ON THE TIME REVERSION IN FEYNMAN'S QED

by

Wladimir Guglinski

(wladimirguglinski@hotmail.com)

May 30 2005

ABSTRACT

Feynman's Quantum Electrodynamics was developed by considering the reversion in time, which means that there is a violation in the causality: something in the future yields a happening in the past.

Here we show that the paradox exists when one tries to understand the electron's motion through a classical trajectory. However, by considering that the electron actually moves through a helical trajectory, the success of Feynman's theory can be explained without considering the reversion in time.

1. THEORETICAL ADVANTAGES OF THE HELICAL TRAJECTORY (HT)

The HT of the elementary particles was proposed by Natarajan^[1]. From the several advantages that the HT brings to Theoretical Physics, it can be mentioned the following ones:

- A) The authors Lindsay and Margenau in the page 353 of their book^[2] comment the velocity of an electron according to the equation $V = c^2/v$, obtained by applying the de Broglie's postulate: *"In the inertial system with respect to which it is moving with constant velocity the electron appears as a progressive wave. The wave velocity can clearly never be less than c since $v \leq c$. This might seem to contradict the fundamental result of special relativity in accordance to which c is the maximum possible velocity for the propagation of physical effects. [...]. The exact picture is still in question, or perhaps one should say that there is now grave doubt whether such a pictorial representation is at all satisfactory. Nevertheless the de Broglie idea initiated wave mechanics"*. From their words we realize that the incompatibility between the Relativity and Quantum Mechanics lies in the de Broglie's postulate. So, if there is theoretical possibility of eliminating the incompatibility through a new theory that replaces the de Broglie postulate by the HT, of course that the theorists cannot neglect such a possibility: they have the duty to investigate it.
- B) In another author's paper^[3] it is shown that a theory developed from de Broglie's postulate is unable to explain a new version of the Michelson-Morley experiment conceived by the author, in which the light is replaced by a flux of protons and the interferometer is replaced by a crystal. This new version of the Michelson-Morley experiment can be explained only if we consider that the protons move through a helical trajectory.
- C) In the author's paper^[4] on the photon's model it is shown that Maxwell's Equation can be obtained from a model of photon where two particles move through the helical trajectory.
- D) In 1964, Christenson and collaborators discovered that the system (K^0 , $\bar{K}^0$) sometimes is responsible by a process interpreted as a *"temporal reversion"*. In the author's paper^[5] proposing a new model of neutron it is shown that the interpretation by a temporal reversion can be avoided when we consider the spin-fusion mechanism, which is a property of the particles that move through the helical trajectory, as proposed in another author's paper^[6]. Obviously a new interpretation that eliminates a time reversion hypothesis cannot be neglected, by considering that it is absurd to suppose that the Nature operates through the temporal reversion.
- E) The belief on the existence of non-local interactions (according to Quantum Mechanics) comes from the interpretation on the Allan Aspect experiment based upon the Bell's Theorem. However the validity of such theorem lies on the following premise: that de Broglie's postulate reflects indeed a fundamental property of the matter (the duality wave-particle). But since from several theoretical evidences we conclude that Broglie's postulate lead us to problems without solution, and remembering that we can consider the duality wave-particle as a property of the HT, then we could not take the Bell's Theorem as the point of departure for proposing that non-local interactions exist in the Nature. In a paper^[7] on the EPR paradox a new interpretation (based on local interactions) is proposed for explaining the Allan Aspect experiment, taking in consideration the model of

photon^[4] proposed by the author.

F) Among the several successes obtained by Bohr with his hydrogen model, perhaps the most striking is the calculation of the Rydberg's constant. From the theoretical calculation Bohr has obtained $R_H=10.968.100\text{m}^{-1}$, while from the experiments the constant obtained is $R_H=10.967.757,6\pm 1,2\text{m}^{-1}$. Considered from the viewpoint of the probability, it is impossible that Bohr's successes are merely accidental (such a hypothesis is against the laws of probability).

In another paper^[8], by proposing a new hydrogen model where a corpuscular electron moves through HT about the proton, the author shows not only that Bohr's successes are not accidental, but it is even shown that Bohr's model can be conciliated with Schroedinger's Equation, a theoretical task that it is possible by considering the electron's motion through the HT within the electrosphere. So, one of the greatest mysteries of Physics - the success of Bohr's model - is demystified thanks to the HT.

From those several advantages of the HT one realizes that its contribution to Theoretical Physics must be considered seriously. And here it is shown one more advantage: from the electron's HT it is possible to eliminate the time reversion in Feynman's Quantum Electrodynamics. Considering that the time reversion is the most unacceptable paradox of QM, the author hopes that the advantages of the HT will be taken in consideration by the scientific community starting from now.

2. FEYNMANN'S STARTING POINT

According to the classical electromagnetism, the force exercised by a load over another one is transmitted by the way of an electromagnetic field: the load generates a field that actuates on the other one. As the field propagates with the speed c of light, the first load influences on the second after a time: such delay is the time t that the field spends to peruse the distance L between the two loads ($t = L/c$).

Feynman started to develop his theory from the assumption that the force of interaction between two electrons is not due to a field. The interaction is an "action at distance" between the loads, which is felt by the second load after a time $t=L/c$ predicted in the classical electromagnetism. Let us see how he introduced the time reversion in his theory.

Maxwell's Equations, symmetrical with regard to the time, admit two sort of solutions. The first ones correspond to the waves that leave away the source by wasting a time (in our common sense about time). They are called "retarded", because they arrive to the receptor after a delay, since they peruse the space with the speed of light. The second solutions, not considered commonly because they make no sense (the effect happens before the cause) correspond to waves that converge to the source and do again the curse of time with the speed of light. They are called "advanced", because they arrive to the receptor before their departure from the source (they leave out the source in the future, go back in the time, and arrive to the receptor in the past time).

Feynman's theory considers that the receptor receives in a present instant these advanced waves (emitted by the source in an instant of the future). So, in his theory the interaction between the source and the receptor combines two sort of waves: the retarded waves received by the receptor after their emission by the source, and the advanced waves received by the receptor before their emission by the source. Feynman determined that such combination is formed by 50% of retarded waves and 50% of advanced waves.

The Fig. 1 illustrates the combination of retarded and advanced waves according to Feynman's hypothesis: a load with motion (source) induces an electromagnetic field. The action of this electromagnetic field over another load (receptor) is described by the Maxwell's Equations. As they are symmetrical with regard to the time, their solutions are of two kind: the retarded and the advanced waves received by the receptor. So, looking at the Fig. 1, in the present instant t the receptor receives:

a) the retarded waves emitted by the source in the past time $t' = t - L'/c$ (1)

b) and it also receives the waves that shall be emitted in the future time $t'' = t + L''/c$ (2)

As t'' is the future with regard to the present time t , of course that such a theory defies the

logic, since the receptor receives the advanced wave before its emission by the source (such advanced wave goes back in the time: after leaving out the source in the future time t'' , it arrives to the receptor in the present time t). But the experiments have corroborated the calculations obtained from Feynman's theory.

3. PROPERTIES OF THE HELICAL TRAJECTORY (HT)

- 1) The HT appears in the Dirac's theory of the electron. In their book^[2] Lindsay and Margenau say in the page 508: *"The only possible resolution of this apparent paradox is to assume that the electron performs, in a classical sense, a rapidly periodic movement with the speed of light, while it progresses uniformly along x in conformity with (12). Schrodinger was the first to point out this peculiar trembling motion; its actual significance is not clearly understood"*.
- 2) According to Natarajan's proposal, *"When we consider a particle at rest in the laboratory frame, it has no external motion ($v_{CX} = 0$). The internal velocity, however, is given by $v_{IN} = c$ (Postulate 4). On the other hand, if the particle is observed to be moving with a uniform velocity v in the laboratory ($v_{CX} = v$), then v_{IN} should be $v_{IN} = (c^2 - v^2)^{1/2}$ so that the result of these two velocities is still c (Postulate 3 and 4)."*

If we consider the hypothesis that an electron can lose its HT (in some kind of interactions) along a very short time, in order that during a fraction of second its trajectory becomes rectilinear, then in this case from Natarajan's postulates 3 and 4 we conclude that along such short rectilinear motion the electron peruses it with the speed c of light.

4. NEW HYPOTHESIS FOR FEYNMAN'S PARADOX

The electron (source) in the Fig. 2 comes from the left moving through HT, with speed v . In the point A it emits a wave. Such emission yields an internal disturbing in the resultant of forces that keep the electron moving with circular motion transversally to the line center of the HT. As consequence, the electron does not move through HT after emitting the wave: it gets a classical rectilinear motion. The Fig. 3, where $c' = (c^2 - v^2)^{1/2}$, shows the composition of the velocities from the point A to B, and it is seen that the electron peruses the distance AB with the speed c of light.

Let us continue to describe what happens in the Fig. 2. In the point B the electron emits another wave, and after that it moves from B to C keeping the classical trajectory. In the point C it retrieves its circular motion about the line center of the HT, and so it goes from C to D with speed v' ($v' < v$ because the electron has emitted two waves, one in the point A and another in the point B).

In the point D the electron emits another wave, it loses again its circular motion about the line center of the HT, and so it goes with speed c from D to E, where it emits another wave, and after that it peruses the distance EF with speed c . In the point F it retrieves again its HT, and moves from F to G with speed v'' ($v'' < v'$), and so on.

Let us analyze the interaction between the source and the receptor, according to the Fig. 2.

The first wave is emitted in the point A in the time $t' = tL'/c$, and it arrives to the point R (receptor) in the time t . The second wave is emitted in the point B. But since the electron already has perused the distance AB with the speed of light, then the second wave also arrives to the point R in the time t (together with the first wave, because the distance ABR is perused with the speed of light: AB is perused by the electron with speed c , and BR is perused with speed c by the second wave). Therefore the both trajectories AB and ABR are perused with the speed of light, and therefore the two waves arrive to the receptor together.

Of course that the influence of the two waves on the receptor is the same, the reason why in his hypothesis Feynman has arrived to the conclusion that, according to his theory, the interaction with the receptor would be caused by a combination of 50% of retarded waves and 50% of advanced waves.

Now consider the situation from the Feynman's viewpoint. In the Fig 1 he supposed that the source would have to move from A to B with a speed v . Then from such hypothesis it would be impossible to consider that the second wave could arrive to the receptor together with the first wave, since the emission of the second wave would have a time delay, corresponding to the

time necessary for the electron to move with the speed v between the points A and B of the Fig. 1.

5. CONCLUSIONS

One could say that the arguments proposed in the paper are based on speculation only. So, what could be the advantage for the science to consider a new interpretation for the meaning of the Feynman's theory?

Response: First of all, we have to take in consideration that the temporal reversion is absurd, and therefore it is reasonable to believe that there is some hidden unknown mechanism responsible for the success of Feynman's theory. If such hypothesis is correct, the success of his theory is accidental, and it is important to discover what is the real mechanism of the phenomenon.

Besides, such new interpretation can encourage the researchers to investigate the phenomenon, and in this way new experiments can bring a definitive answer to the paradox.

In one among his lectures about the nanotechnology, Feynman predicted that in the future the researchers would have to face unexpected behavior from the electron, and they would have to discover new laws of the electron's interactions. It seems that Feynman was aware that the Nature puts "something" out of our sight, and Quantum Mechanics is unable to help us to understand some fundamental behavior of the particles. Perhaps the present theory may open the eyes of the researchers, and to help them to look for new laws in the scale of nanotechnology.

Einstein was right when he opposed so strong resistance against the non-local actions considered in the development of Quantum Mechanics, that's why he claimed that QM is an incomplete theory.

Non-locality and time reversion are two phenomena that our intuition refuses to accept. The physicists got used to accept them because they had no alternative, since they had to render themselves to the accuracy obtained from QM formalism.

Nevertheless the paradoxes arisen from the QM conceptual foundations can be explained from a new alternative: to replace the de Broglie's concept, by considering that the wave-particle duality is not a property of the matter, as he proposed, but simply a property of the helical trajectory. Along several papers the author has shown that such aim is attainable.

From the papers met in the author's book Quantum Ring Theory^(*) one starts to understand that the paradoxes have appeared in QM because the elementary particles move through the HT, and inasmuch the theorists did not consider it in the development of QM, all the properties of the HT had to be replaced by a mathematical formalism that describes the phenomena as they would be produced by strange properties, like the non-locality and the time reversion.

As the theorists now are seeing that by introducing the HT it is possible to eliminate the paradoxes, they cannot neglect anymore this new alternative that is offered to them.

(*) To be published in 2005 by the Bauu Institute Press

References:

1. Natarajan T. S., , *A Unified Conceptual Foundation for Relativity and Quantum Mechanics*, Physics Essays vol. 9 n.2 , 303, 1996
2. Lindsay R. B. & Margenau H. , *Foundations of Physics* , Ox Bow Press, Pg 287, 1981
3. Guglinski W., Michelson-Morley Experiment for Protons, Bauu Institute Press, in press
4. Guglinski W., A Model of Photon, Bauu Institute Press, in press
5. Guglinski W., New Model of Neutron, Journal of New Energy, Vol 4, No. 4, 2000
6. Guglinski W., Stern-Gerlach Experiment and the Helical Trajectory, Bauu Institute Press, in press
7. Guglinski W., Demystifying the EPR Paradox, Bauu Institute Press, in press
8. Guglinski W., Fundamental Requirements for the Proposal of a New Hydrogen Atom, Bauu Institute Press, in press

Fig.1 – Feynman's theory
The receptor receives in the past time t a wave emitted by the source in the future time $t'' = t + L''/c$

Fig. 2

Fig. 3

Informações adicionais*

Wladimir Guglinski

Wladimir Guglinski nasceu em Goiânia-GO, em 04 de Agosto de 1950. Engenheiro Mecânico, formado em 1973 pela Escola de Engenharia da UFMG-Belo Horizonte, é um pesquisador que, juntamente com outros cientistas de várias partes do mundo, vêm realizando experiências que provam que grande parte dos conceitos e modelos estabelecidos pela Física Moderna estão errados. Há vários anos o cientista vêm se dedicando ao desenvolvimento de uma Nova

Teoria no campo da Física Teórica, que segundo ele, poderá ser a base de uma nova ciência que realmente irá explicar as leis da Natureza em toda a sua lógica perfeita.

Para Guglinski, a ciência dos últimos séculos se desenvolveu erradamente pois considerou só aquilo que pode ser visto e provado por meios materiais. O saber dos povos antigos foi deixado de lado e o Universo passou a ser entendido como se fosse formado apenas de matéria, "o que levou a Física aos erros e paradoxos existentes", diz o cientista.

**Comentários feitos por Prof. Carlos Eduardo Cardoso.*

cardoso@tchequimica.com