

On Seven Serious Problems and Two Great Enigmas of Science and on Their Role in the Choice of Researcher's Worldview.

Vladislav S. Olkhovsky

Institute for Nuclear Research of NASU,

Kiev-028, prospekt Nauki 47, Ukraine;

Institute of the Universe and Life Genesis,

Kiev, the joint ensemble of evangelical churches of the Ukraine;

Email: olkhovsky@mail.ru

Abstract

There are presented six grand problems of natural sciences and mathematics which are connected with theological problems and also two philosophical enigmas of science. Particularly exposed the problem of resurrection of Jesus Christ is exposed particularly as a historical fact for the unbelievers. They are popularly described. It is clearly indicated the connection of the researcher's worldview with the essence of these problems and enigmas during their investigations.

Key words: universe origin, anthropic principle, time irreversibility, quantum mechanics, origin of alive, origin of spiritual human life, resurrection of Jesus Christ, applicability of mathematics, connection between human brain and spiritual life.

1. Introduction.

In various fields of modern science there are distinguished seven important problems and two enigmas, which can be related to 9 miracles of being as a Divine Creation and Providence. Some of them are discussed in scientific papers as the great and grand problems of physics (see, for instance, [1]). All of them are up to now discussed by parts in some general or popular papers on natural sciences and in a lot of philosophic and apologetic theological papers. The complete list of 7 problems and 2 enigma of science was firstly presented in [2]. Their interpretation and attempts of their interpretation and/or solution are usually connected with the researcher's worldview. These are:

- (1) **The problem of the universe origin.**
- (2) **The problem of the anthropic principle in the tuning of nature laws and physical constants.**
- (3) **The problem of the irreversibility of time.**
- (4) **The problem of interpretation and comprehension of quantum mechanics.**
- (5) **The problem of the origin of the alive** (including the particular dilemma: either the progressive biologic macro-evolution, or the creation of species by the Intelligent Design).
- (6) **The problem of the origin of the spiritual human life.**
- (7) **The resurrection of Jesus Christ as a historical fact.**
- (8) **Enigma of the unexplainable applicability of the abstract mathematical principles.**
- (9) **Enigma of the unexplainable connection of the human mind and spiritual life with the human brain.**

As to the problem 1, we can add here the following. There are analyzed in [3] such points of view in the explanations of the universe origin: Some physicists do sincerely consider that the universe can be explained by itself. For instance, the space-time births its own “dust” during the process of its own self-creation and someone calls it by the “cosmic self-tuning (cosmic bootstrap)”, as if indicating to the internal contradiction of the idea that someone can raise himself, pulling himself by bootlaces (P. Atkins). Others don’t really hesitate in the evident internal contradiction of such explanations, since a certain cause cannot bring to a certain consequence without preceding that consequence in its existing (K. Word). But some, like S. Hawking, consider that no unified theory of the world can describe the birth of the world by itself, exactly similarly as to that science can never reply to the answer why the universe exists. In other words, the laws of nature, revealed by men, cannot be themselves generate the causes of phenomena. The proposed sometimes statements on the appearance of the universe as a result of some fluctuation in quantum vacuum do only move back the question on its beginning by one step, since after such statement the questions do inevitably raise on the origin of such vacuum and of laws of its ruling. Therefore, notwithstanding the surprising agreement of various scientists on the existence of the universe beginning, all the attempts to prove that the universe can be explained by itself are as much dissatisfied as any non-critical accepting of the representation of the *entirely material* beginning of the world, because it cannot explain neither rational cognoscibility of the world, nor its harmonic tuning on the human existing!

As to the problem 5, we add here that the conclusion on the Intelligent Design in the creation of the genetic information in the alive organisms is made not because we have a shortage of scientific data but, on the contrary, namely because we *have* them! Our knowledge of the genetic biologic information plus our knowledge of that that the information sources from the Intelligent Design are unique possible sources of such information for now, together with the fact that the casual chances and the laws of nature cannot birth the given complex genetic information, bring to the abductive conclusion with the best possible explanation hypothesis. Then, as a summary of the facts, which testimony against the doctrine of the progressive biologic macro-evolution and enlisted in a lot of scientific apologetic Christian papers (see, in particular, [4-6]), one can state that:

There is an extensive introduction in the large number of open problems in many fields of physics, published by the Russian physicist V. Ginzburg in [1], which is rather interesting to study. Inside this large list of open problems of modern physics (and in a certain degree of modern natural sciences), represented by V. Ginzburg repeatedly in Russian editions, some of them are marked him “great” or “grand” problems. Between namely these problems I would like to separate four of them:

2. The problems 1 and 2 (the problem of the universe origin and the problem of the anthropic principle).

They are connected with the cosmological problem (in other words, the problem of the Universe origin). According to V. Ginzburg, it is also a grand problem, or strictly speaking, a great complex of cosmic problems many of which are far from the solution.

(I) Earlier, after Enlightenment till approximately 1920, scientists in the natural sciences did usually consider the Universe as *eternally existing and eternally moving*.

Now the most convincing arguments against the model of the eternally existing Universe are:

- (a) *the second law of thermodynamics which does inevitably bring to the heat death of the Universe,*
- (b) *the observed cosmic microwave background .*

The most surprising conclusion of the revealed non-stationary state of the Universe is *the existence of the “beginning”, under which the majority of physicists understand the beginning of the Universe expansion.*

The cosmologic problem as the problem of the origin and evolution of the Universe has initiated to be analyzed by A.Einstein (after 1917) and now it is connected with papers of many other physicists. The first several authors had been G.Lemaître (who proposed what became known as the Big Bang theory of the origin of the Universe, although he called it his "hypothesis of the primeval atom"), A.Friedman and G.Gamow.

And what namely had been in the "beginning"? Gamow had assumed in 1921 that the expansion had initiated from the super-condensed hot state as a result of the *Big Bang*, to which he and others had ascribed the time moment $t=0$, i.e. the beginning of the Universe history. The initial state in this model is *postulated*. However, *the nature* of the initial super-condensed hot Universe state *is not known*. Such initial point (or super-small region), in which the temperature, pressure, energy density etc had reached the anomalous huge (almost infinite) values, can be considered as a particular point, where The "physical" processes cannot be described by physical equations and in fact are excluded from the model analysis.

Strictly speaking, namely in the region of this point (from $t = 0$ till $\sim t_0 = 10^{-44}$ sec, where t_0 is the Planck time) is arising the general problem of the world origin and also the choice dilemma: the beginning of the Universe formation from vacuum ("nothing") is *either* a result of the irrational randomness after passing from other space-time dimensions or from other universe, caused by some unknown process, *or* a result of the creation of the expanding Universe (together with the laws of its functioning) by the supreme intelligent design from *nigilo*.

The framework for the standard cosmologic model relies on Albert Einstein's general relativity and on simplifying assumptions (such as homogeneity and isotropy of space). There are even non-standard alternative models. Now there are many supporters of Big Bang models. The number of papers and books on standard and non-standard versions of the cosmologic Big Bang models is too enormous for citing in this not very large paper (it is possible to indicate, only for instance, [7-10] for initial reading in cosmology of the Universe and in the different quasi-classical and quantum approaches in cosmology for description of the creation and the initial expansion of the Universe). However, there is no well-supported model describing the action prior to 10^{-15} seconds or so. Apparently a new unified theory of quantum gravitation is needed to break this barrier. Understanding this earliest of eras in the history of the Universe is currently one of the most important unsolved problems in physics.

Moreover, it is worth to underline that many physicists consider that the second law of thermodynamics is universal for all closed systems, including also our Universe as a whole (which is closed in naturalistic one-world view). Therefore the heat death is inevitable (see, for instance, [1] and especially [11]). And finally, to-day a lot of attention of researchers is dedicated to the problems of hypothetical dark mass and dark energy.

(II) From 1973 (and particularly after eighties) the term "*anthropic principle*", introduced by B.Carter, has become to acquire in the science and out of the science a certain popularity [12,13]. Carter and other authors had been noted that physical constants must have values in the very narrow interval in order the existence of the biologic life can become possible, and that the measured values of these constants are really found in this interval. In other words, the Universe seems to be exactly such as it is necessary for the origin of the life. If physical constants would be even slightly other, then the life could be impossible.

After meeting such testimonies, a number of scientists had formulated several interpretations of anthropic principle each of which brings the researchers to the worldview choice in its peculiar way. We shall consider here two of them.

According to *the weak anthropic principle* (WAP), the observed values of physical and cosmological constants caused by the necessary demand that the regions, where the organic life would be developed, ought to be possible. And in the context of WAP there is the possibility of choice between two alternatives:

(1) *Either* someone does irrationally believe that there are possible an infinity of universes, in the past, in the present and in the future, and we exist and are sure in the existence of our Universe namely because the unique combination of its parameters and properties could permit our origin and existence.

(2) *Or* someone does (also irrationally) believe that our unique Universe is created by Intelligent Design of a Creator (or God) and the human being is also created by Creator in order to govern the Universe.

According to *the strong anthropic principle* (SAP), the Universe has to have such properties which permit earlier or later the development of life. This form of the anthropic principle does not only state that the universe properties are limited by the narrow set of values, compatible with the development of the human life, but does also state that this limitation is *necessary* for such purpose. So, one can interpret such tuning of the universe parameters as the testimony of the supreme intelligent design of a certain creative basis. There is also a rather unexpected interpretation of SAP, connected with the eastern philosophy, but it is not widely known.

3. The problem 3 (the problem of the irreversibility of time).

It is more strictly the origin of the irreversibility of time not only on the earth and in the near cosmos, but also in all universe. The problem of the irreversibility of time is one of the most and difficult problems of physics [1,14,15].

In the Newton mechanics, in the relativity theory, in quantum mechanics and quantum electrodynamics the equations of the microscopic motion of the particles and photons are symmetric relative to changing of time sign (direction) and describe processes, which can go along both time directions. More strictly, physical laws do not change under the combined operation *CPT*, where *C*, *P* and *T* mean changes particles for antiparticles, then to the mirror image (so left and right are interchanged) and at last the reverse the time direction, respectively. The laws of physics do practically (with the accuracy of 10^{-10}) not changed under the combined action of two operators, *C* and *P*. [It signifies that, in particular, life would be just the same for inhabitants of another planet made of antimatter and who were our mirror images]. With the same accuracy (10^{-10}) the laws of physics must also be unchanged under the alone operator *T*. However, there is a big difference between the forward and backward time directions in our everyday life on the macroscopic and cosmic levels, which cannot be explained by the extremely small (10^{-10}) violations of *CP* and *T*-invariance in the (infra-)weak interactions between elementary particles. And it is a serious problem: *how* does appear the irreversibility of time on the macroscopic and cosmic levels?

Before to try answering this question, let bring a few typical examples of the time asymmetry in the nature be considered.

The heat passes from hot bodies to cold ones. Any perturbation expands with time in all directions and decreases. Practically any macroscopic process (with the exception of super-fluid and super-conductive phenomena) is dissipative in its nature and any moving macroscopic body loses its energy and finally stops. We can see a cup falling off a table and breaking in pieces on the floor but we do not see pieces of the broken cup gathering together off the floor and jumping back onto the table. Around us there is a lot of changes of the biologic origin: A man is being born, is developing, is becoming old and at last is dying. A lot of manifestations of the earth history has a character of information registrations but any concrete information is wiped out with time.

In all these examples there is the increase of disorder or entropy, and respectively the decrease of information, with time. It is the essence of the second law of thermodynamics. Someone says that it determines the thermodynamic arrow of time, that is the direction of time, in which disorder, or entropy, increases.

There are also other kinds of asymmetries. We can observe only delayed electromagnetic waves outcoming from a point source in all directions into the universe. But nobody observed advanced waves incoming from the infinity to a point. Someone considers that an explanation of this asymmetry cannot be based on local considerations and demands taking into account the large-scale (cosmologic) properties of the universe, which is now expanding.

There are opinions about at least two arrows of time besides the thermodynamic one: the psychological arrow – the direction in which we feel time passing and remember the past but not the future; then the cosmologic arrow of time – the direction of time in which the universe is expanding. These opinions originated a lot of new questions:

Does the thermodynamic arrow determine the psychological one?

Do three arrows always indicate to the same direction?

What is connection between the thermodynamic and cosmologic arrows?

And so on. Now all these questions are open. And it is almost evident that the observed arrow of time is not determined by only single physical process and the existence of the direction is a general property of time which has a lot of different manifestations.

The absence of the scientific response on all such questions on time does particularly sharpen the problem of the choice of the world-view (in the question on the future of universe and of the humanity). Let us analyze theologically this problem [15]. The second law of thermodynamics seems to be created by God simultaneously with other laws of Nature during the Creation of the universe. Before the sin fall the activity of the Saint Spirit had been restored the order in Nature and had been ensured the physical immortality of the first men not by the elimination of the second law of thermodynamics, but inserting an order and support of life by His creative activity. But after sin fall, i.e. after the human separation from God, the non-separable connection of an order and life with the Saint Spirit vanished (although a certain support of spiritual life remained). A man had lost his physical immortality and, although he does not noticeably govern the creation, however he continues to influence on it. Only after the second arrival of Christ, when a new universe will be created, the Saint Spirit will begin again to act everywhere, and a saved man, repented and accepted the expiatory sacrifice of Christ, will acquire the physical immortality and together with Christ and under His leadership will govern eternally the creation.

4. The problem 4 (the problem of interpretation and comprehension of quantum mechanics).

The majority of critics of quantum mechanics are unsatisfied with the probabilistic nature of its predictions. One can add here also the questions and paradoxes of the theory of quantum measurements theory, especially like the wave-function reduction and the Einstein-Podolsky-Rosen paradox. The appearance of quantum mechanics, and, in particular, the discussion of N.Bohr with A.Einstein (lasting many years), had seriously undermined the traditional forms of the naïve realism in the philosophy of the scientific realism and had strongly influenced (and continues to influence) not only on physics but also on other kinds of knowledge in the sense of the dependence of the reality on the observer and, moreover, on our understanding of the human knowledge at all. The problem of the relativistic quantum mechanics and quantum field theory is even much more sharp because of the incompatibility of the main premises of the quantum theory and of the relativity theory.

Various interpretations of quantum mechanics. Not only philosophers of scientific critical realism, but also up to now a certain part of physicists, beginning from A. Einstein, D.Bohm, Y.Aharonov and some others, did not agree with the Copenhagen interpretation of quantum mechanics and, moreover, had constructed alternative versions of interpretation (see, for instance, [16-24]).

Einstein never accepted quantum mechanics as a "real" and complete theory, struggling to the end of his life for an interpretation that could comply with relativity without complying with the Heisenberg uncertainty principle. As he once said: "*God does not play dice*", skeptically referring to the Copenhagen interpretation of quantum mechanics which says there exists no objective physical reality other than that which is revealed through measurement and observation.

The Einstein-Podolsky-Rosen paradox and various approaches to its resolution. In 1935 Einstein, Podolsky, and Rosen [16] were formulated their thought experiment, which had been called the *EPR paradox* (which is later also referred to as the *EPRB paradox* after Bohm, who modernized the formulation of the thought experiment). Taking a system of two correlated particles A and B, they supposed that A and B are arisen in one point and then are flying in different directions. No particle had the defined coordinate and impulse at the moment of their birth but as a consequence of the impulse conservation, the sum the particle impulses is always equal to zero, as well as the sum of their coordinates. If one measures the coordinate of the particle A, its wave function will be reduced to a certain narrow distribution near a certain point. And simultaneously the wave function of the particle B will be similarly reduced, since the coordinate of the particle B after such measurement will be known too. So, if the wave function does completely characterize a particle, simultaneously something will be happened really with the particle B, although the measurement was performed with the particle A, which could be very far from the particle B! But if the wave function of the particle B will be changed *without any measurement (and hence any performed change) of the particle B*, consequently the wave function is not *good*, or *complete* characteristics of the quantum particle. Namely in this consists the paradox EPR. However, in reality the considerations of the thought EPR experiment do not disprove quantum mechanics and even the conceit of wave function at all. The point is that the both correlated particles are characterized by the only one common wave function and one cannot ascribe a certain wave function to any from the correlated particles. Therefore at the moment of the measurement of one from two correlated but far remote particles *the common wave function of both correlated particles is really changing*. That was cleared up after the publication of the EPR article.

The EPR paradox had stimulated the development of a series of new conceits and caused the interest to the correlated states of quantum particles. When such states were revealed experimentally for photons, there was started a rapid development of a new physical region – quantum optics. Besides that, the experiments with correlated particles of quantum particles permitted to verify if the probabilistic behavior is really a property of any separate quantum particle or it is a property of the ensemble of particles. It had also drawn attention to a phenomenon predicted by quantum mechanics known as *quantum entanglement*, in which measurements on spatially separated quantum systems can instantaneously influence one another. As a result, quantum mechanics violates a principle formulated by Einstein, known as the principle of locality or *local realism*, which states that changes, performed on one physical system, should have no immediate effect on another spatially separated system. The principle of locality seems to be persuasive, because, according to relativity, information can never be transmitted faster than the speed of light, or causality would be violated. Any theory, violating causality, would be deeply unsatisfying. However, a detailed analysis of the EPR scenario shows that quantum mechanics violates locality without violating causality, because no information can be transmitted using quantum entanglement.

Nevertheless, the principle of locality appeals powerfully to physical intuition, and Einstein, Podolsky and Rosen were unwilling to abandon it. They suggested that quantum mechanics is not a complete theory, just an (admittedly successful) statistical approximation to some yet-undiscovered description of nature. Several such descriptions of quantum mechanics, known as "*local hidden variable parameters*", were proposed. These deterministically assign definite values to all the physical quantities at all times, and explicitly preserve the principle of locality.

Of the several objections to the then current interpretation of the quantum mechanics spearheaded by Einstein, the EPR paradox was the subtlest and most successful. The EPR paradox has not been resolved or explained, in a way, which agrees with classical intuition, up to this day. It brought a new clarity and permanent shift in thinking about 'what is reality' and what is a 'state of a physical system'.

The shift was caused by the EPR thought experiment, which has shown how to measure the property of a particle, such as a position, *without* disturbing it. In today's terminology, we would say that they did the determination by measuring the state of a distant but entangled particle. *Quantum entanglement* is a property of a system of two or more particles (objects) in which the quantum states of the constituting objects are linked together so that one object can no longer be adequately described without full mention of its counterpart—even if the individual objects are spatially separated. According to quantum mechanics, the state of the counterpart particle will instantly change even though we did not disturb it in any local way. It conflicts with our classical intuition with the relativistic principle of locality. Different views on the essence of the quantum entanglement bring to different interpretations of quantum mechanics. The very concept of quantum entanglement also conflicts with our intuition the same way.

However, experiments have shown that entanglement does occur, and in fact quantum entanglement has practical applications in the field of *quantum cryptography* and *quantum computation*. Earlier quantum entanglement had been utilized in experiments with *quantum teleportation*. *Quantum teleportation* is a technique used to transfer quantum information from one quantum system to another. It does not transport the system itself, nor does it allow communication of information at superluminal (faster than light) speed. Its distinguishing feature is that it can transmit the information present in a quantum superposition, useful for quantum communication and quantum computation. In quantum cryptography, an entangled signal is sent down a communications channel making it impossible to intercept and rebroadcast that signal without leaving a trace. In quantum computation, entangled states allow simultaneous computations to occur in one step.

Entanglement has many applications in quantum information theory [25-33]. Mixed state entanglement can be viewed as a resource for quantum communication. With the aid of entanglement, otherwise impossible tasks may be achieved. Among the best known applications of entanglement there is super-dense coding .

In 1964 J.Bell had shown that many theories, known as hidden variable theories, are either non-local or known as satisfying Bell inequality [18]. Quantum mechanics predicts that this inequality is not satisfied. To make sure, additional experiments were made to confirm that predicted action at distance is indeed instant. Today most physicists agree that local hidden variable theories are untenable and that the principle of locality does not hold. Therefore, the EPR paradox would only be a paradox because our physical intuition does not correspond to physical reality. But even now the topic remains active and some people are still looking for. Quantum mechanics is neither "real" (since measurements do not *state*, but instead *prepare* properties of the system) nor "local" (since the state vector comprises the simultaneous probability amplitudes for all positions), and the properties of entanglement are some of the many reasons why the Copenhagen Interpretation is no longer considered standard by a large proportion of the scientific community. So, the discussion of N.Bohr with A.Einstein had originated so many interesting fundamental results, experimental applications and other (already second or derived) discussions, which have endless continuation up to now, that it was unique in the history of physics.

And now, let us speak some words on the *many-world interpretation* (MWI) in quantum mechanics (and in quantum cosmology). In this interpretation one assumes the existence of the parallel universes, in every of which the same nature laws and physical constants are acting, but all of them are found in different states. MWI refuses an indeterminate collapse of the wave function which is connected with the measurement in

the Copenhagen interpretation. The ideas of MWI had been originated in the phd-thesis of H.Everett but the term MWI had been proposed by B.S.M. de Witt who had developed that idea, and then the various authors had participated in the further development of that topic [34-43].

In various versions of MWI there two main points: The first one consists in the existence of the wave function for the total Universe, described by the Schrodinger equation, but without any in-determined collapse. The second one consists in that such state of the Universes is the quantum superposition of several (and may be, of the infinite number) states of the equal parallel universes which are non-interacting among themselves.

According to the modern criteria of the scientific theories, MWI is experimentally non-verified and non-falsified, and therefore is not scientific! However, any other interpretation of quantum mechanics, including the Copenhagen one, is also not scientific but philosophical and therefore the usefulness of the quantum-mechanical interpretation is determined by its pragmatism. And, although the analysis of some problems in the MWI brings to the same results as in any other interpretation, but these results are more simple logically, so they had been resulted to some physicists to be more popular in quantum mechanics (and quantum cosmology).

May be, it seems that the majority of the opponents of the MWI reject it because, for them, introducing a very large number of worlds that we do not see is an extreme violation of Ockham's principle: "Entities are not to be multiplied beyond necessity". However, in judging physical theories one could reasonably argue that one should not multiply physical laws beyond necessity either (such a version of Ockham's Razor has been applied in the past), and in this respect the MWI is the most economical theory. Indeed, it has all the laws of the standard quantum theory, but without the collapse postulate, the most problematic of physical laws.

The reason for adopting the MWI is that it avoids the collapse of the quantum wave. And there is no experimental evidence in favor of collapse and against the MWI. We need not assume that Nature plays dice. The MWI is a deterministic theory for a physical Universe and it explains why a world appears to be in-deterministic for human observers.

The MWI exhibits some kind of non-locality: "world" is a non-local concept, but it avoids action at a distance and, therefore, it is not in conflict with the relativistic quantum mechanics.

The MWI is not the most accepted interpretation of quantum theory among physicists, but it is becoming increasingly popular .

The strongest proponents of the MWI can be found in the communities of quantum cosmology and quantum computing. In quantum cosmology it makes it possible to discuss the whole Universe avoiding the difficulty of the standard interpretation which requires an external observer. In quantum computing, the key issue is the parallel processing performed on the same computer; this is very similar to the basic picture of the MWI. However, the advantage of the MWI is that it allows us to view quantum mechanics as a complete and consistent physical theory which agrees with all experimental results obtained to date. And also, the elegant conception of the de-coherence, proposed in 1970 by Dieter Zeh, explains that the various branches of the single wave function, which describe these worlds, are oscillating in time with the different phases and so as if do not exist each for other [44].

The ensemble interpretation. For the sake of the completeness it must be noted that there is known one more interpretation (or more exactly, several versions of that interpretation), which is named by the statistic (or the ensemble) interpretation. It correlates the mathematical apparatus of quantum mechanics not simply with the ensemble of the measurement results, but with the ensemble of the micro-systems, connected with these results. There were in the A.Einstein, K.Popper, L.I.Mandelstam and others in 30-th at its source. As to the opinion of Einstein, the in-deterministic aspect of quantum mechanics follows from the failure to

ensure the complete description but not from the immanent characteristics of the matter itself. Einstein proposed his own interpretation, in which he defended the Born's statistical postulate for ψ -function but interpreting it in the sense that the ψ -function is connected not with the single physical system but with the *ensemble* of identically prepared systems. And the statistical character of the quantum theory is a consequence of the incompleteness of its description of the reality. From such positions some manuals and lecture notes were prepared, for instance, the lectures of L.I.Mandelstam [45] and the manuals of D.I.Blokhintsev on quantum mechanics in 1949-1976 [46], in which there were constantly introduced the conceit of the *ensemble of the systems, which are found under the equal macroscopic conditions, independently each from other*. The same interpretation was used also by L.Ballentine [47] and others (see also [48,49]). In some versions of this ensemble interpretation it turned out to be possible to bring the conceit "the reduction of the wave function" to an objective effect of the probability theory or to somewhat "weaken" it (may be, that someone can be able even to avoid the introducing the conceit "reduction", after a certain fine elaboration of this kind of interpretation – and therefore the statistical ensemble interpretation will be more preferable than MWI). But up to now the ensemble interpretation did only expand the space of debates and made the argumentation more persuading, however this interpretation did not bring to new conclusions in comparison with the general Copenhagen interpretation and the conceit of "hidden parameters". In the West the debates between the supporters of the ensemble and Copenhagen interpretations went along the channels of the usual discussions about the philosophy of quantum mechanics (the refinements of positions, exposures of premises, considerations of paradoxes etc), without the exit out of the main Bohr-Einstein discussion. And the Soviet supporters of the ensemble interpretation (K.B.Nikolsky, D.I.Blokhintsev and their followers) went along the way of the non-academic political polemics, which did strongly compromised that interpretation in the eyes of the non-communist compatriot physicists.

A short summary on various interpretations of quantum mechanics. Up to now the problem of the final interpretation of quantum mechanics and of quantum theory of measurements is far from the total consensus and remains to be open for physicists and moreover for philosophers (in the region of the science philosophy) and for theologians (in the region of the scientific apologetics of the Christianity).

There is a rather interesting thought on the possibility of such extrapolations of quantum mechanics into the philosophy and theology, which is compatible with the Biblical point of view, in [50]. May be, the microscopic objects do exist only therefore that God observes them? And further: If it is obligatory that the conscious observer is required for the actualization of the creation of the universe and if the Copenhagen interpretation of quantum mechanics is considered as a final one, one can attend only one possibility of the theistic generalization, which is compatible with the biblical worldview, – admit that the Creator had realized His Own Choice from a variety of possibilities allowed by quantum mechanics (also created by Him).

And in conclusion, one can add that the internal inconsistency of the premises of quantum mechanics as a non-local theory and of the relativity theory (both special and general) lies on the bases of the impossibility to construct self-consistent relativistic quantum mechanics, quantum field theory and quantum cosmology even in the quasi-linear approximation.

As a whole, the problem of the final interpretation of quantum mechanics and of quantum theory of measurements is far from the total consensus and still remains open for both physicists and philosophers (in the science philosophy).

One can add here that the still inherent incompatibility of the postulates of quantum theory as non-local theory and relativity theory (both special and general) as local theory is the main root of the impossibility to

construct the self-consistent relativistic quantum mechanics, quantum field theory and the quantum cosmology even in quasi-linear approximation.

Another long incompleteness of non-relativistic quantum mechanics (even in the Copenhagen interpretation) had been the problem of time as a quantum observable, canonically conjugated to energy; and its solution is now the *final completed chapter in its scientific (physical and mathematical) foundations*. It has been known from the beginning of twentieth of XX (see [51] and later also the discussion of Y.Aharonov and D.Bohm with N.S.Krylov and V.A.Fock [52,53]) till the last years, when it has in fact been resolved practically by using the mathematical means (see [54]). And, moreover, the solution of this problem brought to one more paradox with the experimentally observed non-locality of quantum mechanics in tunneling times – the Hartman effect with its generalizations and violations.

5. The problem 5 (the problem of the origin of the biologic life).

Now let us analyze, in a condensed way, one of the great natural problems marked in [1] – *the problem of the reductionism of biology to physics* (including, first of all, *the problem of the physical and chemical explanation of the origin of the biologic life*).

Explanation of the origin of the biologic life in terms of physics and, in general, of natural sciences (chemistry etc., including also mathematics) \leftrightarrow there is a problem of the origin of the genetics, genetic code (or at least a small set of several codes) which is unique for all the terrestrial biosphere, and the defense mechanisms for the defense of the organism development during cell reproduction,...

\leftrightarrow there is an inevitable choice (dilemma): *either* a natural process like a certain jump which is similar to some kind of phase transition (or like to synergetic process, or even like the irrational many-world interpretation), *or* a supreme intelligent design of a super-human creative basis in the being (or a Creator).

Any attempt of the natural origin is failed. And not only because the self-origin of only one self-reproducing cell has not a scientifically reliable explanation in the limits of the modern physics (the probability of the chance formation of the protein configuration, containing still 500 nucleotides, is extremely small, i.e. near $1/10^{950}$, and for the cell formation it is necessary at least 250 different proteins). There are no scientific explanations yet even for the following facts and no answers for the following problems:

How a numerous quantity of the chemical reactions could take place in a very limited space volume for create one protein molecule?

How there were created the conditions, which were necessary for uniting some components and at the same time were unfavorable for uniting other components, and how then the successive creation of a protein (or RNA or DNA) molecule can happen?

If even a principal possibility of the formation of the simplest protein components (DNA) had been shown in the known Oparin, Miller (etc) experiments under the special laboratory conditions, all the same it is very remote from the conditions of the primordial earth or of the unstable cosmos. So, no terrestrial or cosmic origin of cells (moreover, with the genetic structure) are impossible!

And how one can explain that

(a) The genetic information in the DNA can be read only by the specific ferments, for the creation of which the special information is also coded in the DNA.

(b) The biochemical process of the protein synthesis is the most complicated process between all known biochemical processes in the cell, and also some protein is already necessary for the protein production. Then, the genetic code is beforehand required for the information transfer from the DNA to the protein, and such code is almost universal for the whole terrestrial biosphere.

(c) And finally, the genetic code has the vitally necessary control system, which is, in its turn, is coded in the DNA.

It is impossible to explain all these facts in the natural way.

(d) And how one (or almost one) main genetic code for the whole terrestrial biosphere had been originated?

Nobody could elaborate somehow working model of the origin of even one self-reproducing cell yet.

The first main part of this problem of the origin consists in the absence of the answer to the following question: *how* had been originated the conditions, which are vitally necessary for living systems now, during that time when the life had been absent but which are created by only living systems! So, it is absolutely unclear: what had been earlier – habitat with is necessary for the life, or the alive organisms in the medium which had not supported the life.

The second main part of this problem consists in the mystery of the origin of the enormous quantity of the coded genetic information.

Finally, there is no doubt that *the whole terrestrial biosphere is a wonderfully balanced eco-system of the irreducible complexity and integrity*. The interaction of all its components (flora, fauna, micro-organisms and habitat) is such that the disappearance of even if one of them will bring to the disappearance of the whole biosphere.

So, it is not surprising that during the last ten (or somewhat more) years the number of scientific papers dedicated to the critics of the natural evolutionary biologic and pre-biologic theories has become to increase [55-58].

There some, may be, naturalists who do still hope that certain synergetic processes can initiate the self-organization of the non-living matter into the alive organisms. But now it is known (see, for instance, [59]) that *all concrete macroscopic systems with known history of their origin, which are more highly ordered than their environment, were created not by rare occasional fluctuations, but under the direct influence of external forces or as a result of bifurcations caused by some non-linearity and external forces in the open systems*. Moreover, I. Prigogine denied that revealed by him processes of local decreasing of entropy can explain the origin of the alive from the non-alive [60]: *“The point is that in a non-isolated system there exists a possibility for formation of ordered, low-entropy structures at sufficiently low temperatures. This ordering principle is responsible for the appearance of ordered structures such as crystals as well as for the phenomena of phase transitions. Unfortunately this principle cannot explain the formation of biological structures”*.

Returning to the *direct* analysis of the problem of the reductionism of biology to physics in the narrow sense (“if the biology (at least molecular biology and genetics) can be totally explained in terms of physics (and chemistry)”), I can recommend to pay a particular attention to the discussion on the special problem of the principal possibility of the explanation of the cell self-reproduction in terms of quantum mechanics, initiated by E. Wigner [61], then continued by M. Eigen [62] and afterwards analyzed by M. V. Vol’kenstein [63].

Firstly, Wigner *ab initio* considered (see, for instance, [61]) that the spontaneous self-appearance and spontaneous *self-reproduction of even simplest biologic macro-molecules and one-cell organisms do evidently contradict to quantum mechanics*, namely which describes the casual probabilistic currency of events (in the standard Copenhagen interpretation). He had shown that the probability of the existence of self-reproducing states is practically equal to **0**, with the help of the following considerations:

The complicated system, the evolution of which is supposed to occur by itself casually, can be described by the Hamiltonian, being a stochastic symmetric matrix like $H_{mn} = H_{nm}$ with the statistically independent elements (by the way, namely this property permitted for von Neumann to show that the second

principle of the thermodynamics follows from quantum mechanics). As usual, let the organism's state in the space of states be described by the vector (wave function) ν ; and the similar vector of the feeds be w , then the general vector of the state of the organism and feeds will be $\Phi = \nu \times w$, and after the reproduction – will be $\Psi = \nu \times \nu \times r$, where the vector r characterizes feed removals and coordinates of two organisms in the surroundings. Let the space of the organism is N -dimensional, and the vector r is R -dimensional.

If the evolution matrix S , which creates the final state as a result of the interaction between the organism and feed, is disordered and stochastic, then

$$\nu_k \nu_\lambda r_\mu = \sum_{k' \lambda' \mu'} S_{k \lambda \mu, k' \lambda' \mu'} \nu_{k'} w_{\lambda' \mu'} \quad (1)$$

The $N^2 R$ equations correspond to this equation. The number of unknowns $N+R+NR$ for $N \gg 1$ is much less than the number of equations. Therefore it would be a miracle if these unknowns could satisfy the written relation (1). So, if the interaction S does not specially “arranged” in such a way that it would guarantee the self-reproduction of the organism, then the probability of the multiplication would be practically equal to 0.

Strictly speaking, the situation is more complicated: it is necessary to consider a lot of states of the alive organism and the unitarity of the S -matrix, and instead of equality of (1) it is necessary to use inequalities, which are connected with the demand that the general probability of the states for two alive organisms would be explicitly more than $1/2$. However, even considering all this, the main conclusion will remain the same.

Then M.Eigen had shown that the possibility of the cell self-reproduction can be explained by quantum mechanics if and only if the evolution matrix (the S -matrix of the process) is *specially instructed* for this aim [62]. Further M.V.Vol'kenstein in his analytic review [63] had expressed his expectation that M.Eigen in his future study of the pre-biologic evolution can find the possibility of such special instruction. But up to now nobody had revealed such possibility! As to me, I can see only a certain similarity (of course, partial) between two kinds of processes (with are more intellectual than naturalistic, by the way): between the process of the human writing of certain scientific files in modern computer devices and the process of the supreme-intelligence-design writing of certain genetic programs (including the genetic program of the cell reproduction) in cells of alive organisms.

The main problem, according to V.Ginzburg, is connected with the explanation of *the origin of the biologic life* and *the origin of the human abstract thinking* (but the second one, as to me, is connected not with biology but with the origin of the human spiritual life which is far beyond natural sciences). V.Ginzburg assumes that for a possible explanation of the origin of the biologic life one can naturally imagine a certain jump which is similar to some kind of phase transition (or, may be, certain synergetic process). But there are other points of view too.

6. The problem 6 (the problem of the origin of the spiritual human life).

Is it possible the naturalistic explanation of the self-origin of the human spiritual life? Even if there would be found the missing links of unknown primates, which are similar to a man *morphologically and in the sense of the brain structure*, it were not signify their *spiritual* similarity. Human being is a *dual* biologic and spiritual being: Human personality has *abstract thinking, self-conscience and language with its grammatical structure, which are absent in any animal*. Any attempt to discover the physical similarities between primates and men as the base for the evolution doctrine overlooks from the very beginning a huge (infinite) abyss between any animal (*the absence of the spiritual life*), from one side, and a man (*the presence of the spiritual life*), from the second side. And in this situation there is no one spiritual gene in reality.

In his last papers on the methodology and philosophy of science (see [64-66]) A. Einstein described the abyss, which separates the concrete world of the corporal objects and the abstract world of the concepts, ideas and hypothesis, which cannot be surpassed by any evolution theory. The problem consists even not only in the complete absence of the material transformation of corporal objects into abstract constructions and ideas, but also in the impossibility of such transformation without the preliminary existence and active intervention of the human mind which is capable to communicate information, coded by the human language, to elaborate it and to think abstractly. This argument and the absence of the scientific confirm of the progressive macro-evolution of the biologic species into the human being by real facts gave the reasons for A. Einstein to a public declare in 1950: “*I think that the evolutionistic doctrines of Darwin, Haeckel and Huxley are without any doubt in the stage of the evident decline*“ (is quoted from [66]).

By the way, all the data from the human history, psychology and anthropology testimony that without the intercourse and relations, in the spiritual solitude, no human personality can stably spiritually exist, degrading during a certain limited not very long (near 20 years) time. And diffused in the ex-USSR the so-called “work” hypothesis of the transformation of certain primates into the human beings and the hypothesis of the primacy of the material social-economic basis and of the secondarity of the spiritual superstructure in the human society cannot resist any serious critics. Any hypothesis on casual origin of the spiritual life or on its natural origin in the material (biologic or/and social) basis without the inflow of the intelligent information from without demand evidently much more blind belief than the hypothesis on the Intelligent Creator [65].

7. The problem 7 (the resurrection of Jesus Christ as a historical fact).

The fact on the resurrection of Christ does particularly sharply set the problem of the choice of the world-view. *The resurrection of Christ* has for a long time supported and confirmed by all criteria of the academic historical science (see, for instance, [67-69]) and at the same time is not recognized by non-Christians (it is a serious problem for them). As to the documental historical witnesses, New Testament has the highest indices of every kind of manifestations: the confrontation of the dating of the described events with the dating of the most early copies, the biggest number of the most earlier copies, the degree of the exactness of the coincidence between various original copies in comparison with any other antique book (before Christ), the comparative analysis of the Christian sources and the contemporary non-Christian sources in describing the life and the resurrection of Jesus Christ.

All attempts of the followers of the Marxism-Leninism, beginning from Marx, Engels and Lenin, to elaborate the explanation of the Christianity origin, basing on only history of previous religions or on social-economical reasons without the historical witnesses on real existence of Jesus Christ, His death as the expiatory sacrifice for the human salvation and His resurrection – all these attempts have completely collapsed. But there are some indications that F.Engels before his death had written his affirmation on his acceptance of the resurrection of Jesus Christ [70].

8. The enigma 8 (enigma of the unexplainable applicability of the abstract mathematical principles).

Mathematics, as it is known long ago, is the result of the activity of entirely abstract human mind. However, many scientists and philosophers, and not only they, had noticed and notice now that all known mathematical disciplines had been applied, earlier or later, and it is continued nowadays, to be used for the exact formulation of the nature laws. Someone explains this fact as a certain curious incident, as a pure chance. But who believes in God, expressed Himself in the Bible, this fact does directly follow from the predestination of man to govern the creation, so the rationality of the human mind does evidently correspond to the rationality of the nature laws.

Namely such is the best solution of this enigma.

9. The enigma 9 (enigma of the unexplainable connection of the human mind and spiritual life with the human brain).

In [71] there are presented the results of the numerous researches of that that the human spiritual life and the functioning of brain are principally different each from other, although they are somewhat connected, and that the human conscience and mind are not, in particular, the result of the activity of the only material brain. There is also cited the opinion of the English evolutionist J.Haldane: “ If my thinking is completely determined by the motion of the brain atoms, I have no reason to suppose that my convictions are true” and then it is substantiated that if the human conscience is a function of the only human brain, then the integral “*T*” cannot simply exist! Can atheism explain this enigma or one ought to recognize that the Spirit is primary?

10. Conclusions.

Several reasons caused here to formulate a new view of the history of physics (especially in the field of natural sciences) in XX-XXI cc: Firstly, under the influence of scientific and technological progress it has been intensified such direction of the science philosophy as the scientific realism (i.e. the correspondence of the science to the reality), which has in turn changed three forms: from the naïve realism to the usual realism and then to the critical scientific realism (the last one had been developed under the strong influence of sharp discussions in quantum mechanics). Secondly, a novel division of the different classes of natural sciences with different objects and paradigms did inevitably force to analyze scientifically not only simple natural phenomena and processes, but also (a) the *human intelligent design*, related with the object of science or with the influence of researcher on the natural process, and (b) the philosophic aspects related with the *origin* of the Universe and life. Thirdly, some big problems of physics and natural sciences (a) sharp problems and paradoxes *revealed in the development of quantum mechanics and quantum theory of measurements*, b) a huge complex of the problems connected with the *Universe origin and the expansion after the Big Bang*, c) the open problem of the origin of the biological life) have been gradually concentrated the attention of the researchers, if not scientifically but at least philosophically, to those problems as to the grand or great problems. Fourthly, the analysis of mathematics in different sciences, beginning from physics, shows that mathematics has now become the branch of the natural sciences (namely of theoretical physics) starting from the *S*-matrix theory of quantum collisions and the dispersion relations [72] and has lately in fact generated the final solution of the old problem of time as a quantum observable, canonically conjugated with energy [54]. Fifthly, there was started to increase the discussion between the supporters of various meta-theoretical (semi-scientific and semi-philosophic) approaches to the problems of the origin of life and the whole Universe – between the hypothesis of the Supreme Intelligent Design (the creationism) and the hypothesis of the self-organization of the matter from the lower levels (beginning from the 0-th level, i.e. vacuum) into the higher levels. And to the last doctrine there was adjoined in the XXI c the meta-physical doctrine of the parallel other universes with some kind of interaction between them or with an irrational spontaneous passage of the matter from them to our Universe – those hypothetical universes are or the exactly same as ours, or with other space-time dimensions, or with other values of the physical constants.

References

1. Ginzburg, V.L., (1999) What problems of physics and astrophysics seem now to be especially important and interesting (30 years later, already on the verge of XXI century), *Physics – Uspekhi*, 42, 353-272; (2002) On some advances in physics and astronomy over the past 3 years, *45*, 205-211.
2. Olkhovsky, V.S., (2007) About seven serious problems and two enigmas of science and about their role in the choice of worldview [in Russian: В.С.Ольховский, (2007) Семь серьезных проблем и две загадки науки как девять чудес бытия и их роль в мировоззренческом выборе, в альм. Человек и христианское мировоззрение, Симферополь, вып.12, 230-233; (2007) В.С.Ольховский, Восемь чудес и тайн бытия как восемь великих проблем и загадок науки. Их роль в мировоззренческом выборе, в альм. Междунар. симпозиума „Путь, истина и жизнь”, вып.2, Курск (Россия), с.18-25].
3. Gooding, D., Lennox, L., (2004) *The human quest for Significance: Forming a world-view*, Myrtlefield Trust.
4. Junker, R., Scherer, S., (1998) *Evolution: Ein kritisches Lehrbuch*, 4th ed. Giessen (Germany): Weyel Verlag; 5th ed. Giessen (Germany): (2001) Weyel Verlag; 6th ed. Giessen (Germany): (2006) Weyel Verlag.
5. Olkhovsky, V.S., (2001) Comparison of the faith postulates in evolutionism and creationism with respect to modern scientific data, *Physics of the Alive*, *9*, pp.108-121.
6. In Russian: Olkhovsky, V.S., (2001) Comparison of the doctrines of evolutionism and creationism with respect to modern scientific data [in Russian: В.С. Ольховский, (2001) Сопоставление доктрин эволюционизма и сотворения в свете современной физики, в альм. Человек и христианское мировоззрение, Симферополь, вып.6, с.266-272];
In Russian: В.С. Ольховский, (2002) Как соотносятся постулаты веры эволюционизма и сотворения между собой и с естествознанием, в альм. Сотворение, Москва, изд. “Паломник”, вып.1, с.35-67. [Online] Available: <http://www.creation.webzone.ru>;
in Italian: Olkhovsky, V.S., (2001) *La scienza e la Fede Cristiana*, 3 conferenze pubbliche tenute il 26-27 Maggio 2001, ed. della Chiesa Cristiana Evangelica, via Britannia, 70/a, Roma, Italia, info: 067002559;
Vladislav Olkhovsky, (2004) *L'evoluzione biologica secondo National Geographic, LE PROVE SONO DAVVERO SCHIACCIANTI?*, Sulle Tracce delle ORIGINI, Italia, 15/12/2004. . [Online] Available: <http://www.creazionismo.org/articolo.asp?id+87>].
7. Hartle, J.B. and Hawking, S.W., (1983) Wave function of the Universe, *Phys.Rev. D28*, 2960-2975.
8. Vilenkin, A., (1994) Approaches to quantum cosmology, *Phys.Rev. D50*, 2581-2594; gr-qc/9403010..
9. Kragh, H., (1996) *Cosmology and Controversy*, Princeton (NJ), Princeton University Press; ISBN 0-691-02623-8.
10. Peacock, J., (1999) *Cosmological Physics*, Cambridge University Press; ISBN 0521422701. qc/9403010..
11. Adams, F.C. and Laughlin, G., (1997) A Dying Universe: the Long-Term Fate and Evolution of Astrophysical Objects, *Rev. of Mod. Phys.*, *69*, 337-372.
12. Carter, B., (1974) "Large Number Coincidences and the Anthropic Principle in Cosmology",

- IAU Symposium 63: Confrontation of Cosmological Theories with Observational Data, Dordrecht: Reidel.
13. Barrow, J.D., and Tipler, F.J., (1986) *The Anthropic Cosmological Principle*, Clarendon Press, Oxford.
 14. Olkhovsky, V.S., V.A. Tchinarov, V.A., (1993) *Fundamental Problems of Time in Physical and Biological Systems*, in: *Atti della Accademia Peloritana dei Pericolanti, Università di Messina [Italy]*, v.LXXI, pp.53-69.
 15. Olkhovsky, V.S., [in Russian: В.С.ОЛЬХОВСКИЙ, в сб. *Человек и христианское мировоззрение*, вып. 3, Симферополь, 1998, с. 264-267].
 16. Einstein, A., Podolsky, B. and Rosen, N. (1935) *Can Quantum-Mechanical Description of Physical Reality be Considered Complete?*, *Phys. Rev.*, 47, 777-780.
 17. Bohm, D. (1952) *A Suggested Interpretation of the Quantum Theory in Terms of "Hidden Variables"*, I, *Physical Review*, 85,66-179; (1952) *A Suggested Interpretation of the Quantum Theory in Terms of "Hidden Variables"*, II, *Physical Review*, 85,80-193; Bohm, D., Aharonov, Y. (1957) *Discussion of Experimental Proof for the Paradox of Einstein, Rosen, and Podolsky*, *Phys.Rev.* 108, 1070-1076; Aharonov, Y., Bohm D., (1959) *Significance of Electromagnetic Potentials in the Quantum Theory* *Phys. Rev.* 115, 485-491; Bohm, D., Aharonov, Y. (1960) *Further Discussion of Possible Experimental Tests for the Paradox of Einstein, Podolsky and Rosen*, *Nuovo Cimento* 17, 964; Aharonov, Y., Bohm D., (1962) *Remarks on the Possibility of Quantum Electrodynamics without Potentials*, *Phys. Rev.* 125, 192; Aharonov, Y., Bohm D., (1963) *Further Discussion of the Role of Electromagnetic Potentials in the Quantum Theory*, *Phys. Rev.* 130, 1625.
 18. Bell, J. S. (1964) *On the Einstein-Podolsky-Rosen Paradox*, *Physics*, 195-200 [Bell, J.S. (1965) *On the Einstein-Poldolsky-Rosen paradox*, *Physics* 1, 195-200]; Bell, John S, (1987) *Speakable and Unsayable in Quantum Mechanics*, Cambridge University Press.
 19. Pais, A. (1979) *Einstein and the quantum theory*, *Rev. Mod. Phys.* 51, 863-914.
 20. Popper, K. (1982) *A critical note on the greatest days of quantum theory*, *Found. Phys.* 12, 971-976.
 21. Holland, Peter R. (1993) *The Quantum Theory of Motion: An Account of the de Broglie-Bohm Causal Interpretation of Quantum Mechanics*, Cambridge: Cambridge University Press.
 22. Mermin, N. D. (1993) *Hidden Variables and the Two Theorems of John Bell*, *Rev. Mod. Phys.* 65, 803-815.
 23. Paty, M. (1995) *The nature of Einstein's objections to the Copenhagen interpretation of quantum mechanics*, *Found. Phys.* 25, 183-204.
 24. Dürr, D., Goldstein, S., and Zanghì, N. (1997) *Bohmian Mechanics and the Meaning of the Wave Function*, in Cohen, R. S., Horne, M., and Stachel, J., eds., *Experimental Metaphysics — Quantum Mechanical Studies for Abner Shimony*, Volume One; Boston Studies in the Philosophy of Science 193, Boston: Kluwer Academic Publishers; Dürr, D. (2001) *Bohmsche Mechanik als Grundlage der Quantenmechanik*, Berlin: Springer-Verlag.
 25. Hardy, L. (1993) *Non-locality for 2 particles without inequalities for almost all entangled states*, *Physical Review Letters* 71, 1665-1668; Sakurai J.J. (1994) *Modern Quantum Mechanics*, Addison-Wesley, USA, (see pp. 174-187, 223-232).
 26. Vaidman, L. (1994) *Teleportation of Quantum States*, *Phys. Rev. A* 49, 1473-1476.
 27. Brassard, G., Braunstein, S., Cleve R (1998) *Teleportation as a Quantum Computation*,

Physica D 120, 43-47.

28. Bouwmeester, D., Pan J.-W., Mattle K., Eibl M., Weinfurter H., Zeilinger A. (1997) Experimental Quantum Teleportation, *Nature* 390, 6660, 575-579.
29. Boschi, D., Branca, S., De Martini, F., Hardy, L., & Popescu, S. (1998) Experimental Realization of Teleporting an Unknown Pure Quantum State via Dual classical and Einstein-Podolsky-Rosen channels, *Phys. Rev. Lett.* 80, 6, 1121-1125.
30. Kilin, S. Ya. (2001) Quanta and information, *Progress in optics*, 42, 1-90.
31. Riebe, M., Häffner, H., Roos, C. F., Hänsel, W., Ruth, M., Benhelm, J., Lancaster, G. P. T., Körber, T. W., Becher, C., Schmidt-Kaler, F., James, D. F. V., Blatt, R., (2004) Deterministic Quantum Teleportation with Atoms, *Nature* 429, 734-737.
32. Ursin, R. et al., (2004) Quantum Teleportation Link across the Danube, *Nature* 430, 849.
33. Olmschenk, S. et al (2009) Quantum Teleportation between Distant Matter Qubits, *Science* 323, 486.
34. Everett, H. (1957) Relative State Formulation of quantum mechanics, *Review of Modern Physics* 29, 454-462.
35. De Witt, B.S.M., (1970) Quantum mechanics and Reality, *Physics Today* 23, 30-35.
36. Everett, H., *The Theory of the Universal Wave Function*, in B. De Witt and N. Graham (eds.), *The Many-Worlds Interpretation of Quantum Mechanics*, Princeton NJ: Princeton University Press, 1973.
37. Deutsch, D., (1986) Three experimental implications of the Everett interpretation, in R. Penrose and C.J. Isham (eds.), *Quantum Concepts of Space and Time*, Oxford: The Clarendon Press, pp. 204-214.
38. Tipler, D., (1986) *The Many-Worlds Interpretation of Quantum Mechanics in Quantum Cosmology*, in R. Penrose and C.J. Isham (eds.), *Quantum Concepts of Space and Time*, Oxford: The Clarendon Press, 1986, pp. 204-214.
39. Albert, D. and Loewer, B. (1988) Interpreting the Many Worlds Interpretation, *Synthese* 77, 195-213.
40. Barvinsky, A.O., and Kamenshchik, A.Y., (1995) Preferred Basis in Quantum Theory and the Problem of Classicalization of the Quantum Universe, *Physical Review D* 52, 743-757.
41. Deutsch, D., (1996) *The Fabric of Reality*, New York: The Penguin Press.
42. Lockwood, M., Brown, H.R., Butterfield, J., Deutsch, D., Loewer, B., Papineau, D., Saunders, S. (1996) 'Symposium: The 'Many Minds' Interpretation of Quantum Theory', *British Journal for the Philosophy of Science* 47, 159-248.
43. Barrett, J.A., (1999) *The Quantum Mechanics of Minds and Worlds*, Oxford: University Press.
44. Zeh, H. D. (1970) On the Interpretation of Measurement in Quantum Theory, *Foundations of Physics* 1, 69-76; Zeh, H. D. (1973) Toward a Quantum Theory of Observation, *Foundations of Physics* 3, 109-116.
45. Mandelstam, L.I., *Lectures on Optics, Theory of Relativity, and Quantum Mechanics* (Nauka, Moscow, 1972) [in Russian: Л.И. Мандельштам, Лекции по оптике, теории относительности и квантовой механике, М., 1972].
46. Blokhintsev, D.I., *Quantum Mechanics*, Hardcover, Taylor & Francis Group [in Russian: Д.И. Блохинцев, Основы квантовой механики, М., 1976; Д.И. Блохинцев, Принципиальные вопросы квантовой механики, М., 1966].

47. Ballentine, L.E., *The Statistical Interpretation of Quantum Mechanics*, *Reviews of Modern Physics*, 42, № 4, 1970; Ballentine, L.E., *Quantum Mechanics*, Prentice-Hall, 1990.
48. Popper, K.R., *The Logic of Scientific Discovery*, N.Y., 1961; Popper, K.R., *Quantum Theory and the Schism in Physics*, L., N.Y., 1982.
49. Home, D., Whitaker, M.A.B., *Physics Reports*, 210(1992)223 – 317.
50. Janik, J.A., *Moje (fizyka) pytania do innych fizyków i do filozofów*, in: *Nauka, Religia, Dzieje. IX Seminarium w Castel Andolfo, 5-7 sierpnia 1997*, Wydawn. Uniwers. Jagiell., Kraków, 1998, p.15-22.
51. Pauli, W., in: *Handbuch der Physik*, vol.5/1, ed. by S.Fluegge (Berlin, 1926), p.60; see also: Pauli, W., *General Principles of Quantum Theory* (Springer; Berlin, 1980).
52. Aharonov, Y., Bohm, D., (1961) *Time in the quantum theory and the uncertainty relation for time and energy*, *Phys. Rev.* 122, 1649-1658; Aharonov, Y., Bohm, D., (1964) *Answer to Fock concerning the time energy indeterminacy relation*, *Phys. Rev. B* 134, 1417-1418.
53. Krylov, N.S. and Fock, V.A., (1947) *On two main interpretations of energy-time uncertainty*, *Sov. J. Zhetf* 17, 93-99; Fock, V.A., (1962) *On the energy-time uncertainty and on an attempt to refute it*, *Sov. J. Zhetf* 42, 1135-1140.
54. Olkhovsky, V.S., (2012) *Time as a quantum observable canonically conjugated to energy. Time analysis of quantum processes of tunneling and collisions (nuclear reactions)* [LAP LAMBERT Academic publishing].
55. Macnab, R., (1978) *BACTERIAL MOTILITY AND CHEMOTAXIS - MOLECULAR-BIOLOGY OF A BEHAVIORAL SYSTEM*, *CRC Critical Reviews in Biochemistry* 5, 291-341; P.S.Moorhead and M.M.Kaplan, eds., (1967) *Mathematical Challenges to the Neo-Darwinian Interpretation of Evolution*, Philadelphia: Wistar Institute Press.
56. Behe, M.J., (1996) *Darwin's Black Box. The biochemical challenge to evolution*, the Free Press.
57. Junker, R., Scherer, S., (1998) *Evolution: Ein kritisches Lehrbuch*, 4th ed. Giessen (Germany): Weyel Verlag; (2001) 5th ed. Giessen (Germany): Weyel Verlag; (2006) 6th ed. Giessen (Germany): Weyel Verlag, 2006.
58. Olkhovsky, V.S. (2001) *Comparison of the faith postulates in evolutionism and creationism with respect to modern scientific data*, *Physics of the Alive*, 9, 108-121.
59. Prigogine, I., Stengers, I., (1984) *Order out of Chaos. Man's new dialogue with nature*, Heinemann, London; Nicolis, G., Prigogine, I., *Exploring Complexity*, W.Freeman and Co, N.Y., 1989.
60. Prigogine, I., Nicolis, G. and Babloyants, A., (1972) *Thermodynamics of Evolution*, *Physics Today*, 25, p.23.
61. (1970) *Symmetries and reflections, scientific essays of Eugen P.Wigner*, Indiana University Press, Bloomington –London; essay 11 (“The possibility of existence of a self-reproducing system”).
62. Eigen, M. (1971) *Self-Organization of Matter and the Evolution of Biological Macromolecules*, *Naturwiss.*, 58, 465–523.
63. Vol'kenstein, M.V. (1973) *Physics and biology*, *Sov.Phys.Usp.*, 16, 207-216; see also: Vol'kenstein, M.V., (1988) *Complementarity, physics and biology*, *Sov.Phys.Usp.*, 31, 140-150.
64. Einstein, A., (1936) *Physics and Reality*. In Author, *Out of My Later Years* (1956),

- NJ:Citadel.
65. Einstein,A., (1944)Remarks on Russel’s theory of knowledge,in:Philosophy of Bertrand Russel,ed. by Schlipp, P.A.,Tudor,N. Y., J.W.Oller,J.W., (2000)Einstein’s Gulf: Can Evolution Cross It?, Impact#327 of Institute for Creation Research, 2000.
 66. Muschalek,H., [in Italian (1972)“Dio e gli scienziati”, ed. Paoline, Alba, pp.30-31].
 67. Olkhovsky, V.S., [in Russian: В.С.Ольховский, в сб.: (2006)Человек и христианское мировоззрение, вып. 11, Симф., с. 278-282].
 68. Little,D., [in Russian translation: Б.Литтл, в сб.: (2000)Человек и христианское мировоззрение, вып.5, Симф.,с.18-23].
 69. Feansy,D., [in Russian translation: Д.Финзи, в сб.: (2000)Человек и христианское мировоззрение, вып.5, Симф., с.73-79];
Olkhovsky, V.S. [in Russian:В.С.Ольховский, в сб. (2004)Человек и христианское мировоззрение, вып.9, Симф., с. 31-38].
 70. [Online] Available:[in Russian: Ученые подтверждают ключевые истины Библии - Дом Солнца www.sunhome.ru > Философия > Философии (дата последнего посещения: 07.09.13)]
 71. Strobel, Lee, (2004)The case for Creator: a journalist investigates scientific evidence that points toward God, International Trade Paper Edition.
 72. Bogolyubov,N.N., Medvedev,B.V., Polivanov,M.K.,eds., Dispersion relations, transactions Problems of modern Physics, N2 [in Russian: Боголюбов Н.Н., Медведев Б.В., Поливанов М.К. (редакторы), (1957) Дисперсионные соотношения, статьи в сб. Проблемы современной физики, №2]; Arnold V.I., (2008)What is mathematics?, Moscow, MCNMO-press< p.3 [in Russian: Арнольд В.И., (2008) Что такое математика?, М., изд-во МЦНМО, стр.3].