

## **The Universe in the Form of a Vortex Thor Does Not Need Dark Energy Part I (in English)**

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*"Ignorance is the greatest disease of humanity"*

**/ Voltaire /**

### **1. Abstract**

- A new model of the structure of the Universe in the form of a vortex Thor has been proposed.
- Equations of the dependence of the change in the volume of space, the rate of change in the volume and the equation of acceleration / deceleration of the change in the volume of space of the vortex Torus, depending on the parametric angle of its generating circle, have been obtained.
- Verification of a number of observational cosmic facts, which have not been explained within the existing standard cosmological model, has been verified for their full compliance with the proposed New model of the Universe in the form of a vortex Torus.
- For the first time, an explanation of the majority of unsolved space problems was obtained within the framework of the proposed New Model, evidence of the correspondence between theory and practice "from one place" was obtained, without

modernizing existing standard theories and without attracting additional new ad hoc hypotheses to replace the old hypotheses that do not work.

➤ A new concept of the accelerated expansion of the Universe has been presented and practically proven, the riddle of Dark Energy has been solved: the reason for the accelerated expansion of the space of the Universe in the form of a vortex Torus has been found, due solely to its topology, which does not need the presence of any physical forces, neither known nor hypothetical!

➤ It is shown why the currently observed accelerated expansion of space is not constant, but cyclical.

➤ The resolution of the “Dark Energy” phenomenon gives good grounds for both the reformation of the Big Bang hypothesis and for the emergence of cosmological science from a deep systemic crisis, as well as for the rapid development of cosmological science in the very near future.

➤ The reformation of cosmological science, caused by new knowledge about the true structure of the Universe on the basis of the proposed New model, will create hundreds and thousands of jobs for young scientists willing to devote their lives to the noblest of occupations - the search for the structure of Our Universe, since this is the mission of Homo sapiens and both a representative of the Human race and a universal Cosmic Observer, in full accordance with the words of cosmologist John Wheeler: “observers are necessary for the Universe to become being”, laid down in the basis of a strong anthropic principle (“The universe must have properties that allow intelligent life to develop”).

Key words: crisis of cosmology, Universe, Dark Energy, vortex torus, Kashlinsky's Dark Streams, accelerated / decelerated expansion, scientific principle.

## **2. Introduction**

*“Sometimes it’s more useful not to know what has been done before you, so that do not go astray on the beaten path leading to a dead end ”*

**/ Gersh Itskovich Budker /**

A few years ago, Nature correspondents interviewed scientists from various fields of science about future discoveries for 2020, then we quote the words about the future of astronomical science, vice-chairman of the board of the US National Research Council for Physics and Astronomy, Adam Burrows:

*“Key questions for the next decade include determining the nature of dark matter that fills the Universe - it will be a major disappointment if the dark matter paradigm is not confirmed by direct detection of weakly interacting particles, since 40 years have passed since its inception.*

*Revealing the nature of dark energy is considered by some people to be the most fundamental conundrum of astronomy. Others want to know how rarefied gas and dust turns into dense stars and planets, and how many Earth-like and life-friendly planets are in the Galaxy. All of these questions can be answered by 2020, but the astronomer and cosmologist community must decide which one to prioritize.*

*This is the golden age of astronomy and cosmology. The possibility of a great breakthrough remains great, but a lot of money and skills will be needed to achieve at least part of what was planned ...*

*Will humanity get stuck on the cusp of a comprehensive understanding of the universe?*

*Political decisions in the next year or two will resolve this issue” [1]*

The forecast was given for 2020, but so far it seems that humanity is still “stuck on the threshold of a comprehensive understanding of the Universe”, because no noticeable breakthroughs in solving the two most radical problems of space - Dark Matter (DM) and Dark Energy (DE) followed, we still do not know the physical essence of these mysterious forces ... in addition, observational facts of new mysteries that are not capable to explain the standard " $\Lambda$ CDM" model just added. A detailed list of unsolved cosmic mysteries can be found in the author's work: **"On the unsolved mysteries of modern observational cosmology."** [2]

Today, enormous efforts of the planet's scientists are aimed at understanding the structure of our Universe on the largest spatial scale and constructing an adequate model of the structure of Our Universe, corresponding to all the observable data obtained in recent years using ground-based and space-based instruments. But such efforts, unfortunately, did not lead to the expected results: we still cannot give a firm and adequate answer about the structure of the Universe, about its origin and its further fate without involving unknown hypothetical “dark entities (DM and DE)” that casts a shadow on standard cosmological models, requiring them to be radically improved or replaced, although much effort has been made in this direction and an unprecedented number of scientific hypotheses, theories and concepts have been created.

So the "working" cosmological model for today is the Standard Lambda Cold Dark Matter ( $\Lambda$ CDM) model, in which it is considered that "the spatially flat Universe is filled, in addition to ordinary baryonic matter (about 5% - by the author), with dark energy (70% - described by the cosmological constant  $\Lambda$  in Einstein's equations - the author) and cold dark matter (25% - Cold Dark Matter - the author) "[3], and therefore is often called the generally accepted and standard the number of observational facts obtained by astronomers of the planet in recent decades after its adoption, especially with regard to the purely hypothetical foundations of the model - Dark Energy and Dark Matter, which have not been found in nature, but accepted "de facto", not as an indisputable argument, but rather, as ad hoc - hypotheses, true only for the given case and applied only when there is no other way out!

The same can be said about the origin of the Universe itself: based on the same " $\Lambda$ CDM" model, theorists have developed the so-called. the theory of the Big Bang (TBB), based on the "crazy" idea of the emergence of our material world "out of nothing", and although this hypothesis, which consists of 95% of hypothetical guesses about "dark energy and matter", is remarkable for its amazing mathematical beauty and seemingly flawless logic, and therefore it was transferred to the status of a theory, but in its essence it has such an obvious and flashy flaw that, when critically examined, it nullifies all the efforts of the scientists who created it, and the point is not only that

the recognition of this revolutionary, even radical the concept of "everything from nothing" contradicts not only common sense, but also all historical experience, all physical laws and principles developed by generations of scientists on the planet throughout the centuries-old history of physical science, but also that the recognition "de jure" of 95% of unidentified and factors not proven in practice, but so necessary for physicists for its life support, in practice, it should have led science to a complete revision of all classical physics, both theoretical and empirical physics.

By the way, the moment that hypothetical dark entities (DE and DM) are involved in the Big Bang theory, the search for which for several decades has not led to anything, that the very idea of the birth of the whole Universe through an explosion of vacuum from nowhere to nowhere (!), Even in its accepted form, is a headache for cosmology, a contradiction between logic and common sense, the height of madness and fantasy, and yet these "crazy ideas" still say nothing about the fact that they are wrong in principle or generally inapplicable in any other way ! It may well turn out that if real physical processes or other convincing reasons are found that bring galaxies (DM) and the Universe itself (DE) into the form of motion that we observe in it today, then the idea of the Big Bang with the participation of hypothetical "dark forces" is quite can be rehabilitated and become a truly wired and more than sought-after theory by science!

But this requires very convincing evidence, which is not available today!

That is why it is extremely important for science today to establish the truth in this most mysterious and most intriguing history of cosmology: in the search for the reasons for additionally unwinding the arms of galaxies and accelerating the expansion of space, and in general - in the centuries-old history of the search for the structure of the Universe.

That is why many sane scientists correctly understand the tense situation that has arisen around the DE mystery (here we will consider only this problem, and the TM problem will be considered in the second part of the "Brief Concept") and are in no

hurry to take extreme measures to abandon the very idea of the Big Bang. but at the same time they understand that it is thanks to this artificially created deadlock that cosmology is plunging into a systemic crisis, dragging along with it the rest of the civilized world, which today also faces acute problems in many spheres of human activity, but nevertheless comes first to raise the need for reforms in the field of cosmological science, because "the history of earthly civilization is the history of understanding the structure of the Universe" and successes in other fields of human activity and the very fate of mankind on planet Earth depend on successes, primarily in this area of knowledge.

For this reason, we want to offer our work, in which, not only at the phenomenological level, but also at the formal level, a new Model of the structure of Our Reality is presented, which gives a different vision and understanding of its physical and topological structure and its properties, - a model that removes dozens of other hypotheses and "theories" from today "generally accepted", but not able to solve numerous cosmological problems, to the most fantastic, requiring an extremely intricate formal apparatus and incredibly complex mathematical calculations with the involvement of modern computer systems, the power of which is increasingly unable to provide growing needs of theoretical science!

Realizing his responsibility for the proposed new Model of the Universe structure, for the correspondence of its general positions to all those available to astronomers, numerous observational data, especially those that have not received due justification within the framework of the adopted cosmological model, the author of this work performed a deep verification of experimental data and theoretical calculations, following from his Model in full accordance with the Principle of Scientific Validity and the underlying "Scientific Method", which is the fundamental stone of modern empirical science.

So, over the past 7 years, the author has analyzed in the most thorough and conscientious manner several of the most famous cosmological mysteries (an expanded list of them is given in the author's work here [4]) from among those who

have not received understanding by astronomers of the planet within the framework of existing standard models, while absolutely adequate results were obtained for the correspondence of observational (experimental) data and theoretical (model) data from the new Model, which gives hope for scientific recognition of this work of the author.

The verification results will be described in more detail at the end of the article in the Experimental Evidence section.

There is one more reason why true knowledge about our House is very necessary for humanity, because only they are able to give an accurate and predictable forecast about the future fate of earthly civilization, because for mankind it is not "what's the difference" to know what awaits us in the future, even if this future is tens of billions of years away, but in the scientific, psychological and, especially in moral terms, it is very important to know the truth that will be with our Reality and with Us ... "at the very, very end of time"! The desire for knowledge is inherent in us at the genetic level, this is how we are arranged - in the image and likeness of those who bequeathed these words to us, which are stored today in the open book of Genesis: "*... and you will know the truth, and the truth will make you free*" [5] ... we dare just add: "*... and happy.*"

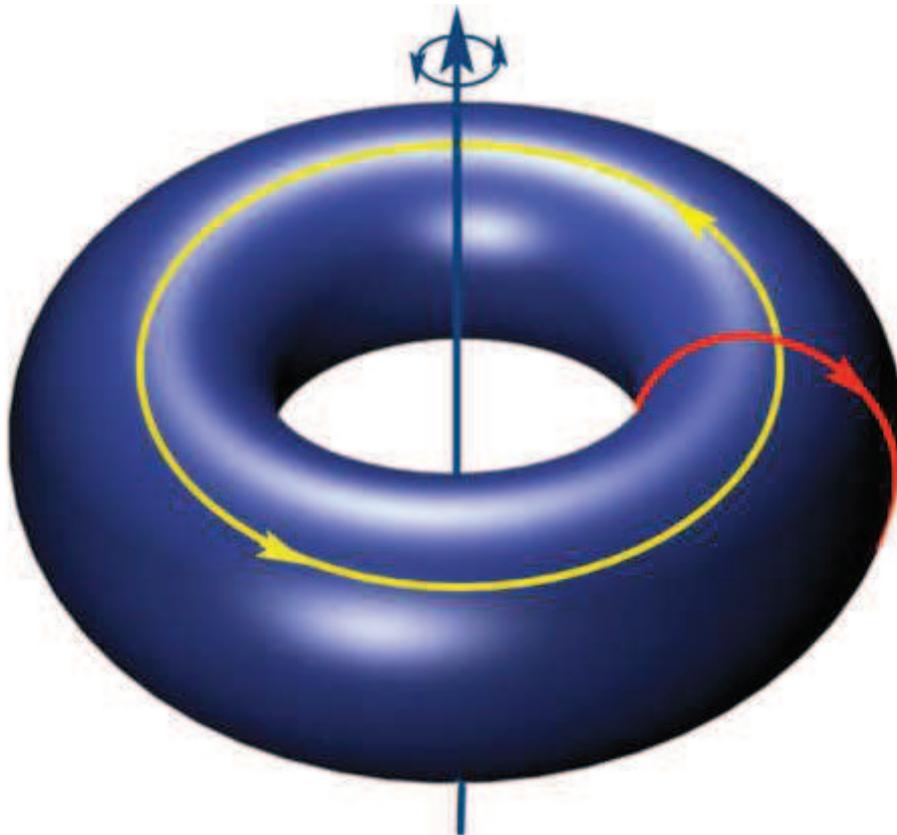
### **3. Equations of topology and dynamics of the space of the Universe in the form of a vortex torus**

*«Nothing exists until it is measured»*

**/ Niels Henrik David Bohr /**

We represent the Universe in the form of a vortex torus (Fig. 3.1) and, depending on the parametric vortex angle  $\varphi$  (the angle along the generating circle - highlighted in red), several parameters characterizing some "internal" properties of the torus-Universe: a) the value of the change in the volume of space inside Torah; b) the value of the change in the rate of expansion/contraction of the volume of the torus space; c)

the value of the acceleration of expansion/contraction of space inside the volume of the Torus.



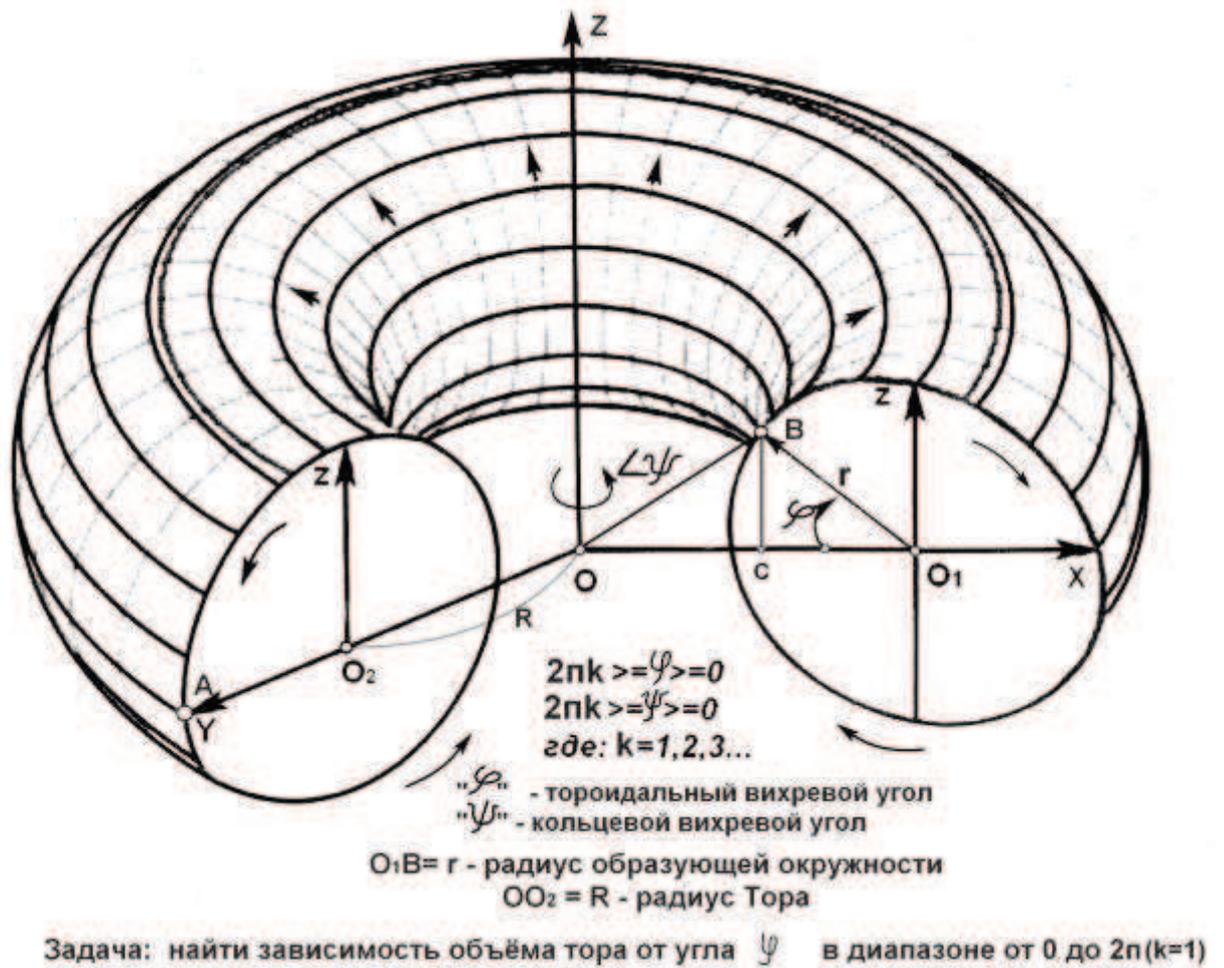
**Fig. 3.1 Universe in the form of a vortex torus**

Here, in red, the toroidal vortex rotation along the generatrix of the torus circle is shown, and in yellow, the toroidal vortex rotation along the annular radius of the torus (which forms the spin torus).

Thus, we accept that such a Universe: is not infinite, has a form, like any physical body; has a surface, volume, mass; its dimensions are determined by two parameters - the radius of the generating circle ( $r$ ) and the outer, annular radius of the torus ( $R$ ) (see Fig. 3.2). Although the torus is also characterized by other parameters: spin (angular moment of rotation), angular and linear velocities of the vortex rotation of the torus surface, we will not mention them here, since this is a task for future research (as well as the problem of determining the electric charge and magnetic field of the physical

body of the torus -Universe), since our goal is only to find the dependence of three physical parameters depending on one of the parametric vortex angles of the torus.

To do this, consider the torus diagram in Fig. 3.2 in section by vertical planes passing through the OZ axis and the centers of the generatrices of the circles  $O_1$  and  $O_2$ .



**Fig. 3.2 Scheme of a vortex torus in vertical sections**

The equation of the torus with the radius of the generating circle  $r$  and with the distance  $R$  (ring radius of the torus) from the center of the generating circle to the axis of rotation  $OZ$  is specified in parametric coordinates:

$$\begin{cases} x(\phi, \psi) = (R + r \cos \phi) \cos \psi \\ y(\phi, \psi) = (R + r \cos \phi) \sin \psi \\ z(\phi, \psi) = r \sin \phi \end{cases} \quad \phi, \psi \in [0, 2\pi) \quad \dots\dots\dots(3-1)$$

The angle  $\varphi$  will be called the vortex angle of the torus, and the torus itself will be called the vortex torus, and in the future we will write this word with a capital letter (as in relation to Our Universe).

After certain calculations (we omit the calculations for simplicity and taking into account the diagram in Fig. 3.2) we obtain the equation for the change in the Torus volume depending on the vortex angle  $\varphi$  :

$$V(\varphi) = \pi r^2 (R - \frac{2}{3} r \sin \varphi) \quad \dots\dots (3-2)$$

we see, when the vortex angle reaches the limiting value for one circular revolution of 2, we obtain the reference value of the Torus's volume:  $V(\varphi) = 2 \pi^2 R r^2$ .

The first derivative  $V'(\varphi)$  characterizes the rate of change of space inside the volume of the vortex Torus:

$$dV(\varphi) / d\varphi = \pi r^2 (R - \frac{2}{3} r \cos \varphi) \quad \dots (3-3)$$

The second derivative  $V''(\varphi)$  determines the acceleration with which the space inside the vortex Torus changes (expands / contracts):

$$d^2 V(\varphi) / d\varphi^2 = \frac{2}{3} \pi r^3 \sin \varphi \quad \dots (3-4)$$

Since we are only interested in the qualitative nature of the obtained dependences, we put two constants, the Torus radius R is three times larger than the vortex radius r and, after replacing the parameters r (= 1) and R (= 3), noting that such a replacement is quite appropriate, and in As a result, we get the required dependencies.

### 3.1 Graph of dependence of the change in the volume of the Torus on the vortex angle $\varphi$ .

Since we are only interested in the qualitative form of the sought dependences, after replacing the parameters r (= 1) and R (= 3), equation (3-2) will have the form:

$$V(\varphi) = \pi r^2 (R \cdot \varphi - \frac{2}{3} r \cdot \sin \varphi) = 3.14(3 \cdot \varphi - 0.66 \cdot \sin \varphi), \dots(3-5)$$

the graph of the dependence of the change in the volume of the Torus on the vortex angle is shown in Fig. (3.3)

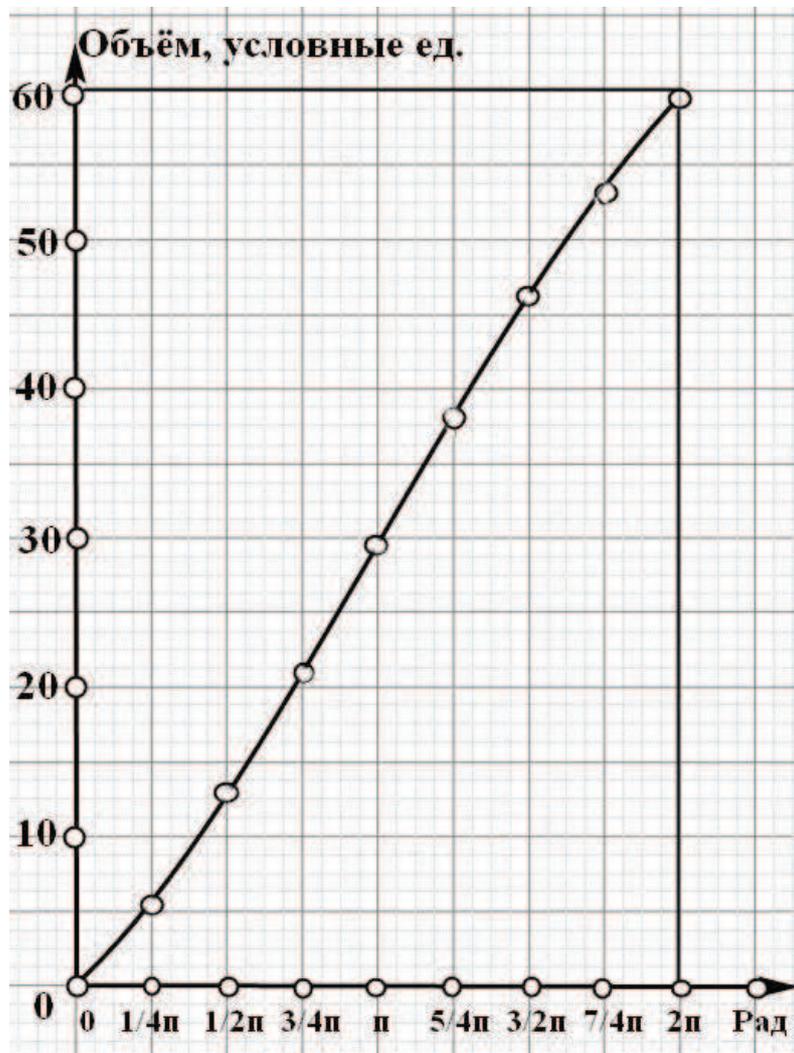


Fig. 3.3 Change in the volume of the Torus space depending on the vortex angle  $\varphi$

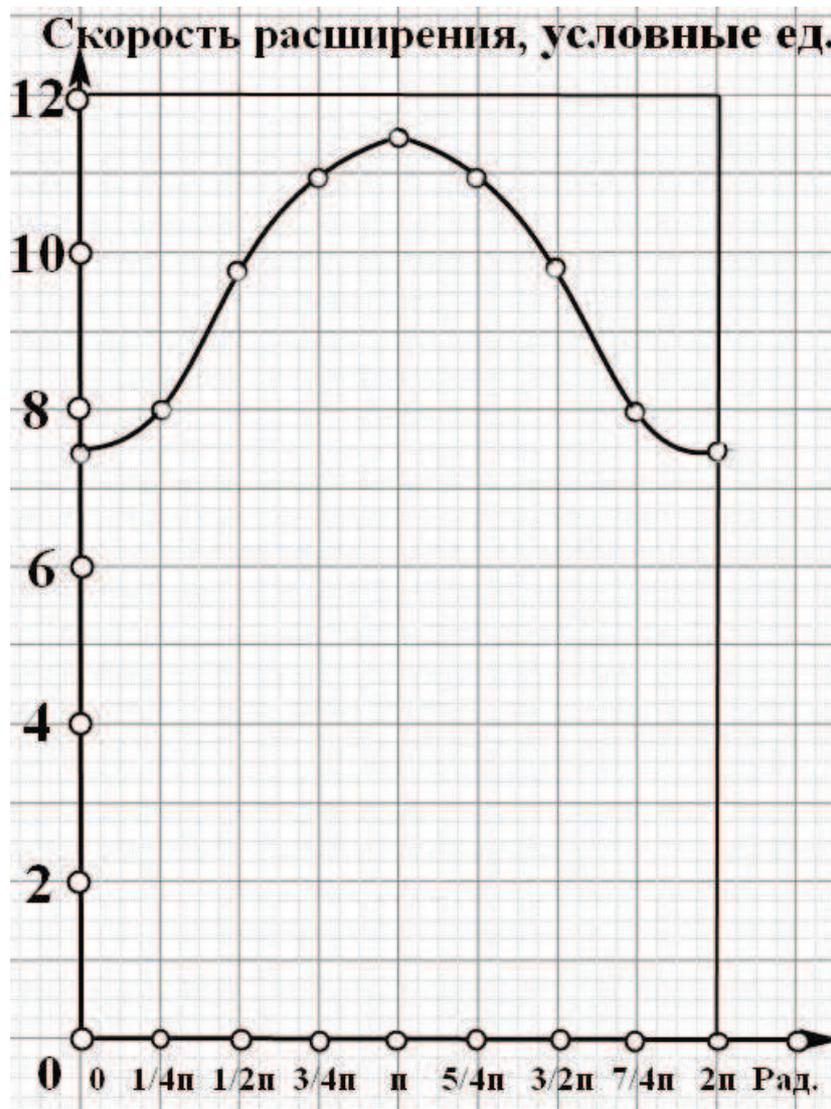
Let's pay ATTENTION to the nonlinear dependence of the change in the volume of the Torus depending on the vortex angle, it is this unique property of the Torus that will lead in the future to very interesting, radical results!

3.2 Graph of dependence of the rate of change of the volume of the Torus on the vortex angle  $\varphi$ .

After replacing two parameter-constants  $r (= 1)$  and  $R (= 3)$ , equation (3-3) has the form:

$$dV(\varphi) / d\varphi = \pi r^2 (R - 2/3 * r * \cos \varphi) = 3.14(3 - 0.66 * \cos \varphi), \quad \dots(3-6)$$

the graph of the rate of change (expansion / contraction) of the volume of space inside the Torus as a function of the vortex angle is shown in Figure 3.4.



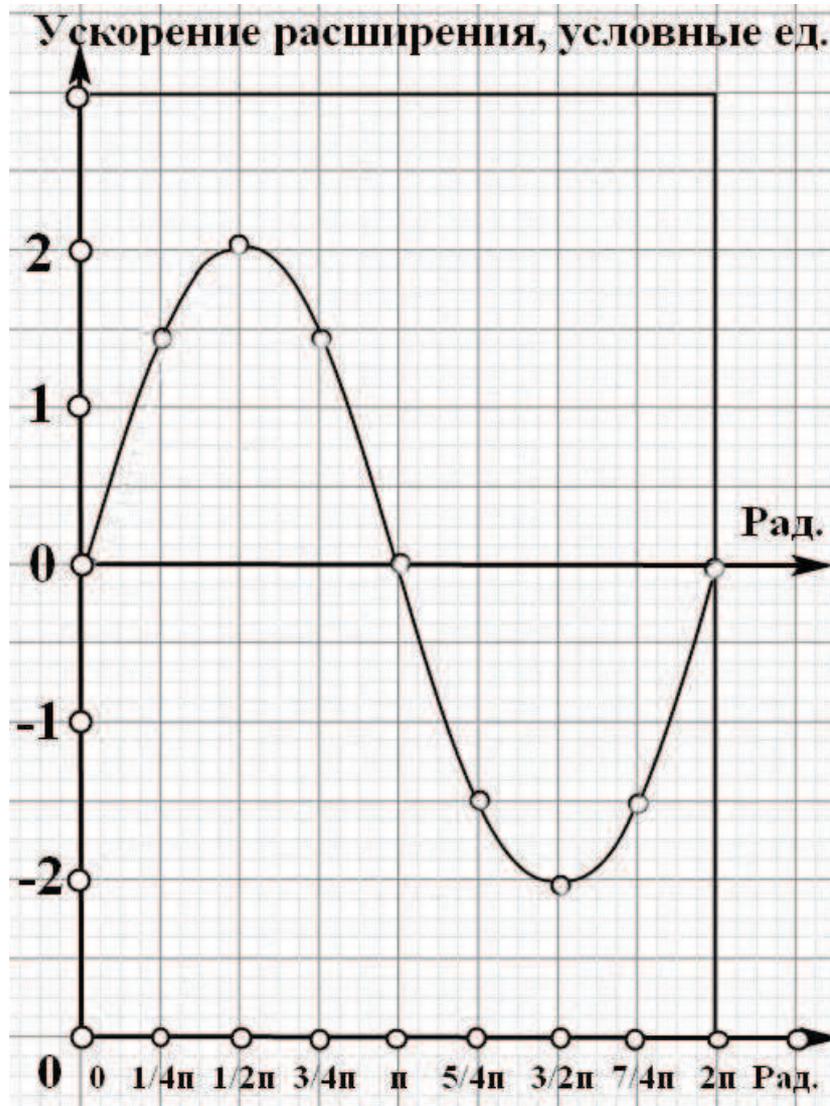
**Fig. 3.4 The rate of change in the volume of Thor's space depending on the vortex angle  $\varphi$**

### **3.3 Graph of the dependence of the expansion / contraction acceleration of the Torus volume on the vortex angle $\varphi$ .**

After replacing two constants  $r (= 1)$  and  $R (= 3)$ , equation (3-4) has the form:

$$d^2 V(\varphi) / d \varphi^2 = 2/3 \pi r^3 \sin \varphi = 0.66 * 3.14 \sin \varphi = 1.97 \sin \varphi, \dots(3-7)$$

the graph of the required dependence of the expansion / contraction acceleration of the space of the Torus volume depending on the vortex angle is shown in Fig. 3.5:



**Fig. 3.5 Acceleration of expansion / contraction of the Thor space volume depending on the vortex angle  $\varphi$**

As can be seen from the graph in Fig. 3.5, the acceleration of the expansion / contraction of the volume of space inside the Torus occurs according to a harmonic law and has an alternating character. So, in the interval of the first quarter of the circular angle (from  $0^0$  to  $90^0$ ), there is an accelerated expansion of space, which reaches a maximum at the point  $90^0$  degrees, and then (in the range from  $90^0$  to  $180^0$ ) is replaced by expansion with a deceleration, which ends by 180 degrees, then the

space compression cycle begins: first with acceleration (range from  $180^0$  to  $270^0$ ), and then - compression with deceleration (in the range from  $270^0$  to  $360^0$ ).

This harmonic law of accelerated-variable motion of space inside the Thor determines the unique property of the Universe in the form of a vortex Thor, which allows it to "do" without the notorious Dark Energy, thereby freeing the minds of cosmologists from ancient times from "headaches" and directing their efforts to a thorough analysis of this new and unique property, which will undoubtedly bring a lot of other, interesting information about the structure of Our Universe, which means it will allow us to advance in understanding the general structure of the Reality around us, bringing us closer to the answer to the most important and complex Question facing earthly science : "What is That that surrounds us, and what are we made of ourselves?"

#### 4. Experimental evidence

*"No amount of experimentation is possible  
prove the theory, but one experiment is enough,  
to refute it "*  
**/A. Einstein /**

The ingenious Albert Einstein, one of the most prolific theorists of the 20th century and the last of the romantics of the outgoing era of the cult of experimental physics, he said truly wonderful words that urged scientists to always follow the cult of His Majesty Experiment - cold, sobering and striking like the ruthless sword of the goddess of justice, and not to ruin their mind, talent and honor in for the sake of capricious and always changeable to their Majesty Madame Theory!

The criterion of truth should be only practice, only a well-staged experiment, better than which nothing can be for a scientist - without proof, any hypothesis is nothing, because, - *"What is accepted without proof can be rejected without proof"*  
**/ Euclid /.**

Today, this more than rational advice is often violated and without reliable proof, a hypothesis sometimes becomes a theory, an example is the Big Bang theory: raising

a beautiful hypothesis to the rank of a theory, not finding sufficient evidence for it, and even giving it the status of a dominant one, theoretical physicists reduced to naught "the very cornerstone Principle of scientific validity, invented by their colleagues so that any hypothesis should be accepted exclusively in accordance with the established criteria of scientific character, within the framework of the accepted by the scientific community *"... the system of categories, values, regulatory principles, methods of substantiation, samples, etc., by which the scientific community is guided in its activities ..."*, known as the "Scientific Method", is a criterion-principle that *"... includes methods of studying phenomena, systematization, correction of new and previously acquired knowledge. Inferences and conclusions are made using rules and principles of reasoning based on empirical (observable and measurable) data about an object ... Observations and experiments are the basis for obtaining data. To explain the observed facts, hypotheses are put forward and theories are built, on the basis of which, in turn, a model of the studied object is built."* [6]

For this reason, following the indicated "Scientific method" and the Principle of scientific validity, we will show, using the example of some of the most famous, but not explained in the framework of existing theoretical knowledge, cosmic mysteries obtained as a result of repeatedly verified observational experiments in space, for their compliance with the calculations and the provisions arising from the proposed by us theoretical (phenomenological) part of our Model of the structure of the Universe.

The purpose of such a test is to prove the adequacy and scientific nature of our Model of the Universe, offered to the attention of readers for solving unsolved problems of space. A positive result of such a proof will be an unconditional argument in favor of our Model.

**4.1 Consider a few of the most famous and unsolved problems of space, which relate only to the structure of the Universe itself:**

**Problem # 1: Dark Energy is the most important, most painful and most incomprehensible mystery for cosmology of the 20-th and 21-st centuries.**

The internet is replete with messages like this: “Doesn't dark energy exist? New evidence refuting the accepted model of the structure of the Universe ”:

*“Modern science claims that our Universe consists of only 5% of“ ordinary ”matter familiar to us. About a quarter more is made up of mysterious dark matter, about which we know quite little, since it is inaccessible to direct observation.*

*The largest part - the remaining two-thirds - falls on even more mysterious dark energy, about which we know practically nothing at all, but it is this energy that makes the Universe expand faster and faster. ” [7]*

Dark Energy is the cornerstone of the most active theory of the origin of the Universe today - the theory of the Big Bang (TBB), which, at the same time, increasingly conflicts with observational data and common sense: the cause is 95% of matter (along with Dark Matter) appearing in this theory, is beyond the limits of experimental observations and evidence, and is purely hypothetical, which grossly contradicts the previously mentioned Principle of Scientific Validity!

So, according to the famous scientist, astrophysicist, Nobel Prize laureate Hannes Olof Alfvén, referring the Big Bang hypothesis to the category of mathematical myths and, noting the growth of fanatical belief in it, he writes: “... *This cosmological theory is the height of absurdity - it claims that the entire universe emerged at a certain moment like an exploded atomic bomb, measuring (more or less) the size of a pinhead. It seems that, in today's intellectual atmosphere, the great advantage of Big Bang cosmology is that it is an insult to common sense: credo, quia absurdum (“I believe because it's absurd”)!*

*When scientists fight against astrological nonsense outside the walls of “temples of science”, it would be nice to remember that even worse nonsense is sometimes cultivated within these walls. ” [8]*

The solution of this most burning riddle in the history of astronomical science of the last few decades is the subject of our proposed work as a whole!

**Proof #1:**

And the little box just opened: the biggest mystery of cosmology has finally received the simplest, most beautiful and logically flawless explanation! This simplicity only once again testifies to the benefits of the work proposed by the author on the New model of the structure of the Universe, since there is a known historical rule according to which viable, "correct" theories do not need either complex and tangled phenomenological constructions or cumbersome theoretical constructions accessible to the mind of only a narrow circle of dedicated scientists!

A worthy alternative to this "dark entity" has been obtained, which, while not being a physical force, nevertheless provides the phenomenon of the accelerated expansion of the Universe that we observe today, which earlier, about 5-6 billion years, changed the transition from deceleration to acceleration! Such an amazing "power" is ... the very topology of the Universe in the form of a vortex Torus, which, due to the vortex rotation of the Universe, manifests itself in the fact that the volume of space inside the vortex changes not in a linear, but in a harmonious manner, i.e. with an increase in the parametric vortex angle from  $0^{\circ}$  to  $360^{\circ}$ , the volume of space first increases with increasing (interval  $0^{\circ} - 180^{\circ}$ ), and then - the increase in volume slows down ( $180^{\circ} - 360^{\circ}$ ) - (see the graph in Fig. 3.3), which later led us to obtaining the equation of the dependence of the alternating acceleration of change (expansion / contraction) of the volume of space (see Fig. 3.5), which has become a formal mathematical proof of the geometric nature of the force "accelerating" the Universe, which is a consequence of its unique topology!

This cyclical nature of the behavior of space inside the Universe is confirmed by both experimental results (see the works of Adam Riesz and Michael Turner, which will be discussed below) and our mathematical calculations performed in this work!

Now it became clear what accelerates the expansion of the Universe and why dark energy has nothing to do with this process: the accelerated expansion of the Universe is a consequence of its topology, and not any physical forces! A. Einstein, who put the geometry of space at the head of his theory of gravity, would most likely have approved this idea of ours about the role of geometry in the acceleration of the

Universe, which led us to an equally remarkable revelation designed to free the minds of scientists from the insoluble and erroneous theory of the dark that tormented them for many years. energy.

Amazing result obtained! Confirmed by dry mathematical calculations, according to which: Our Universe in the form of a vortex Torus with accelerations of different sign slows down ( $< 0$ ), expands ( $> 0$ ) and is in a state of equilibrium ( $= 0$ ) simultaneously, but at different points in space, while its the shape, volume and basic physical parameters (the ratio of the radii of the Thor) remain unchanged. It is difficult to imagine something similar in other models!

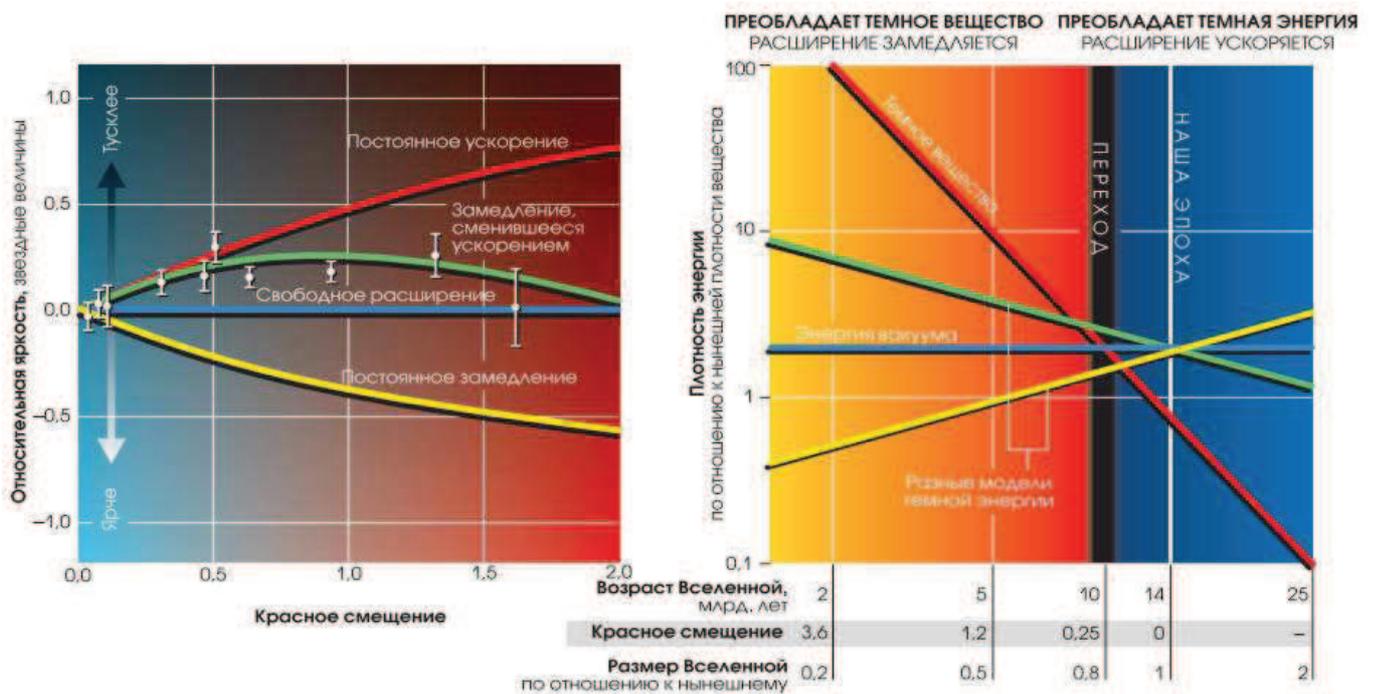
**Problem # 2: The accelerated expansion of the Universe observed today replaced the slowed expansion only 5-6 billion years ago. [9]**

**Proof #2:**

The accelerated expansion of the Universe, observed today, replaced its slow expansion, which happened about 5 billion years ago, was discovered by US astrophysicists Saul Perlmutter, Adam Riess and Australian and Brian Schmidt, who became laureates of the 2011 Nobel Prize in Physics "for the discovery of accelerated expansion The Universe through the observation of distant supernovae "- (see Fig. 4.1), this is what the media wrote about this important discovery:

*«... Observations of distant supernovae show that before the acceleration began, the expansion of the Universe was slowing down (see the left graph). Scientists have found that type 1a supernovae with redshifts greater than 0.6 are brighter than they could be if the expansion of the universe was always accelerating or if their light was weakened by intergalactic dust. The transition point in the expansion of the Universe from decelerating to accelerating is at a distance from our epoch by about 5 billion years in the past. If astronomers can pinpoint the given moment more precisely, they will know the density of dark energy at that time and, perhaps, understand the nature of this energy (right graph)» [10]*

A long 17 years have passed since these lines were written, but until now scientists have not been able to clarify either the "density of dark energy", nor to know its nature, nor to answer the question about the reason for the transition of the Universe from one state to another (from deceleration to acceleration), meanwhile, how the proposed Model of the Universe in the form of a vortex Thor easily copes with this, one of the most difficult mysteries of the cosmos, with the unraveling of the nature of the "force" that accelerates the expansion of space, an alternative to Dark Energy! To do this, you just need to compare the "green" curve of acceleration of expansion / contraction (see on the left graph in Fig. 4.1) with the graph of the dependence of the rate of change in the volume of Thor's space, in Fig. 3.4 and with a graph of the acceleration of expansion / contraction of the volume of the Thor space, in Fig. 3.5 presented in our work.



**Fig.4.1 - Change of expansion deceleration by its acceleration (from observations)**

Since the qualitative nature of the behavior of both graphs coincides, we can state the first theoretical substantiation of the observed in practice experimental result of variable accelerated expansion of the Universe observed from the point where the terrestrial observer is located within half of its observed radius, which is an

unconditional proof of the adequacy of the mathematical calculations of the Model and observational data obtained in experiment of three cosmologists!

On this example, we received a unique confirmation of the coincidence of the results of the theoretical Model and live practice!

**Problem No. 3: Unacceptably large differences in the definition of the Hubble constant, which determines the rate of expansion of the space of the Universe, measured at the moment by two different collaborations of cosmologists, but all attempts to eliminate this contradiction, or at least explain it, do not give a result.**

*«Hubble again showed that the universe is expanding faster than commonly believed:*

*In the general understanding of the expanding Universe, the farther a star or galaxy is, the faster it runs away from us. The Hubble constant, proposed by Edwin Hubble in the 1920s, answers the question: how much?*

*... In 2016, using the Hubble Space Telescope to calculate the distances to galaxies by the luminosity of the Cepheids observed in them ... they obtained a value of the Hubble constant of about 74 kilometers per second per megaparsec, which is more than the constant deduced from CMB observations and equal to 67 kilometers per second per megaparsec.*

*Until recently, scientists believed that as measurements became more accurate, this inconsistency would go away, but instead the difference was confirmed, and the latest refined calculations using the new Hubble observation method for 70 variable Cepheids in the Large Magellanic Cloud are again gave a value of 74 kilometers per second per megaparsec with an error of only 1.9 percent. This estimate strongly contradicts the value of the Hubble constant obtained by the ESA satellite "Planck" as a result of observing the expansion of the Universe 378,000 years after the Big Bang.*

*...“These are not just two inconsistent experiments. We measure something fundamentally different. The first is a measurement of how fast the universe we see today is expanding, and the second is a prediction based on the physics of the early cosmos and data on how fast it should expand. And, since the obtained values do not coincide, there is a very high probability that we are missing something in the cosmological model, which links the two epochs, ”added Adam Riess (experiment leader - author)” [11]*

**Proof #3:**

It is not at all difficult to explain this observed paradox within the framework of our proposed Model of the structure of the Universe: just one group of scientists explored an area of space 5-6 billion years away from us using the Hubble extraterrestrial observatory, and another - an area on the border of the Big Bang, i.e. e. at a distance of 380,000 years from the BB moment (from us - at a distance of more than 13 billion years), but with the help of the Planck space observatory. Since, in accordance with our theory, the Universe expands / decelerates according to a harmonious law, it is clear that the parameters characterizing its expansion change according to the same law (which is clearly seen from the "green graph" on the left side of the diagram shown in Fig. 4.1) ... Therefore, both groups of researchers did not make any errors in the measurements, they received the "correct" Hubble constants, but only - each one his own! Thus, it must be admitted that the Universe in the form of a vortex toroidal body requires a radical revision of many established ideas about its properties, but in order to obtain an adequate assessment, it is necessary to proceed from the proposed new Model of its structure and solely on the basis of criteria of scientific validity, about which was mentioned above.

**Problem # 4: Kashlinsky's Dark Streams - neither their origin nor the port of destination are known, - the flight in one direction in space of giant masses of matter in the form of galaxies and their clusters, observed in the part of space available to us, is evidence of the fact that the real structure of the Universe and**

the nature of the forces that determine its kinematics and topology are not known to us.

*“The expansion of the Universe, by the way, is the best explanation for the motion of galaxies in the territory we see. True, some features of this galactic movement are perplexing. A group of NASA specialists, studying microwave and X-ray radiation, found that about eight hundred distant galaxy clusters are moving together in one direction at a speed of a thousand kilometers per second, as if they were attracted by a certain magnet. This universal movement has been called the "dark stream". According to the latest data, it already covers 1400 galaxies. They are directed towards an area located more than three billion light-years from Earth. Scientists suggest that just somewhere out there, beyond the inaccessible to observations, there is a huge mass, which attracts matter. However, according to the existing theory, the substance after the Big Bang, which gave birth to our Universe, was distributed more or less evenly, which means that there can be no mass concentrations with such a fantastic force. Then what is there? "[12]*

**Proof #4:**

Kashlinsky's Dark Streams are one of the most important experimental proofs of the Model of the Universe proposed by the author (including the fact that it rotates), for the reason that the purposeful and coordinated movement of huge masses of matter inside the Universe is impossible under the influence of any external or internal forces, but exclusively as a result of the rotation of the Universe itself! In this and only in this case, it is possible to indicate the reason that generates Dark Streams: only the Universe, as a whole, in the form of a body of finite size, as a result of a complex vortex motion, is capable of enthralling with its inner surface all the surrounding space, which, in turn, carries away everything the substance in it! Such an experiment is not difficult to carry out in terrestrial conditions, it is enough to put a glass of tea with tea leaves floating in it on a rotating disk: in this case, not only the glass itself (analogy of the surface of the Universe) will begin to rotate, but also the liquid itself (analogy of space) and the tea leaves in it (analogy of matter in the form of galaxies

and their clusters), creating in general what cosmologists observe and call "Kashlinsky's Dark Streams".

Being adherents of "exact science", let us note some fundamental difference in the behavior of tea leaves in a glass of tea and the flows of matter in the observable Universe: in the first case, under the action of centrifugal force, tea leaves will eventually gather near the walls of the glass, and in real space of space all matter (galaxies, clusters, black holes, gas, dust, relic) will remain uniformly distributed throughout the entire volume of the Torus (which we actually observe, calling this property of space isotropy and homogeneity), as a result of the fact that the rotation of the real Universe is characterized by two types of rotation, those. not one degree of freedom (as in the case of tea), but two - the rotation of the Torus around the central axis OZ (analogous to the rotation of the disk and the glass) and the proper vortex rotation of the Torus along the generatrix of the circle - (see Fig. 3.2). By the way, as a result of this form of motion, the vortex balances the first centrifugal force, which leads to auto-preservation of the ratio of the Torus radii:  $r / R = \text{const}$ , which in turn leads to the stability of the vortex shape, preventing its destruction!

**Problem 5: The observed asymmetry of the spins of "left" and "right" spirals in galaxies is within 7%, which cannot be explained otherwise than if the Universe had a finite shape and if it rotated.**

Arguing for the rotation of the universe is one of the most difficult problems in cosmological science:

*“In the 90s of the last century, it turned out that the Universe was expanding, and with acceleration.*

*Now there is reason to believe that the Universe, most likely, also rotates around its axis. At least the data indicating such an amazing phenomenon was obtained by physicist Michael Longo of the University of Michigan.*

*As part of the Sloan Digital Sky Survey (SDSS) project, Michigan studied images of more than 15,000 spiral galaxies, determining which direction they are*

*twisted - clockwise or counterclockwise, right or left. The researchers looked for mirror symmetry in the universe, suggesting that the right-handed and left-handed galaxies should be equally divided. It turned out that there are much more leftists - those that rotate counterclockwise.*

*Longo's group peeped in about 1.2 billion light years - the anomaly, that is, asymmetry, persisted.*

*Followers of Longo from the Lawrence Technological University with the help of a special computer program have already examined 250 thousand spiral galaxies, casting their gaze as much as 3.4 billion light years. And they also found more left-handed galaxies than right-handed ones. ” [13]*

#### **Proof #5:**

The practical proof of the rotation of the Universe is also one of the most important experimental evidence (more precisely, the main thing (!)) Of the adequacy of the proposed by the author of the Model of the structure of the Universe, for the reason that the very concept of our Model is built precisely on the assumption of the vortex nature of the rotation of the Universe, and the mathematical proof of this thesis in the form of the equations and graphs given earlier (see Fig. 3.4 and Fig. 3.5) only confirmed the absolute correctness of the previously obtained phenomenological guesses, in accordance with “... *inferences and conclusions made using the rules and principles of reasoning based on empirical (observable and measurable) data about the object ...* ”, as required by the fundamental Principle of scientific validity!

#### **And yet She turns!**

**Now this is a clearly proven scientific fact, confirmed by the theoretical calculations proposed here and verified experimental evidence observed in practice!**

**The author is convinced that his proposed new Model of the structure of the Universe, confirmed by many observational data, is able to explain future cosmic**

**"problem" riddles, if they are discovered and the existing standard LDCM model will also not be able to explain them!**

## **5. Conclusions**

***“Imagination is more important than knowledge. Knowledge is limited, while imagination encompasses the whole world, stimulating progress, giving rise to evolution ”***

**/Albert Einstein/**

And so, the goal is achieved, the dependences of changes in the qualitative characteristics of the vortex Torus are obtained: change in volume, rate of change in volume and acceleration of change in volume depending on the vortex parametric angle  $\phi$ .

In fact, a mathematical description of the topological properties of space inside Our Universe, presented in the form of a toroidal Vortex, has been obtained. It is clearly seen that such a shape of the Universe allows it to have a finite shape and size, and allows space to simultaneously, but in different places, at rest, expand with acceleration, with deceleration, contract with acceleration, with deceleration, and at the same time not change any shape , no volume!

This is an absolutely amazing property of "our" Universe, which provides a simple and adequate explanation of a number of observational facts that the standard cosmological model is unable to explain - thus, there is no need for a hypothetical Dark Energy to explain the dynamic properties of the space of Our Universe, namely - expansion with acceleration at the present moment of universal time, explains the well-known fact recorded by cosmologists: why about 6 billion years ago the previous compression of the space of the Universe was replaced by the modern accelerated expansion!

**5.1 Interesting consequences from the solutions of the equations of state of the vortex Torus**

Let's refer to the diagram in Fig. 3.2 and to the graph in Figure 3.5, as can be clearly seen from the figures for one complete revolution of any point on the surface of the vortex Torus (when the angle changes from  $0 \pi$  to  $2 \pi$ ), the space inside the Torus-Universe undergoes the following dynamic stages of its state (by analogy with the time change of the Earth days):

-) from  $0 \pi$  to  $1/2 \pi$  (from 6-00 to 12-00) - the stage of accelerated expansion (analogue - morning);

-) from  $1/2 \pi$  to  $1 \pi$  (from 12-00 to 18-00) - stage of delayed expansion (day);

-) from  $1 \pi$  to  $3/2 \pi$  (from 18-00 to 12-00) - the stage of accelerated compression (evening);

-) from  $3/2 \pi$  to  $2 \pi$  (from 12-00 to 6-00) - stage of delayed compression (night);

Then the Universal Cycle repeats itself from the beginning!

Thus, one complete cosmic life Cycle of the Universe can be compared with the well-known philosophical and religious concept of the ancient sages of China and the East and known to us as the Day of Shiva! An amazing coincidence? Is it really accidental? Or maybe the ancient eastern sages knew something about the structure of Our Universe, which until today was not known to us, giving such an epic name to the real physical Process, which in such an amazing way completely coincided with the results of our phenomenological constructions and mathematical constructions!

In our opinion, a convincing and reasoned alternative to the fantastic hypothesis about Dark Energy has been obtained, and now it becomes clear why it has not yet been found either in space or in terrestrial experiments? It was not found because it simply does not exist in nature! The Universe itself accelerates / contracts the space inside itself, doing it simultaneously, but at different points, without changing its topological characteristics! And it does this by virtue of its unique topological properties that have no analogue in other bodies!

Accidental coincidence or someone's ingenious idea?

We do not think that Nature (or her Creator !?) has chosen not the best, not the most beautiful and not the most wonderful decision for Our Universe! Otherwise, we should accept and admit that we have received just such a solution, since such a vortex form of the existence of matter is the simplest and most widespread in Nature, and therefore only it is true!

## **5.2. Main results**

One of the most elusive and painful problems for astronomers of the planet has been solved - the riddle about the nature of the force that brings the space of the Universe into accelerated expansion and is known until now under the intriguing name of "Dark Energy". According to our proposed model, the reason for the phenomenon of accelerated expansion observed today should be sought in the topology of the Universe itself, when no external and internal physical forces are required to explain the expansion / contraction of its space, and the observed variable dynamics of motion ("from deceleration to acceleration") is achieved due to the unique form of the Universe itself, found by us in the form of a vortex Torah - the most widespread form of motion of matter in Our Reality!

And one more very important result for cosmologists: the Universe, which has the final form of a physical body, gives a very good chance to confirm the hypothesis of many Universes, because, just as there could not be one of our galaxies in our one Universe, so there cannot be one of our Universe in the Overreality that goes beyond it! Thus, we are expanding outwardly Our World to another large-scale level! This is great news for developers and admirers of the idea of the Multiverse and supporters of the theory of BV and the theory of Inflation!

And so, we have reached another large-scale level of Our Reality, naturally, the eternal philosophical question immediately arises: what is beyond it, beyond the border of our Universe? It's a difficult question, but that's what we and Homo Sapiens are to answer such questions. And therefore ... we will search!

**And so, recall:** According to our proposed New Theory of the structure of the Universe in the form of a vortex torus, Our Universe ... with variable acceleration: slows down, expands and is at rest simultaneously, but at different points in space, while its shape, volume and basic physical parameters (including the ratio of the Torus radii  $R$  and  $r$ ) remain unchanged!

## 6. Afterword

*“Fight and seek! Find and not give up! ”*

*/ Lord Tennyson "Ulysses" /*

Searching for answers about the structure of our Universe for long 50 years, the author can confidently say that even today we still live in the House, the knowledge of the structure of which, although gradually replenished by the efforts of earthly science, but also unresolved questions every day also become more and more more and more, and the gap in the contradiction between theory and practice is only widening!

But no matter how full the piggy bank of our knowledge about our Universe is, we have not come close to the question-questions, which, probably, will always gnaw our minds: what is what we call the Reality that surrounds us, accessible to our senses for sensations, observations and knowledge, and our mind for analysis and understanding, - we are not even able to formulate it in the most general form, because we not only lack observational data and theoretical knowledge, but also lack basic verbal concepts, logical images and mathematical formal definitions! We have no tools, neither linguistic, nor logical, nor mathematical!

Try to formulate for yourself, at least in your thoughts this question and you will understand all your powerlessness and all the greatness of the abyss that has risen before you:

- what is what we see around us and what we ourselves are a part of?
- who and how created this World?
- why does this grandiose Reality exist and we are in it?

Even about how our Promised Land is arranged, we do not know everything ... we do not even know what energetic processes melt magma in the center of our planet and prevent the Earth from cooling down for several billion years!

Naturally, further stay in such a suspended, indefinite state sooner or later will put humanity in front of a dilemma: "To know or not to know?", Since the answer to the second question largely depends on the answer to the second: " To be or not to be? "

One thing is clear, humanity cannot endlessly remain in ignorance, because this contradicts the very essence of both Being and the essence of Homo sapiens, whose purpose is to comprehend the truth, and therefore to know the world order of Our Reality.

That is why: **"The history of the earthly civilization is the history of the knowledge of the structure of Our Universe"**.

## 7. Acknowledgments

*"How much wisdom is needed to never lose kindness!"*

*/ M. Ebner-Eschenbach /*

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Thanks also to all future far-sighted and not greedy well-wishers who understand that there are more important things in the world than the latest smartphone model or a jackpot ripped off in a casino, those who understand that a person does not live by bread alone, that creative people of Science and other professions, Those who generously donate their talents and their righteous work for the good of society themselves need a kind word, recognition, awards, and material encouragement - naturally, if their work is worthy of such a high assessment of society! Look how beautifully the French king Charles IX said about this, who, discussing the role of material incentives in science, reminded his subjects that in a normal society interested in the future of his own and his children: *"horses and scientists should be fed, but not fed"*... but *"how much kindness there is in a man, so much life is in him"* - / R. Emerson /.

... How far is our society still from this wise moral dogma, invented by the clever French ruler almost 5 centuries ago ...

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**THE END**