SMARANDACHE HYPOTHESIS: EVIDENCES, IMPLICATIONS AND APPLICATIONS

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ABSTRACT: In 1972, Smarandache proposed that there is not a limit speed on the nature, based on the EPR-Bell (Einstein, Podolsky, Rosen, Bell) paradox. Although it appears that this paradox was solved recently, there are many other evidences that guide us to believe that Smarandache Hypothesis is right on quantum mechanics and even on the new unification theories. If Smarandache Hypothesis turns to be right under any circumstance, some concepts of modern physics would have to be "refit" to agree with Smarandache Hypothesis. Moreover, when the meaning of Smarandache Hypothesis become completely understood, a revolution on technology, specially in communication, will arise.

I. SUPERLUMINAL PHENOMENA EVIDENCES AND SMARANDACHE HYPOTHESIS

It appears that was Sommerfeld who first noticed the possible existence of faster-than-light particles, later on called tachyons by Feinberg [1]. However, tachyons have imaginary mass, so they had never been detected experimentally. By imaginary mass we understood as a mass prohibited by relativity. However, relativity does not directly forbid the existence of *mass less* superluminal particles, such as the photon, but suggests that

superluminal phenomena would result in time travel. Hence, many physicists assumed that superluminal phenomena does not exist in the universe, otherwise we would have to explain all those "kill your grandfather" paradoxes [2]. A famous example of this sort of paradox is the causality problem.

Nevertheless, quantum mechanics suggest that superluminal communication exist. In fact, there are hypothesis on the obligatory existence of superluminal phenomena on nature [3, 4]. The EPR-Bell paradox is the most famous example. Pondering about this paradox, Smarandache again suggested in 1993, in a lecture in Brazil, that there is no such thing as a limit speed on the universe, as postulated by Einstein [5]. It appears that recently this paradox was completely solved by L. E. Szabó [6]. Even so, there are still many more evidences of the infinite speed — or simply instantaneous communication — in the universe, as we shall see briefly.

I.1. The Rodrigues-Maiorino Theory

Studying solutions of Maxwell and Dirac-Weyl equations, Waldyr Rodrigues Jr. and José Maiorino were able to propose a full-unified theory for constructions of arbitrary speeds in nature (for arbitrary they meant ) in 1996 [7]. They also proposed that there is no such thing as a limit speed in the universe, so that Smarandache Hypothesis can be promoted to theory, as Smarandache-Rodrigues-Maiorino (SRM) theory.

What is unique about Rodrigues-Maiorino theory is that special relativity principle suffers a breakdown, however, even relativistic constructions of quantum mechanics, such as Dirac equation, agree completely with superluminal phenomena. Also, according to Rodrigues-Maiorino theory, even well positioned mirrors can accelerate an electromagnetic wave to velocities greater of the light. This assumption was later on confirmed by Saari and Reivelt (1997) [8], who produced a X-wave (named this way by Lu, J. Y., a Rodrigues' contributor) using a xenon lamp intercepted with a set of lens and orifices.

The SRM theory is a mathematical pure and strong solution of the relativistic quantum wave equation, indicating that there is no speed limit in the universe, and therefore is the most powerful theory today for construction of arbitrary speeds.

I.2. Superluminal Experiments

Many experiments, mainly evanescent modes, result in superluminal propagation. The first successful evanescent mode result was obtained in 1992 by Nimtz [9]. Nimtz produced a 4.34*c* signal. Later on he would produce a 4.7*c* FM signal with Mozart's 40th symphony. This achievement of Nimtz would be passed over by other results even eight times faster than the constant *c*.

In the case of Nimtz experiment is not clear if it violates the casual paradox. On the other hand, L. J. Wang, A. Kuzmich and A. Dogariu recently published an outstanding result of an anomalous dispersion experiment where a light pulse was accelerated to 3 ℔ times the speed of light, not violating the casual paradox, thus resulting in a time

travel! In practice, this means that a light pulse propagating through the atomic vapour cell appears at the exit side so much earlier than if it had propagated the same distance in a vacuum that the peak of the pulse appears to leave the cell before entering it [10].

I.3. The Speed of Gravity Revisited

The general relativity of Einstein postulates that the speed of gravity force is the same as the constant *c* due to the restriction of the special theory of relativity. However, if the speed of light is not a limit on the universe, isn't time to revisit this postulate?Van Flandern published some astrophysical results that indicate gravity is superluminal [11]. Observations of some galaxies rotations made by NASA suggest that some galaxies are spinning with superluminal velocity [12].

Van Flandern data was later on explained with a theory that does not need superluminal phenomena by Ibison, Puthoff and S. R. Little [13]. Yet, observations of superluminal signaling from galaxies remains unexplained from subluminal point of view.

I.4. Tachyons

Some models to the superstring theory, our foremost candidate for the unified theory of physics, include tachyons, the particles able to move faster than light. Even so, physicists found a way of hacking the theory so that tachyons disappear; some others, like Freedman, defend that the theory should not be hacked that way at all [1]. The superstring theory is probably the best field for studying tachyons, for it will not make you work with imaginary masses. Prof. Michio Kaku compared the idea of more dimensions in physics to a matrix scheme in his book *Hyperspace*. Imagine a matrix of 4x4, that inside we can have the Theory of Relativity, and another were we have the quantum mechanics. If we build a bigger matrix, say 8x8, we can therefore include both relativity and quantum mechanics in a single matrix. That is the main idea of unification through the addition of more dimensions. In the same way, working only with the 4x4 matrixes, we do not have enough space for working with tachyons. However, in a bigger matrix we will have enough space for finding solid solutions of tachyonic models.

Tachyons were already, in an obscure manner, detected in air showers from cosmic rays [2].

II. IMPLICATIONS AND APPLICATIONS

According to Rodrigues-Maiorino theory, the consequence of the existence of superluminal phenomena would be the breakdown of the special relativity principle. But we will not need to modify anything in quantum mechanics itself. More precisely, it appears that is quantum mechanics, which is banning the old pure relativity, according to SRM theory. Nevertheless, the theory of relativity indeed accepts some sort of superluminal communication, resulting in time travel, as Wang et al showed it.

Perhaps we would be able, in a distant future, to send messages to the past or to the future. Anyway, superluminal phenomena would have a more stand-on-ground application with local communication. According to Rodrigues-Maiorino theory, the X-wave is *closed* in a way that it does not loss energy as it travels. So, a superluminal X-

wave radio message would achieve its destination almost in the same condition as when it were sent and no one, except the destination, could spy the content of the message. The invention of such superluminal-signaling transmitter would be of great power associated with MIT's pastille able to curve light in 90º, in the manufacturing of optic fibers.

III. CONCLUSION

The various experiments and solid theories that rise from quantum mechanics involving superluminal phenomena are a high-level indication of the Smarandache Hypothesis, that there is no such speed limit in nature. This implies in a breakdown of Einstein postulate of relativity, but not in any field of quantum mechanics, even on the relativistic wave equation. As in our evolution came a time that newtonian dynamics were not enough to understand some aspects of nature, it is maybe getting a time when Einstein's relativity must be left aside, for hence quantum mechanics will rule.

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