

Detailed answer to comments from reviewer 2

1. The authors must to consider theories related to de connections of the space-time linked with the Chern-Simon form and the possibility of used it to the value of this fine structure, which could be related with the evaluating of certain length between elemental frames of physical identities

We are grateful to the referee for the wish in the future to link the problem of the fine structure α to Chern-Simons theory, that is, to the three-dimensional (and multi-dimensional) topological quantum field theory of Schwartz's type proposed by Edward Witten. In condensed matter physics, Chern-Simons theory describes the topological order for the conditions of the fractional quantum Hall effect. In terms of mathematics Chern – Simons theory is interesting because it allows to calculate the knot invariants such as the Jones polynomial. The theory of knots and links related to the theory of homology and homotopy. Therefore we recommend to pay attention to the **MILLENNIUM PROBLEM**, solved by **Perelman** and the Knot Problem based on **Alexander's polynomials**. In this connection we recommend to read the book **S.Kh. Aranson, G.R.Belitsky,E.V.Zhuzoma. Introduction to the Qualitative Theory of Dynamical Systems ob Surfaces.American Mathematical Society/Providence,Rhode Island,1996, V.153, 325 p.**, as well as in an earlier article **S.Kh.Aranson & V.S. Medvedev. Regular Components of Gomeomorphisms of the n-Dimensional phere.Math.USSR,1971. V.14,No 1,p.1-14.**

2. The structure of the space-time obeys to the field connections of each once points in which are produced “movements” due to the actions of these fields. I think that the fine-structure will have that to see with the connectivity due to the connection between points or particles of the space-time

We are grateful to the reviewer for the wish in the future to link the problem of fine-structure constant α with the movement of the particles in space-time due to the fields action. In this we can see the interest of the reviewer to the subject of this article.

3. “Mathematical Nanotechnology: Quantum Intentionality” published in JAMP, SCIRP

We also thank the reviewer for the wish in the future to link the fine-structure problems to nanotechnology. In this regard, the monograph of the world famous physicist Igor Aranson is of direct interest. Igor Aranson is a Head of the department of the American National Laboratory (Argone National Laboratory, Illinois, USA), where also a winner of the Nobel Prize in physics Alexei Abrikosov works. We are talking about the following monograph **Igor S.Aranson & Lev S.Tsimring. Granular Patterns.Oxford.University Press.2009, 343 p.** Igor Aranson is the son of doctor of physical and mathematical sciences on differential equations and topology and geometry Samuil Aranson, who is one of the co-authors of the present article. Doctor of Computer Science Alexey Stakhov is another co-author of the present article. He is author of the fundamental book **“The Mathematics of Harmony,”** (World Scientific, 2009), a new new interdisciplinary field of science and mathematics.

4. Here the author could to find certain parameters to relate with yours conjectures.

We are grateful to the reviewer for his description of a large range of physical problems that may be associated with the problem of the fine structure constant, which in the future could realize our physical and mathematical model of the fine structure constant α in the connection with the age of the Universe.

5. The paper must be reduced or resumed and certain sections must be eliminated.

The authors wrote the article in a very compact form with links to their published works. In this regard, the question of reducing the volume of the article in any sense is contrary to the recommendations of another reviewer to insert in the article our proof of the constant sign of

the derivative $\frac{d\alpha}{d\psi}$ what was done by us by means of reducing some of the texts, to leave the same amount of the article. Therefore, reducing the article could lead to the loss of its meaning.

6. The arguments presented by authors not are sufficient to solve a complex problem on the equilibrium so fine in the microscopic level of the space-time in whole their regions of the space-time and the insignificant production of the matter to produce accelerated expansion that increase in the time related with the torsion.

The authors of the article did not put the question about the accelerated expansion of the Universe, which increases the time due to the torsion what is a subject of the theory of torsion fields. The Russian literary hero Kozma Prutkov told: "It is impossible to grasp the immensity" At the same time, Albert Einstein, in his article "On Science", wrote: *"I believe in intuition and inspiration. The basis of all scientific work is the fact that we believe that the world is orderly and knowable essence. My religious feeling is respectful admiration in such order, which reigns in a small part of the reality, accessible to our weak minds."*

We thank the reviewer for friendly advices.

7. The inclusion of the Wikipedia as reference is unacceptable

We agree with this remark. However, in our article we refer to Wikipedia only in the case where the accuracy of the given information is not in doubt and is confirmed in Wikipedia by specific references to the works of many well-known authors on the subject.

8. The paper must to use Theorems and consolidated results studied in field theory obtained in Mathematical Physics.

We agree with the reviewer in the fact that our physical and mathematical model of the Fibonacci special theory of relativity has relation to mathematical physics and its important branch of the field theory. In the field theory, mathematical physics studies, in particular, the postulates of Einstein's special theory of relativity and relativistic main effects.

In Mathematical Physics we investigate the physical problems by using mathematical models, and the results are presented in the form of theorems, graphs, tables, and so on and then we give a physical interpretation of these mathematical results.

Mathematical physics is the theory of mathematical models of physical phenomena. It refers to the mathematical sciences; and a mathematical proof is the criterion of truth in it.

However, in contrast to the pure mathematical sciences, mathematical physics investigates physical problems on the mathematical level, and the results are presented in the form of theorems, graphs, tables, and so on and then we give a physical interpretation of these mathematical results.

We have used this important idea of mathematical physics in this article. That is, in our model of Fibonacci special theory of relativity, we have confirmed its compliance with astronomical observations (experiments) on the basis of changes in the speed of light in a vacuum, depending on the changes in the fine structure constant α from the age of the Universe.

According to observations of the **Paranal Observatory in Chile**, 10 million years ago, that is, through 3.7 billion years after the Big Bang, the fine-structure constant α has decreased by no more than 6×10^{-7} times.

If we denote by α_{\min} the value of the fine structure constant α for the present time, and through α_{\max} the maximum possible higher value of fine structure constant α over 3.7 billion years after the *Big Bang*, the theoretical value α of in our model for this situation must satisfy the inequality:

$$\alpha_{\min} < \alpha \leq \alpha_{\max}.$$

In our theoretical model, we have obtained the following results:

$$\alpha_{\min} = 0.007297351997377362 < \alpha_0 = 0.007297354733194072 < \alpha_{\max} = 0.0072973563757885605.$$

This means that the above inequality is fulfilled with accuracy up to nine decimal places!

It is even more than expected confirms the accuracy of coincidence of the theoretical model of the created by authors Fibonacci special theory of relativity with experimental data.

9. The numerical data are in much cases uncertainly

We took as a basis the experimental data from the table 'Chronology of Big Bang "from Wikipedia https://ru.wikipedia.org/wiki/%D0%A5%D1%80%D0%BE%D0%BD%D0%BE%D0%BB%D0%BE%D0%B3%D0%B8%D1%8F_%D0%91%D0%BE%D0%BB%D1%8C%D1%88%D0%BE%D0%B3%D0%BE_%D0%B2%D0%B7%D1%80%D1%8B%D0%B2%D0%B0

Last validation of this table was made July 2, 2015.

The results correspond to the works of such renowned scientists as:

1. Andrei Linde (USA) (Nobel Prize 2014). The Many Faces of the Universe. Public lecture by Professor Stanford University (June 10 2007).

2.A.D. Linde. Particle Physics and Inflationary Cosmology.- Moscow: Science, 1990 (Russian)

3..I.Ya. Aref'eva. Holographic Description of the Quark-gluon Plasma formed by collisions of heavy ions, Successes of physical sciences. – 2014 (Russian)

We have no reason to doubt with the experimental data of this table 3.7. As said David Hilbert in the Preface to his famous 23 mathematical problems that all physical experiments have errors and a harmonious combination of thought (theory) and experience (experiment) can give reliable results.

Here are his exact words:

"In the meantime, while the creative power of pure reason is at work, the outer world again comes into play, forces upon us new questions from actual experience, opens up new branches of mathematics, and while we seek to conquer these new fields of knowledge for the realm of pure thought, we often find the answers to old unsolved problems and thus at the same time advance most successfully the old theories. And it seems to me that the numerous and surprising analogies and that apparently prearranged harmony which the mathematician so often perceives

in the questions, methods and ideas of the various branches of his science, have their origin in this ever-recurring interplay between thought and experience."

Dear Reviewer! We hope that you are sure that the first stars in the Universe appeared through 550 million years after the Big Bang? On the present day we have just such experimental data. And maybe later by using more sophisticated devices we will get other data.

In this regard, we stand in solidarity with you, that the ongoing astronomical observations can not be with 100% probability to argue the accuracy of these experiments, even with an interval of confidence.

However, the today physics uses that experimental data that are available. This fundamental difference between physics and mathematics. Mathematics can develop without using experimental data.

10. The format and writing quality is not the required by PSIJ.

Dear Reviewer! In preparing the article for publication and receiving specific comments on the format and quality of writing, all these notes will be corrected

11. The authors not take the considerations on fermion and tachyon spaces and their relevant roll in the charge of the particles.

Dear Reviewer! Thanks you for the new possible application of the fine structure constant. The authors consider it impossible to state all the problems in one article, and your wonderful comments will be taken into account in subsequent articles. Currently, the authors are working on the question about changing the physical constants that are directly related to the fine structure constant α .

Conclusion

Once again the authors thank the referee for very valuable and deep comments, which will be take into consideration in further studies on this topic.

We have admired by your deep knowledge of theoretical and applied physics. It seems to us that you have been interested in the proposed in the article solution of the problem of changing fine structure constant depending with the age of the Universe and you could appreciated it properly.