosmological model. In it the time currency is due to the Universe expanding phenomena. The new concept implies the correctness of the Kozyrev's hypothesis that "time transforms to the star energy".

1. Introduction

N.A. Kozyrev overcame the unbelievable difficulties of an individual human being and of discovery route ones. I believe, all of us should admire him.

I knew the Kozyrev's ideas since 19991, when the collection of his selected works was published by Leningrad State University. I has not being interested in his "causal mechanics", but his very important idea on the time *currency* that he has clearly stressed induced my own reflections over a long period of time. Besides, I was surprised by his thesis about the "time - energy" transformation. Firstly, it seemed to be only an interesting fantasy.

After several reflections I came to a new cosmological model that is just based on the universal time currency phenomenon and generalizes the Einstein's picture. But the most incredible is the fact that this new model, which does not have any common with the Kozyrev's "causal mechanics" leads very naturally the "time - energy" transformation that may be presented in the simple quantitative form.

I would like to present shortly here these two interconnected concepts. The formulas and details one may find on my site http://www.timeorigin21.narod.ru/eng_time

The book short presentation:
• *Paradoxes, Logics, and Physical Nature of Time.*

Papers:
• *Usual collapse and unusual one.*
• O*n the supernovae low luminosity problem.*
• *On an experimental validation of the selected reference frame existence in the Universe.*
• *Cosmology: a New Approach.*
• *Special Relativity and Universe Evolution.*
• *Einstein, cosmological constant, and gravitational forces.*

2. Time and our Universe

The proposed new cosmological concepts is based on the Kozyrev's thesis about the universal time currency. This idea was known before him, but Kozyrev transformed it to the completely realistic form, presented it as a working apparatus. It became clearly that time should be describe not only with extension (like space), but also with especial independent attribute which Kozyrev called "the time currency".

The next step consisted in a such universal base searching, that might generate the universal time currency. The Universe expanding process is considered as such step. The commonly accepted cosmological concept allows many different possible time dependences on the Universe size, it allows also as well a uniform expanding as an

accelerated or decelerated one. Contrary, the proposed model says that the only Universe current size is the unique "marker" of the Universe current age which is always exactly proportional to this size (the velocity of light is natural empirical scale coefficient).

At the first sight, the new presentation distinctly contradict to the commonly accepted one. However, I showed (as I hope) that this new ideas generalize the Einstein's ones and eliminate several mistakes. I would like here to overview shortly two important problems only, the first one is experimental, another is theoretical one.

The modern astrophysics had recently discovered *the Supernovae low luminosity phenomenon*. The scientific community believes that this phenomenon should be explained using the model, which contains the Einstein's famous cosmological constant. The value of this constant one carefully fits in order to have the optimal concordance with the experimental results. Such explanation requires that some acceleration of the Universe expanding must by present in our epoch. However, two difficulties appears. The first one consists in explanation why the modern epoch should be some especial one. The second difficulty is more important and seems to be unsolvable, it is connected with enormous energy that should be due to the cosmological constant value. Meanwhile, I showed that the *linear* connection between the Universe size and age eliminates successfully all the theoretical difficulties. Also, such model solves efficiently the complete set of the known cosmological problems (flatness, horizon, cosmological constant, CMBR dipole anisotropy, Supernovae low luminosity). Of course, any irregularity of the Universe expanding as an experimental fact is disavowed.

On the other hand, several theoretical doubts might appear because the known solutions of the Einstein-Friedmann's cosmological model equations lead generally to the *nonlinear* correspondence between the Universe size and age (if any matter is present in it). Before all, this fact is related with matter presentation as some "galactic dust". In such picture one neglects *the static matter pressure*. However, I showed that this hypothesis violates in principle the situation, although this pressure is really very small. The proof is based on the analysis of the known Schwarzshild's solution for an uniform material sphere **[Tolman, 1934]** in the case of the gravitational collapse of this sphere (by the way, I found out some non-trivial results for a boundary collapse). Finally, two new class of the Einstein-Friedmann's equations solutions was revealed – stationary and linear ones. These solutions has the next fundamental distinctions 1) the current matter density is *always* equal to so called "critical" density value *multiplied by two*, and 2) the cosmological constant does not needed even for the stationary solution, although Einstein introduced this constant in order to obtain the such solution existence. The revealed solutions "joint" very well with the above mentionted Schwarzshild's solution, and eliminate the "dark energy" problem.

3. Time and energy

But it is not all. The refusing to set to zero the static matter pressure led to the more "heretic" step – the refusing the Universe mass and energy conservation law as an absolute principle during the all its evolution. As it is known, this principle just leads to an nonlinear correspondence between the Universe size and age. In our model this correspondence is linear, and mass linearly *increases* with time.

I has to say, this conservation law became some kind of "a sacred cow" for physicists like Euclid's fifth postulate before non-Euclidean geometries discovery. Meanwhile, the energy conservation law is not an axiom, it presents a consequence from the time uniformity condition (the E. Noether's theorem) and it may be correct only if this condition was accomplished. Particularly, as well classical mechanics as quantum field theory deduce the energy conservation law from the corresponding motion

equations. However, I doubt whether time during the Universe evolution may be considered as uniform one. In fact, at the early stage the space curvature was very high, whereas now it is close to zero. But physics is very strongly connected with the Universe geometry, for example, the fundamental metric tensor may be directly written through the curvature tensor components. I have several reasons to think that other most important physical quantities (i. g. Planck constant) change with the Universe age too. Because of that we have to refuse the statement relative to the exact global time uniformity, and, hence, relative to the strong accomplishment of the Universe energy and mass conservation law. By the way, this law is continuously discussed in the Gravity theory.

Here we will turn to the Kozyrev's idea relative to the "time-energy transformation". In the proposed cosmological model a star energy **E** and mass **m** relative increment is equal to a relative Universe age **t** increment:

$$\Delta m/m = \Delta E/E = \Delta t / t.$$

An additional energy evaluation follows from here that may provide the radiation power per star mass unit (**H** is here the Hubble constant, **c** is the velocity of light):

$$\Delta E/(\Delta t \cdot m) \leq c^2 \cdot H$$

Particularly, the Sun relative mass decrement per year (due to the radiation) is equal approximately 10^{-13}, whereas the Universe current age may provide the relative mass increment per year up to 10^{-10}. Note, this phenomena is important for big mass like stars, for usual macroobjects any deviation from the mass conservation law is negligeable in our epoch.

However, I should note that proposed model may add a little "spoon of honey" for a conservation law followers in this "energy story". Our new model allows treat the Universe expanding process as a process of the birth and evolution of a black whole in some external super-universe, from which a matter and radiation flow over into our Universe. Hence, the hypothesis about their summary conservation (over both the universes) may be considered.

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Bibliography

[Tolman, 1934] R.C.Tolman. *Relativity, Thermodynamics, and Cosmology.* Oxford, Clarendon Press, 1934.