

# A Survival Guide to Physics: From How to Think to What to Believe

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Physicists have the imperative need to figure out what they are talking about. Reality is not anymore the familiar and recognizable matter it used to be in previous centuries. Moreover, the newly discovered phenomena and its behavior, such as electrons, atoms, speed of light, Maxwell's equations and others, have forced the investigators to develop new theories that, basically in the twentieth century, attempted to provide more accurate models of reality than the ones available at that moment, such as Galilean Relativity and Newtonian Mechanics. Regrettably, those new theories, such as Special Relativity and Quantum Theory, together with the Standard Model, have not provided an integral vision of the world and have become somehow paradoxical, disconnected and incompatible with each other. The purpose of this paper is to suggest a model of reality based on electromagnetism, which has a high probability of being correct and carries the promise of integrating all branches of physics. In addition, it proposes a completely new mindset of physicist for thinking and believing about the different concepts that have appeared and continue appearing in physics.

*Alice laughed: "There's no use trying," she said; "one can't believe impossible things."*

*"I daresay you haven't had much practice," said the Queen. "When I was younger, I always did it for half an hour a day. Why, sometimes I've believed as many as six impossible things before breakfast."*

-- Lewis Carroll, *Alice in Wonderland*

## 1. Introduction

The objective reality is the *world-outside* our brains. In the brain resides the *world-within*, which is our internal model, or subjective reality, of the *world-outside*.

The *world-outside* has properties that can be detected directly through our physical senses or indirectly by being explained by a teacher, amplified through apparatuses such as microscopes, radar, etc.

Once in the brain, humans ascribe symbols to the perceptions of those objects and concepts. These symbols are part of a natural or mathematical language.

Such words, images, numbers, etc., form a collection of symbolic structures that configure the *world-within* and stand just as an abstract model or representation of the objects or concepts of the physical *world-outside*.

The Sapir-Whorf hypothesis, in essence, explains that we are able to think only about what we are able to identify and represent with symbols. As Whorf states:

"The world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds - and this means largely by the linguistic systems in our minds. We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way - an agreement that holds throughout our speech community and is codified in the patterns of our language. The agreement is, of course, an implicit and unstated one, but its terms are absolutely obligatory; we cannot

talk at all except by subscribing to the organization and classification of data which the agreement decrees." [1]

If our internal representation, that is our *world-within*, does in fact reflect and represents the *world-outside* then this means that we have been able to construct a true internal model of the world. Nevertheless, it is more frequent that the way we see and understand the world is biased or misinterpreted and then such errors influence the language that we use. Nothing compels the physicist to construct the proper model.

Given that the physical theories are just models contrived to describe the world, we have to question how close the said models describe the objective reality or physical *world-outside*.

It is distressing, but experts such as Larry Laudan and Thomas Kuhn advise us that most, if not all, scientific theories in the past have been incorrect and have needed to be changed. These include theories such as the flat Earth, that the Earth is at the center of the universe or the luminiferous aether. By following that line of reasoning, those experts warn us that the current theories have also a high probability of being in error. However, many otherwise reasonable persons that do not have a good acquaintance with the history of science become entrenched in one or other *world-within* or worldview and are not willing to explore some better explanations for the phenomena which they are concerned with.

Poincaré explained that:

"The man of the world is struck to see how ephemeral scientific theories are. After some years of prosperity, he sees them successively abandoned; he sees ruins accumulated on ruins."

Experience tells us that most of the physical theories (*world-within*) do not have the corresponding referent, which is the concrete object or concept in the real *world-outside*, that is designated by the word, expression or theory. Rather, each day new imaginative descriptions that allegedly represent some new facets of the *world-outside* continue appearing.

In this paper, the author is going to insist in his proposal of an electromagnetic model of the world, and argue against some of the possibly fictitious concepts that appear in the following list, mostly collected from the public letters that some members of the NPA have shared with other members:

'Aethers' (a great variety), 'gravity waves' (there is no evidence of them, at least yet), 'gravitons', 'gluons', a Higgs 'God-particle', 'superluminal velocities', 'dark matter', 'dark energy', 'zero-point energy', 'point particles', 'String theory', that the CMB is the remains of the Big Bang, 'neutrinos', 'quarks', that the photons have zero mass, that our universe can have more than three dimensions, that 'time' can be contracted or dilated. A few days ago, a letter from a fourteen year-old kid, attributing to Einstein the following theories that must be included in the previous list, appeared in an important local newspaper: 'worm holes', 'time travels', 'parallel universes', 'black holes' and that it all must have begun with a 'Big Bang'.

As is well known, in a war of conflicting theories, as the one Physics endures currently, the first victim is Truth, and also our children seem to be the collateral damage of the weight of these supposed "experts" that appear frequently in "scientific" TV programs.

With so many suspicious theories, it is no wonder that some investigators [2, 3] have opted for the almost nihilist opposite alternative of rejecting the existence of electrons, photons and the speed of light. In popular words, they throw away the baby with the bath water. If we believe in Occam's razor, their choice and explanations, such as that the natural state of motion is not linear but orbital, must be certainly closer to the truth than any of the theories in the previous list.

Is there some viable alternative? It is an old axiom, as Sherlock Holmes says,

"that when all other contingencies fail, whatever remains, however improbable, must be the truth" [4]

The purpose of this paper is to remind the reader about a model of reality based in electromagnetism, which has a high probability of being correct and that carries the promise of integrating all branches of Physics under a single paradigm. The author has proposed this theory since several years ago and the pieces have continued falling into place. [5]

This purports to satisfy one of the statements provided by the former president of the NPA, Francisco J. Müller:

"If anything is clear in Thomas Kuhn's familiar book, *The Structure of Scientific Revolutions*, it is that no revolution has occurred nor will occur in the future unless there is a proposed alternative theory to replace the older one. The human spirit cannot progress only by negative thoughts. It needs the positive food of truth, the elevation to new syntheses and visions of older and newer realities."

The author of the present paper has been advocating since more than ten years ago that electromagnetic energy (photons) is the pure constitution of all the elementary particles of matter. In section 5 below it is suggested, in an abridged form, the mathematical derivation of the relativistic origin of inertia.

## 2. Assumptions for a theory of Electromagnetic Constitution of Matter

A member of the NPA has declared that a "theory" is its assumptions. The assumptions from a theory must adhere to "real" facts (referents) assumed as undefined premises. In the following, I present a, necessarily incomplete, list of assumptions underpinning my theory. I hold:

1. That electromagnetism, within an empty, vacuum space, is the only constituent of the universe.
2. That photons have mass and energy.
3. That photons displace at the speed of light.
4. That photons displace in empty, vacuum space and do not need an external physical medium.
5. That photons can be curved in rings.
6. That photon-rings of specific energies constitute the stable particles electron, proton and neutron, as well as unstable particles such as the muon.
7. That particles of mass are constituted of structures, called atoms, of photon-rings of specific energies.
8. That time is not a dimension.
9. That electromagnetism is the source of electrostatic and gravitational fields.

I am going to assume that the reader is reasonable. This means that he should not be willing to accept simultaneously the truth of something and its negation. This requirement, for example, would not be satisfied if the reader accepts Quantum Mechanics, which proposes point particles, and at the same time expects that particles must have some finite size. In addition, any serious investigator should challenge such deceiving mathematical methods as "renormalization", to sweep all infinities under the rug.

Some of these assumptions will be examined a little further in the following sections, not necessarily in the order shown in the previous list. The reader is referred to [5] to find the reasons advanced by this author to substantiate the electromagnetic origin of electrostatic and gravitational fields.

## 3. Electromagnetic Universe in Vacuum vs. the Aether vs. General Relativity

Einstein's General theory of Relativity has been successful in explaining a good amount of gravitational phenomena; however, the ontology on which it is based is suspicious. In particular, one of the recurrent mistakes in Physics, according to the present author, is to assign to vacuum or empty space, some physical attributes.

Probably based on the original idea of William Clifford, [6] Einstein described gravity in his General Relativity not as a force but rather as the curvature of a supposed four-dimensional space-time. The energy-momentum of matter causes the supposed curvature, and this curvature determines the paths of moving matter and light. Archibald Wheeler expressed this:

"All the matter of the universe tells space what it is and in turn space tells matter how it must move." [6]

It is nonsensical to ascribe to empty space the supposed quality of curving, and that everything "advances through time" or through "worldlines" in space-time.

As will be argued later, this author does not believe that time is a dimension, that "empty space" can be curved or that something can travel through time.

In the first place, there is no such thing as the permittivity and permeability "of vacuum". It is true that the speed of light is given by the inverse of the product of permittivity by permeability, but these variables do not belong or should be attributable to empty space but to the electromagnetic waves. A wave in a rope, for example, is not carried by the surrounding air or vacuum, but by the rope by itself. A similar explanation allows concluding that the electromagnetic waves are the proper carriers of those physical properties

To avoid the illogical possibility of attributing these properties to empty space, and as a surrogate, many investigators through the centuries, and several members of the NPA in the present day, have logically opted for some kind of aether as the bearer of such attributes.

The present author suggested, in letters to NPA members, that an infinitesimal "crack" in the supposed aether is enough for light to interrupt its travel, initiated at enormous interstellar distances.

As the existence of such ethereal substance does not have the least amount of experimental support and does not resist the most rudimentary argument, it should be definitely dismissed in favor of our more coherent and sound proposal.

#### 4. Particles of Mass are Electromagnetic

That energy is electromagnetic does not need too much explanation, since it is widely accepted that light waves, for example, have this constitution. The Standard Model or Quantum Mechanics perhaps are cluttering the same conclusion for the case of particles of matter. In any case, it is not clear for the present author why physicists have not extended to matter this constitution or declared this belief, despite the fact that this theory has the potential to explain all known phenomena.

The efforts of physicists for proving that all mass is electromagnetic have progressed up to the point of predicting a perfect equivalence between mass and energy. In previous attempts, Feynman, in volume II of his famous and very interesting "Lectures on Physics", [7] in chapter 28, on "Electronic mass", developed the formula that states that the total energy of an electron is

$$U_{\text{elec}} = \frac{3}{4} m_{\text{elec}} c^2 \quad (1)$$

Feynman acknowledges that

"this formula was discovered before relativity, and when Einstein and others began to realize that it must always be  $U = mc^2$ , there was great confusion. We know that there is definitely an electromagnetic piece, and we have a formula for it. And there is the thrilling possibility that the mechanical piece is not there at all – that the mass is all electromagnetic." [7]

The error in those previous attempts and in Feynman's derivation in particular, can be traced to the incorrect assumption that particles are spheres. However, some new investigations [6,

8] continue proposing the spherical wave structure for the electron.

As the reader might surmise, it is almost impossible to think of photons covering a spherical surface, whereas the ring or torus structure proposed by the present author is a clean and obvious alternative that predicts several particle parameters. Notice that the speed of light appears in the equation above since photons can only exist by displacing at such speed.

The next section discusses a little further this proposed model for the electron.

#### 5. The Electron

The proposed model for the electron, as constituted of a photon that travels at the speed of light following a circumference, should be able to be verified by comparing its results with those obtained experimentally or calculated by other means. A particularly simple result obtained with this new model is to compute the intrinsic angular momentum of the electron, commonly denominated "spin". We know that the Compton wavelength for the electron has the approximate value:

$$\lambda_C = 2.42631 \cdot 10^{-12} \cdot m \quad (2)$$

The author assumes that this wave covers the whole circumference of the electron.

Based on this premise we can calculate the radius of the electron,  $r_e$ , by dividing the Compton wavelength,  $\lambda_C$ , by  $2\pi$ :

$$r_e = 3.862 \cdot 10^{-13} \cdot m \quad (3)$$

This is a classic and well-known value. Also, given the known values of the electron's mass,  $m_e$ , and of the speed of light,  $c$ , then the angular momentum,  $L_s$ , of the electron's spin, can be computed using the classical formula of the vector product of the radius of the particle by their momentum:

$$L_s = r_e \cdot m_e \cdot c \quad (4)$$

This equals Planck's constant,  $h$ , divided by  $2\pi$ .

Current physics assigns to spin angular momentum half of the value given by the previous equation. Nevertheless, physicists reintroduce this factor of two in order to calculate another magnitude, called "magnetic dipole moment". They multiply by a factor denominated gyro magnetic ratio, whose value, 2.0024, is almost exactly equal to 2.

In order to apply to the proton the same equation given above, we have to use now the radius and mass of the proton. As the proton radius is about 1836 times smaller than the electron radius and its mass is about 1836 times larger, the result is numerically identical to the one obtained for the electron.

At least part of the investments in such expensive equipment as the Large Hadron Collider might be more properly used to certify that comparatively more massive particles, such as protons, have a smaller size than the less massive electrons. This phenomenon is contradictory with the naive assumption that to larger masses correspond larger sizes. Consequently, physicists prefer to ignore the sizes of particles and decide that all of them are abstract point particles. On the contrary, with our model the explanation is elementary: The smaller particle (proton) has a shorter wavelength (1.321 fm) and larger frequency than the

larger particle (electron); so, correspondingly, the proton is more energetic and massive. The usual value reported for the proton's diameter is about 1.6 fm, which is almost four times larger than the value calculated by dividing its wavelength by  $\pi$ . In any case, we should ask if physicists have some different explanation for this inverse relationship between masses and particle sizes.

The point model of Quantum Theory eliminates the spatial extent. This requires that the particle's rest mass and energy densities become infinite and that both spin and magnetic moment become zero. The point model is actually a mathematical model and is "not based on a model conforming to current physical ideas" [9]. Like the spherical models, the point model is physically unstable and untenable. Besides, it is not adequate for the derivation of properties that require extension, such as the spin and magnetic moment. However,

"Under the vivid imagination of modern "scientific" leaders, the point model persists in current scientific literature – being incorporated into quantum electron theory – and has become the dominating electron theory of our day." [10]

"Parson (1915) was the first to introduce a ring of rotating charge [11], and in 1919, Allen [12] was showing that the magnetic moment and finite size of the ring electron accounted for many characteristics of matter observed in atoms and molecules... Several refinements to the ring model have been made since Parson first proposed it in 1915. Working independently, Iida (1974), Jennison (1979), Bergman and Wesley (1990) [12], Bostick (1991), and Valenzuela (1997) came to similar conclusions." [10]

What these theories have in common is the idea that the electron is a charged sphere or a ring of rotating charge, but they lack an accurate description of inertia. Some of those theories consider that the charge is accelerated and others that the particle must be moving. In addition, these theories do not justify the fact that a static particle must also show the attribute of inertia to a moving observer. On the other hand, the lack of charge of neutral particles such as the neutron, leaves such theories without a mechanism to explain their inertia.

So as to reveal the origin of inertia in our theory, let us assume a plane electromagnetic wave with a differential of momentum,  $dp_0$ , that appears with an angle  $\beta$  in the frame of reference fixed at the electron.

The same wave, viewed from another frame of reference that is moving in the  $x$  direction with velocity  $v$  relatively to the first one, will appear with the energy given by Einstein's formula:

$$dp = dp_0 \frac{1 - \frac{v}{c} \cos(\beta)}{\sqrt{1 - \frac{v^2}{c^2}}} \quad (5)$$

By integrating through the whole circumference, it is easy to find the momentum or the inertia of the moving electron:

$$p = \frac{m_e \cdot c}{\sqrt{1 - \frac{v^2}{c^2}}} \quad (6)$$

The appearance of the speed of light in the "most famous formula of science"  $E = mc^2$  is traceable to our proposed electromagnetic constitution of matter. I wonder if current Physics has contrived some explanation for the appearance of the speed of light in this formula.

For mass particles, such as the electron above, the momentum is computed by integration. This author found some results over more than ten years ago and published them in the web pages of three universities (a paper submitted to *Galilean Electrodynamics* in July 2000 was not published there). Those results show that the direction in which the electron is seen or displaced does not affect the magnitude of momentum. This means that the momentum is not affected whether the particle is seen "from the side" or "from the front" of the ring.

Physicists customarily interpret formula (6) above as that the particle has increased its mass with speed. However, it is very easy to find the contradiction in such an assertion by imagining a fixed electron and moving the observer instead of the electron: how can the electron acquire more mass if we do not even affect or touch the electron in any way? The answer is, of course, that mass, and inertia, are just relativistic phenomena.

To visualize the proposed phenomenological origin of elementary particles and their charges, just imagine that you are following a plane electromagnetic wave, which is displacing forward. Assume that the electric field materializes in the horizontal plane of your extended arms, where the positive electric field is at your right hand side. The magnetic field appears in the vertical plane in the direction of displacement. In order to compose an electron, the wave closes the circumference by turning to the right, leaving the negative electric field outside, at your left hand side. This justifies the negative charge. For the proton, the circular displacement must be done to the left, which leaves the positive electric field outside (positive charge). In order to form a neutral particle, the wave closes in a ring by turning to one side, but now a circularly polarized wave that turns  $2\pi$  radians in each period is required.

When, and if, the internal electric and magnetic fields are in equilibrium, the circular wave is stable, constituting a particle.

## 6. The Concepts of Time and Interval

Einstein considered that time and space are part of a continuous four-dimensional manifold able to contain non-simultaneous events. He wrote: "the idea of the absolute character of simultaneity must be given up." And explained as follows:

"What is the position of the special theory of relativity in regard to the problem of space? In the first place we must guard against the opinion that the four-dimensionality of reality has been newly introduced for the first time by this theory. Even in classical physics the event is localised by four numbers, three spatial co-ordinates and a time co-ordinate; the totality of physical "events" is thus thought of as being embedded in a four-dimensional continuous manifold. But on the basis of classical mechanics this four-dimensional continuum breaks up objectively into the one-dimensional time and into three-dimensional spatial sections, only the latter of which contain simultaneous events." [13]

Some of the most advanced studies [14, 15, 16] postulate that time is not a dimension (as up, front, right) but that it is a scalar. The entire universe lives NOW, always. This suppresses the possibility of a "time coordinate" with non-simultaneous events, as well as "time travels", "time dilation", etc. Every past or future "time" is just a label.

This is the conception of time in which the present author believes and, consequently, allows rejecting completely the following Einstein's claim:

"Since there exist in this four-dimensional structure no longer any sections which represent "now" objectively, the concepts of happening and becoming are indeed not completely suspended, but yet complicated. It appears therefore more natural to think of physical reality as a four-dimensional existence, instead of, as hitherto, the evolution of a three-dimensional existence." [13]

How should we understand phrases such as "time dilation"?

First, we have to be aware of the mechanism for measuring times. As is well known, we have to count the number of periods of some oscillator such as the spin of the Earth, the movement of a pendulum or the changes of state of a Cesium-133 atom. As Peter Marquardt [17] explains, "No clock whatever measures "time" - clocks are devices to compare durations of external processes with an inbuilt periodic process." In this sense, if we were able to probe the frequencies of the electron (about  $1.236 \cdot 10^{20}$  Hz) or of the proton (about  $2.269 \cdot 10^{23}$  Hz), we would be able to more than double the number of digits of precision of the currently most accurate atomic clocks (a "meager"  $9.192 \cdot 10^9$  Hz)

Therefore, "time dilation" should be understood as a phenomenon attributable to the slowing or speeding of clocks and not to the physical extension or contraction of a supposed time dimension.

The Dissidents at the NPA have a clear picture that something is going on wrong with the interpretations provided by Special Relativity: If motion is completely relative, as it is according to Special Relativity, then the observer's A description of B's motion relative to A has to be symmetrical with the observer's B description of A's motion relative to B so that, no matter how A and B move relatively to each other, when they return together at the end of their travel, their respective records of the duration of the travel must be the same. The explanations abound (about ten different and contradictory explanations in 54 peer-reviewed publications collected by our late friend Al Kelly [18]) and all are misleading, with the paradox still alive.

This paradox can be solved very easily in our model of electromagnetic universe through the comprehension that time is measured by counting the periods of the respective oscillators attached to each frame of reference. When an oscillator, such as a Cesium-133 atom, moves away from an observer, its period of oscillation seems to grow longer by the so-called Doppler's red-shift. This is compounded with the time required for light to travel the ever-increasing distance. The opposite occurs if the motion is towards the observer. Therefore, whatever longer duration might have emerged during the travel away of the two observers, it is reduced during the process of returning to meet

again. Evidently, for each of the observers, the period of oscillation does not change in his own frame of reference.

Since Special Relativity does not distinguish between incoming and outgoing directions, it predicts ever-growing time differences for both observers.

One of the basic concepts in Special and General Relativities is the "element of interval", which combines the elements of distance with the elements of time.

Einstein provided the following interpretation of this concept:

"With respect to its metrical character, such a space is characterized by the fact that  $dx_1^2 + dx_2^2 + dx_3^2$  is the square of the spatial separation, measured with a unit gauge, of two infinitesimally neighboring points of a three-dimensional "space-like" cross section (Pythagorean theorem), whereas  $dx_4$  is the temporal separation, measured with a suitable time gauge, of two events with common  $(x_1^2, x_2^2, x_3^2)$ . All this simply means that an objective metrical significance is attached to the quantity

$$ds^2 = dx_1^2 + dx_2^2 + dx_3^2 - dx_4^2 \quad (7)$$

as is readily shown with the aid of the Lorentz transformations. Mathematically, this fact corresponds to the condition that  $ds^2$  is invariant with respect to Lorentz transformations." [13]

Let us interpret the element of interval within a theory where everything displaces at the speed of light. Since both photons and particles are electromagnetic, it is reasonable to suppose that the quotient of the interval of distance divided by the interval of time between the two events should be the speed of light. The precondition for this to happen is that in both events there must appear the same amount of moving energy or mass. Otherwise, any other proportion would produce a speed not equal to the speed of light and, therefore, wrong or belonging to events where independent amounts of energy or mass are present. This would mean that there is no physical connection between these two events and then we could find either superluminal or subluminal "speeds". For example, the distance between the Sun and Earth divided by one second has units of speed but its proportion is not the speed of light, since there we cannot find the same photon or particle appearing in both events. Current relativistic theories do not specify the preconditions for the supposed invariance of interval, allowing the incorrect application of the formulas to disconnected events.

The whole set of events, whose light signals reach a certain point, affect and are simultaneous for an observer at that point, even though one of those events had been produced one thousand years ago in a far away star. On the other hand, for an observer near that star, he will be aware of the events happening now at the Earth, and will be simultaneous with events happening there, one thousand years in our future. If we were to ascribe reality to our universe, we should conclude that both observers are undergoing certain events that are actually occurring simultaneously NOW, but they do not have the possibility of being aware of them or affecting each other until a light signal (can be a particle) from one of them reaches the other.

For moving particles, the speed of light needs to be computed by integrating through the light paths followed by the photons constituting the particles.

It is a misconception of Special Relativity to say that there is no passage of time for light. That would mean that there are no oscillations between the point of departure and the point of arrival. However being oscillatory, this does not mean that whatever light ray is good for measuring times. In fact, a less energetic light ray would undergo less periods of oscillation, during its displacement through the same distance, than a photon with a higher frequency. The relativistic concept of speed of light is incompatible with a zero time expended in its travel. It is reasonable to conclude that there is no travel without time (which are cycles of some given stable oscillator) being expended during such displacement.

## 7. A Survival Guide to Physics

This section provides just some philosophical ideas by a "natural philosopher" with no formal preparation in Philosophy.

In a letter to other member of the NPA that is transcribed slightly edited in the following, this author has suggested what he believes should be the philosophical, and more precisely ontological, attitude a physicist should have.

It is rather evident that nobody is able to certify the existence of anything. Even though you can kick a rock (as you probably know, this was the "argument" that Dr. Samuel Johnson provided for refuting the idealism of Bishop Berkeley's theories), I may wish to ignore or reject the fact that you have hit something, that such a thing is a rock, that the rock damaged you, that kicking a rock demonstrates its existence, etc.

The objective presence of something in the world defines its existence or inexistence. Yet, you can object that you are not able to observe electrons, protons, atoms, cells, bacteria or whatever and, therefore, those do not exist.

I have seen flowing in a cathode ray tube something that can be interpreted as electrons, and another scientist can tell you that he is able to see those objects or some of their properties through a microscope or apparatus. Nevertheless, no matter what we tell you, you are in your perfect right of not believing us, or counter that the experiment does not show the object but only some indirect effect or that can be attributable to a different object. However, if somebody has a disease attributed to bacteria, the people that believe in bacteria could be able to survive by the intake of the specific medicine, and the ones that are dumb enough not to believe in bacteria or their effects, because they have never seen one or do not believe that they cause the illness, will die.

This proves that it is safer to believe in the existence of an objective reality, which is only perceived indirectly.

Next, we have the problem of language, where some symbol, such as a word, is assigned to describe the object.

The problem now is that if I call "photon", for example, to some object, you are able to assign a different word, such as "photum", to the same object. How are we going to agree that we are talking about the same object or that it has the same properties? No way. Again, as a matter of survival, people or species that share some common language and are able to communicate, have advantage over the ones that do not have those elaborated

means for the exchange of ideas or do not share the same language.

Third, and only after we have agreed that there is an objective reality and have assigned the corresponding words for the objects and properties, we will be able to talk about the truth.

The previous allows us to define truth just as the coincidence between the symbols (mathematical, linguistic, etc.) with the *world-outside* and their properties. It seems redundant but it is not. This represents the correspondence between the *world-within* your mind with the *world-outside*.

The range of lack of coincidences between the model in your mind and the *world-outside* as well as with other people's worlds can be vast.

For example, if you do not know something, you cannot even be wrong. Alternatively, you can believe that something is real when in fact it does not exist. A different case appears if you do know that some object exists, but believe that it has different characteristics than it really has. The relationship with other people comes next, who can believe that the object has still other features than the ones you think it has.

As you can see, there is a multitude of potential problems.

The direct or indirect perceptions determine mostly what is real and what is not. A mirage can be deceiving and warrants for more careful observations.

Blind people are at a disadvantage in the scale of survivability because they have less sensors of reality than other people do. However, they can overcome somehow such disadvantage with the use of their brain and other sensors.

We all are blind or deaf persons in one sense or another. Nobody is able, for example, of capturing directly with his/her eyes the images provided by the Hubble Telescope. However, we can trust those images and still engage in a meaningful scientific discourse.

Whereas other people can believe in "slithy toves" [19] despite never having seen them or detected any effect. That could mean a disadvantage in their brain, which could be worst than blindness.

## 8. Conclusions

A large number of theories have been proposed in the twentieth century, most of which do not have the adequate referent but, nevertheless, have been accepted by the mainstream publications and physicists. The credibility conceded to supposed authorities, geniuses and experts has produced a social pressure that has forced to dismiss some viable alternatives.

Although it seems difficult to conceive an observable universe constituted purely of electromagnetism, it is the contention of the present author that this model is a viable theory with a high probability of being correct. The reader should take this proposal seriously.

By using the notion of time provided in this paper, some of the time paradoxes of relativity simply disappear. It remains to determine which parts of such theory are still valid, and which original authors, whoever they were, should be credited for them.

Actually, two times were defined: the universal NOW and the times of arrival of the signals to the observers. This distinction

has not been understood and supplied by Einstein or his followers, having generated enormous confusion in Physics.

No matter which theory is finally deemed correct and consistent for explaining all phenomena in Physics, physicists must begin by first understanding the most fundamental variables, such as time, which does not seem to be a dimension or an object capable of being contracted or dilated; or (vacuum) space, which should not be considered as something that can be curved or as the medium sustaining the oscillations of electromagnetic waves.

The lack of an adequate ontology to describe and understand quanta in Quantum Mechanics, the constitution of particles in the Standard Model, time in Special Relativity or space-time and vacuum in General Relativity, forces physicists to accept the irrational and contradictory conjectures provided by these theories, only because they provide some numerical results that seem to agree with the experimental values.

Alternative theories that have eventually opposed the mentioned in the previous paragraph, and even ones that only indirectly affect the credibility of relativists, have been dismissed. An example of this is the Big Bang theory, which has been endorsed by the establishment even though prestigious astronomers such as Fred Hoyle, Geoffrey Burbidge and Jayant Narlikar [20] or Halton Arp [21] have proposed much more logical and appealing theories called the "continuous creation theory" and the "theory based in an intrinsic red-shift".

The red-shift and the associated hypothetical expansion of the universe are some of the crutches used to support the Big Bang. Hilton Ratcliffe explains that

*"Edwin Hubble was the first to realize it - there is no real evidence for expansion. It is unsupported by observation and actually contradicted by it."* [22]

In 1935, Hubble and Richard Tolman warned us,

*"the possibility that red-shift may be due to some other cause, connected with the long time or distance involved in the passage of the light from the nebula to observer, should not be prematurely neglected."* [23]

In a paper for the Astronomical Society of the Pacific in 1947 (some 20 years after his discovery), Edwin Hubble stated,

*"...it seems likely that red-shifts may not be due to an expanding Universe, and much of the speculation on the structure of the universe may require re-examination."* [22]

It is rather evident to the author that Physics, led by the stubborn physicists of the establishment, who are deaf to what their masters have told, blind to what the observations illustrate and impervious to the arguments provided, is in a collision course with the rest of science.

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