Flaws in EPR paradox, Standard Model and other theories indicate that theoretical physics is dead

Essay written for the FQXi contest "Questioning the Foundations: Which of Our Basic Physical assumptions are Wrong?"

Constantin Leshan

hole@i.ua

There are wrong physical assumption in EPR paradox and Standard Model. In general, the number of wrong physical assumptions is very large. Where experimentation cannot be done, in most cases Theoretical Physics fails in explaining any phenomena. Physics appear to be driven not by the power of human mind but instead by experiments and the unexpected; physicists believe that it is not possible to do physics without experiments. It is a strong indication that Theoretical Physics is dead, or at least not effective.

1. How effective is the modern Theoretical Physics?

In order to evaluate the effectiveness of Theoretical Physics, we will estimate the number of wrong theories and physical assumptions using the demarcation criteria.

As humans are trying to explain everything, it is not surprising that most physical theories are partially or completely wrong. Rather simple reasoning is used to estimate the number of wrong theories. For example, there are hundreds of different theories about the nature of gravitation published in the academic journals, but it is self-evident that a few similar gravitational theories only can be true at the same time, but not hundreds of mutually exclusive theories. Consequently, it is self-evident that 99 % of all published gravitational theories are wrong.

Following the same reasoning as for the gravitational theories, one finds that the same situation arises in all areas of physics. For example, there are hundreds of theories about the nature of space-time, vacuum and ether. However, it is self-evident that one or two similar theories only can be true at the same time, but not hundreds of theories. It is self-evident that the 99 % of all these theories are wrong. From this point of view, it looks very probable that the percentage of false papers and theories in many areas of modern theoretical physics is much larger than 50 – 90 %.

“For every example of a daring, new scientific theory which ends up being accepted, there are many, many examples of wrong theories” [1]. It means Theoretical Physics is dead, people are trying “to guess” the correct theory by listing all possible variants.

One can be certain that there is a high probability that many of these false papers are built-in components of the Standard Model, consequently the Standard Model also may be wrong. If the Standard Model fails, the percentage of partially or complete wrong *theoretical* papers in particle physics may exceed 90 %. Everyone agrees that it is a deep crisis in physics, and its epicenter is located in particle physics theory.

To evaluate the state of Theoretical Physics, we need definitions: 1) An *ideal* theorist could derive most laws of physics from a few initial axioms or experimental observations only, *without need in experiments*. 2) On the contrary, a bad theoretical method builds always the false theories even if the research is supported by experimental data and experimental verification. Moreover, a bad physicist even can “prove” experimentally a false theory.

From this point of view, Theoretical Physics is dead, because most theories created without experimentation are wrong. Moreover, even mainstream theories supported by experimental data and expensive experimental verification appear to be wrong. Note that some false mainstream theories as quark model even have been “proven” experimentally.

Apart from the large number of wrong theories, there are other indications that Theoretical Physics is not effective: physics appear to be driven not by a theoretical power of human mind but instead by the accidental observations and experiments. For example, almost all major discoveries in high-energy physics have been accidental and experimental, and these discoveries were unexpected for theorists. Somewhere between 33% and 50% of all scientific discoveries are estimated to have been stumbled upon, rather than sought out [2].

The list of top 10 breakthroughs for 2011 [3] shows that new discoveries appear today mainly due to high-technology and experiments but not due to theoretical power of the human mind. If all experimental and high-technology devices were to disappear or cease to exist, the flow of discoveries in physics also disappear because most physicists are not able to investigate nature **theoretically**, without experimental support. Nowadays, the dominant view is that "Physics is an experimental science" [4]. It confirms that Theoretical Physics is dead. Thus, we need a scientific revolution in order to make Physics a **theoretical science** with no unexpected and minimal experimental support. There are indications that such technology may exist.

2. Crisis in Physics

The Crisis in Physics is due to following factors: 1) Mainstream science suppresses all competing theories. 2) The university teaching is wrong; 3) Absence of criticism. 4) Perhaps the crisis in physics is caused by "evolution in reverse" of human race.

Dictatorship. "For every Galileo who eventually succeeded there were thousands of crackpots who did not" [1]. The absence of important discoveries today is explained by the fact that the system suppresses (or kills) all dissidents like Galileo. Nowadays these "thousands of crackpots" are professional scientists who control all science – universities, laboratories, scientific journals and funds. They behave just like a dictatorial regime that supports only devoted people; no support and no publication for outsiders and competing theories. In fact, it is the "battle for resources" between the outsiders (like Galileo) and majority ("thousands of crackpots"). It seems that "crackpots" win due to numerical superiority, since physics is in deep crisis. While professionals receive billions of dollars for their projects, nobody supports the competing theories made by outsiders.

University teaching. In the past centuries, amateurs made the main contribution to physics, because the number of amateurs far exceeds the number of professionals. But today we do not see any important discoveries made by amateur physicists because they are suppressed by system. If an original thinker becomes a student in University, wrong teaching destroys quickly his unique research ability. Even if he starts to investigate physics independently, the peer-reviewed journals will reject all his original papers, contradicting the mainstream dogmas. In this way, society kills all original, unique thinkers and produces instead only standard scientists.

Theoretical physics is not a usual profession like electrician or the cook. To become a theoretical physicist, a man must have an inherent, built-in ability for physics, whereas universities produce the stream of identical, standard scientists.

To overcome the crisis in physics, I propose to turn back this process: we might search for gifted people with unique research abilities instead of producing identical physicists. A few gifted and unique theorists may be more effective for physics than a few particle colliders or thousands of standard scientists produced by usual universities. Perhaps, such unique physicists will be the authors of the next revolution in science.

Personally, I would like to create a Theoretical School based on Hole Research Technology for **searching** and **teaching** the talented people using my own experience. I am sure that some outsiders and "crackpots" may have the built-in research abilities, which are much more effective than standard scientific methods.

Absence of criticism. Since professionals produce continually new theories, it is clear that many of these are wrong. However, none of modern theories has been exposed as false science because professionals care about their positions and reputations.

Devolution. In 1900 the world population was 1.65 billion, and today population exceeds 7 billion. Since population has grown by the factor 4.24, consequently the number of talented physicists like Einstein and theoretical discoveries must grow also by factor 4.24. Unfortunately, this is not the case, the list of modern discoveries in physics is very small and consists mainly of experimental works. Perhaps this long period of stagnation in physics is caused by backward evolution; for example, Second World War killed mainly the physically healthy men of the populace whilst preserving the disabled at home [5].

Since even the mainstream theories based on experimental data and experimental verification are wrong, as Standard Model, consequently all theories created without experimentation surely are wrong by definition, simply because Modern Physics is not able to investigate nature theoretically. For example, since experimentation with wormholes is not possible, it is not surprising that the traversable wormhole theory is completely wrong and violates practically all laws of nature. For the same reason, since experimentation at Planck scales is not possible, it is safe to predict that most theories that investigate the Plank scales are wrong. Although I do not have convincing arguments, I suspect that most theories in particle physics are partially or completely wrong; Theoretical physics is dead.

3. A list of wrong Physical assumptions

Although the list of wrong physical theories and assumptions is very long, I have shown a few examples only because of character limit.

1) **Flaws in quantum mechanics (EPR paradox). "**Albert Einstein called this astonishing behavior "spooky action at a distance". In theory, these correlations should be maintained *over arbitrary distances*" [6]. It is a flaw in accepted physics; It can be shown that, contrary to EPR paradox and quantum mechanics, the quantum correlations and entanglement *does depend* on distance. It is shown below that non-local correlations disappear and particles cease to be entangled when the distance between them becomes large in a cosmological sense.

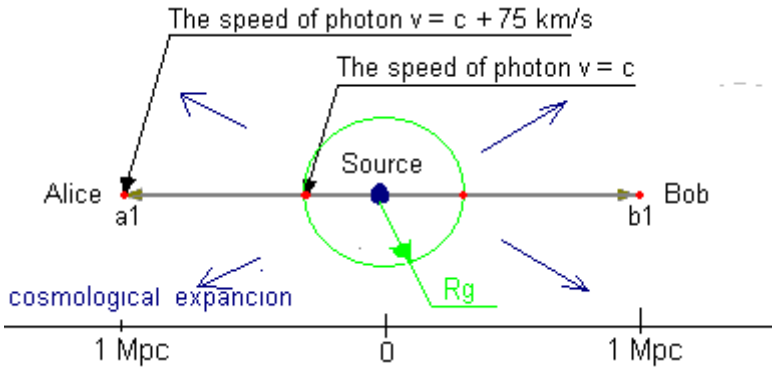

Fig. 1 Cosmological erasing of entanglement. The source emits two entangled photons in opposite directions.

Assume that a stationary source emits two entangled photons in opposite directions, to Алисе and Bob respectively. While the distance R between photons and source is small, the speed of photons v relative to source is equal to the speed of light, v = *c*. What happens, when the distance R is 1 Mpc, R ≥ 1 Mpc? It is at this point that cosmological expansion enters into the game.

The expansion of the universe causes photons a1 and b1 to recede from source faster than the speed of light, if comoving distance and cosmological time are used to calculate the speeds of these photons. The (apparent?) speed of photons a1 and b1 relative the source will be $v = c + H_0R = c + 75$ km/s; H_0 – Hubble constant, c – the speed of light.

Of course, *locally* the speed of light is not surpassed, $\mathbf{v = c}$. Since the photon a1 is "superluminal" relative to Bob, and the photon b1 is "superluminal" relative to Alice, hole theory suggests that photons cease to be entangled, in this case.

Particles remain entangled only if the distance between them does not exceeds R, in megaparsecs:

$$R(Mpc) = \frac{V}{H_0} + R_g\sqrt{1-\frac{V^2}{c^2}} \qquad (1)$$

Rg is the radius of green sphere, where the cosmological expansion is negligible, Rg ~ 1 – 3 parsecs.

First, note that such phenomenon never happened in our laboratories. All Earth-bound laboratories use ordinary photons only, which move with the speed v = c, whereas photons a1, b1 are cosmological "superluminal" objects like superluminal galaxies. Outside of the Hubble sphere, all galaxies have the "recession velocity" which is faster than light. In the same way, all photons that leave the green sphere Rg have the "recession velocity" which is faster than light (relative source).

There are two different explanations on how cosmological expansion erases entanglement. The first argument is that non-local correlations become superfluous and useless if the distance between photons exceeds R (in formula 1). Another explanation is that relativity forbids the appearance of nonlocal correlations in EPR experiments that uses "superluminal" particles.

The uncertainty principle states that the position and momentum (or other conjugate pairs of observables) of a particle cannot be simultaneously measured with arbitrarily high precision. The EPR paradox has been proposed just in order to challenge this statement of uncertainty principle. In this context, the "spooky action at a distance" appears in order to preserve the uncertainty principle. However, when the distance between photons exceeds R (in formula 1), then appears other mechanisms, which preserve the uncertainty principle, therefore nonlocal correlations become useless and disappears.

Imagine that the "spooky action at a distance" is cancelled by cosmological erasing. Does it allow simultaneous measurement of definite value for related (conjugate) pairs of observables?

The answer is "No". Since observers are in motion, the measurement of position and momentum will *not be simultaneous* due to Einstein's relativity of simultaneity. For this reason, the position and momentum of a particle cannot be **simultaneously** measured with arbitrarily high precision. Thus, these two phenomena, cosmological erasing and nonlocal correlations simply replace each other in order to preserve the Heisenberg's uncertainty principle.

If Alice eliminates the effects of cosmological expansion by increasing her speed by ~ 150 km/s towards Bob, the photons a1, b1 become again entangled.

2) **Standard Model is wrong** because it is based on erroneous quark model and suspicious electroweak unification of forces. Another flaw is that the Standard Model is not able to unify gravity with other forces. The doubtful "detection" of the Higgs-like boson at CERN (with 99.999% certainty) does not prove the existence of Higgs mechanism; most likely it is a usual short-lived particle, which have nothing to do with the mass-generation mechanism in Higgs model.

2.1 Let us analyze the Standard Model using demarcation criteria, a set of criteria that would distinguish science from non-science.

The Standard Model is not falsifiable; this theory has been continually modified to try to make it fit the unexpected experimental evidence. For example, since all searches for individual, free quarks have failed, theorists invented confinement to try to keep it in line with evidence. To prevent the failure of Higgs boson, theorists change again the theory to fit the facts.

The original quark model has three quarks, and then gradually increased to 6 to try to keep it in line with unexpected evidence. Thus, it is impossible to prove the Standard Model wrong because theorists can always go back and modify the prediction a posteriori so that it fits the facts. Consequently, SM physically is a wrong theory, although some of its mathematical models are important.

2.2 The Higgs theory is flawed because it is not able to explain in detail, physically, how mass, inertia and gravitation appears. The statement that Higgs boson gives mass through symmetry breaking explains nothing, it is a mathematical trick only, without any physical significance. How can one particle impart mass on all the others by simply floating near? For example, the Hole Gravitation theory [7] explains *in detail* the mass-generation process, gravitation, inertia and time dilation; since Higgs is not able to explain the same, therefore it is a false theory.

2.3 In fact, the Higgs boson fails to explain the mass of a black hole. How can this boson impart mass near the event horizon of a black hole, when particles are not allowed to leave the black hole? We conclude that the Higgs mass-generation mechanism cannot work near the event horizon and inside of a black hole, since the singular region has zero volume and infinite density, and time is frozen. In general, Higgs boson is not able to explain why a black hole has mass. It is an internal inconsistency in accepted physics. We can prove a theory false simply by finding one example or situation that shows it to be wrong.

2.4 **The quark model is wrong.** The quark model could be successful only in case if all particles (or, at least all massive particles) are made of quarks. Unfortunately, the existence of **massive leptons**, which are not made of quarks is a strong sign that Nature does not need in quarks. The successful model must be able to show that *all* particles (or, at least all massive particles) are made of the same stuff, whereas the quark model deals with hadrons only.

The history of physics confirms this line of reasoning. All chemical elements are made of atoms, and no exceptions have been found. All atoms are made of electrons and nuclei, without exceptions. All nuclei are made of nucleons, without exceptions. In the same way, all massive particles must be made of the same stuff, without exceptions. Since massive leptons are not made of quarks, consequently the quark model fails to explain the internal structure of particles.

2.5 The quark model failed in his attempt to reduce the number of elementary particles. It is very improbable that the fundamental theory may have so many fundamental constituent particles – 24.

2.6 I suspect that the "discovery of quarks" in electron-proton scattering is due to incorrect interpretation of experimental data. The electrons may be used for study of such composite structures as atoms or nuclei, but not the "internal structure" of elementary particles as hadrons. It is generally known that all composite systems (atoms and nuclei) can be split apart. Since hadrons cannot split apart, consequently, they have no constituents or internal structure; hadrons are true elementary particles. In fact, the accepted physics is not consistent, since **indivisible** hadrons are considered as composite, with internal structure. In my view, the electron-proton scattering shows simply the inelastic scattering phenomenon and particle-production processes, but not the "internal structure of hadrons".

2.7 The physicists wrongly believe that point-like particles only are elementary, whereas all extended particles are composite. This assumption arises from our every day life experience – we know that all extended macroscopic objects are made of particles. It is quite natural to assume that, as everything else in this world, any extended object must also have the internal structure, but this macroscopic experience cannot be valid for quantum physics. For example, the photon is not a point-like particle but it is generally known that a photon is the true elementary particle, without any internal structure. Thus, it is wrong assumption that the point-like particles only are elementary, whereas all the extended particles are composite.

2.8 The Unification of weak and electromagnetic interactions is unsuccessful, because gravitation cannot be included into scheme.

3) **Fundamental interactions**: It has been wrongly assumed that all the fundamental forces arises due to exchange of virtual particles, in the same way as the electromagnetic force arises from exchange of virtual photons. It is wrong assumption, since non-exchange interactions may exist – for example the Hole Theory of Gravitation [7] is of non-exchange type, where gravitation arises without any exchange of virtual particles.

4) **The concept of the Standard Black Hole** is wrong:
4.1) The statement that black holes contain matter is wrong. The matter consists of spatially separated particles with given properties. Since the singular region has zero volume and infinite density, it cannot contain matter by definition.
4.2) The description of gravitational collapse is wrong. Theorists wrongly think that the mass of the star is conserved during a gravitational collapse.

The strong compression of matter is accompanied always by the **mass defect**. For example, the sum of the masses of two neutrons plus two protons is greater than the mass of a He nucleus. This same line of reasoning could be applied to the concept of gravitational collapse. If a star is compressed into a sufficiently compact region of space, the resulting mass of a black hole must be smaller than that of an initial star. Moreover, if a star is compressed into a point with an infinite density and a radius of zero, the value of mass defect must be very large. Hence, the resulting mass of a black hole must be very small in comparison with the initial mass of a star.
5) Although the Einstein's **Relativity Theory** is correct and successful theory, some unclear assumptions are ripe for rethinking. Einstein published the special relativity in which he concluded that "speeds in excess of light have no possibility of existence" [8]. It is both right and wrong. The reason behind the Einstein's conclusion was that we need an infinite amount of energy to accelerate an object to the speed of light. However, there is such kind of "travel" as Hole Teleportation, where the object neither accelerates nor moves; it simply disappears in one place and reappears in another one without traversing the intervening space. Besides, the notion of "speed" is senseless in teleportation because it is not a mechanical motion. There is neither acceleration nor superluminal motion in hole teleportation theory, consequently special relativity cannot forbid such phenomenon.
6) "Even if the previous problem could be resolved, superluminal travel may lead to a violation of causality" [9]. This assumption is wrong. Moreover, I can prove that all examples of causality violation are wrong, because authors use the similar schemes.

The first error is that they use the imaginary, inexistent signals like tachyons with unphysical properties in order to show the causality imaginary. The real superluminal particles have other properties that prevent the causality violation. For example, let us analyze the generally known Tachyonic antitelephone paradox [10, 11, 12], the two-way example.

"Suppose Alice is on a spacecraft moving away from the Earth in the positive x-direction with a speed v, and she wants to communicate with Bob back home. Assume both of them have a device that is capable of transmitting and receiving faster-than-light signals at a speed of a*c* with $a > 1$. Alice uses this device to send a message to Bob, who sends a reply back". Then, after a multiple exchange of superluminal signals, the author concludes: "Alice will receive the message back from Bob before she sends her message to him in the first place". They concluded that superluminal particles such as Tachyons are therefore not allowed to convey signals.

The paradox arises only because the author uses the inexistent tachyons with imaginary and *wrong* properties. The real superluminal phenomena may have other properties that prevent the causality violation. For example, the properties of Hole Teleportation guarantee the *double protection* against violation of causality. The first property is that teleportation between moving frames is forbidden by conservation laws and relativity. The body at rest cannot appear in a moving

frame, otherwise it will be the violation of energy and momentum conservation laws. It is forbidden also by time dilation and length contraction effects, since the hole sphere will have the different sizes and forms in different moving frames. Hence, Alice and Bob cannot use Hole Teleportation for exchange of superluminal signals, because they are in motion relative to each other.

Another useful property is that Hole Teleportation is a fundamentally random phenomenon: at teleportation the object appears in a random point of the Universe. By definition, the signalization is the process of transmission of signal from transmitter to receiver. Since Hole Teleportation is random, the signal cannot appear in receiver, and therefore it cannot be used for superluminal signaling and causality violation.

In spite of fact that Hole Teleportation is a superluminal phenomenon, its properties guarantee the absence of causality violation.

7). **Traversable wormholes theory is wrong.** The existence of the traversable wormhole theory is a clear proof that the Modern Physics is not able to investigate nature **theoretically**, without experiments. Since experimentation with wormholes is not possible, it is not surprising that the traversable wormhole theory is completely wrong and violates practically all laws of nature. All statements in this theory are wrong: the "exotic matter that gravitationally repels normal matter", the concept of submicroscopic quantum wormholes believed to exist within any volume of space is wrong, as well as macroscopic wormholes, since they violate all possible laws.

Imagine a distant star, which is at distance of more than 14 billion light-years from us, and have a recession velocity which is faster than light. Now imagine the appearance of a traversable wormhole, with one mount **A** near Earth and another **B** near this star. Gravitation propagates in such a way that it takes the shortest possible time to its destination always. it means that Earth and this distant star begin to interact gravitationally through open wormhole. It is a violation of relativity, because wormholes allow Earth to interact with a superluminal object. Also it is violation of the principle of locality, since objects are allowed to interact near instantaneously with distant objects. Since points **A** and **B** coincides (or are close to each other through wormhole), the potential of force fields in points A and B must be the same. It means that the gravity's inverse square law fails to work if the space-time continuum is filled with open wormholes. Consequently, if traversable wormholes exist then long-range fundamental interactions as gravity do not exist and vice versa. The list of errors in wormhole theory is very long [13] because open wormholes violate almost all laws of nature.

4. Conclusions

This study shows that the number of wrong physical assumptions is very large, especially where experimentation cannot be done. There is an urgent need to overcome the Crisis in Physics, because it slows progress down. For this purpose, we must accept the following:

1) The dictatorship in science must be urgently eliminated – the peer reviewed journals must publish all *logical and consistent* theories, without exceptions. Scientific funds must support also the non-mainstream and alternative theories.

2) It is necessary to control the evolution of human race in order to increase the number of people able to contribute to science.

3) The university teaching has to be improved cardinally. The new teaching technology may be the key to fundamental crisis we are facing now.

References

[1] M. Pigliucci, Science vs. pseudoscience: where is difference?, Distributed by Skeptic & Humanist Web, Accessed 20 August 2012
[2] K. Dunbar, J. Fugelsang, Causal thinking in science: How scientists and students interpret the unexpected. In M. E. Gorman, R. D. Tweney, D. Gooding, & A. Kincannon (Eds.), Scientific and technical thinking (pp. 57 - 79), 2005
[3] H. Johnston, Physics World reveals its top 10 breakthroughs for 2011, Physics World, 2012 Accessed 20 August 2012
[4] H.D. Young, R.A. Freedman, University Physics with Modern Physics (11th ed.), Addison Wesley, 2004
[5] D. S. Jordan, War and the Breed: The Relation of War to the Downfall of Nations, (Reprint), University Press of the Pacific, ISBN 1-4102-0900-8, 2003
[6] A. Zeilinger, A. Poppe, A. Fedrizzi et all, Entangled State Quantum Key Distribution and Teleportation, 2005
[7] C. Leshan, Vacuum holes as cause of gravitation and inertia, Acta physica polonica B, Vol. 41, No. 11, 2010
[8] A. Einstein, On the electrodynamics of moving bodies, Annalen Phys. 17, 891-921, 1905 [Annalen Phys. 14, 194 (2005)]
[9] N. T. Bishop, Is Superluminal Travel a Theoretical Possibility? Foundations of Physics, Vol. 14, No. 4, 1984
[10] R. C. Tolman, "Velocities greater than that of light". The theory of the Relativity of Motion. University of California Press. p. 54. 1917
[11] G. Benford, D. L. Book, W. A. Newcomb, "The Tachyonic Antitelephone". Physical Review D 2, pp. 263-265, 1970
[12] Tachyonic antitelephone, From Wikipedia, the free encyclopedia, 2012, Accessed 20 August 2012
[13] C. Leshan, Constantin Leshan about open tunnel paradox in teleportation, Membrana, 2005, Accessed 20 August 2012