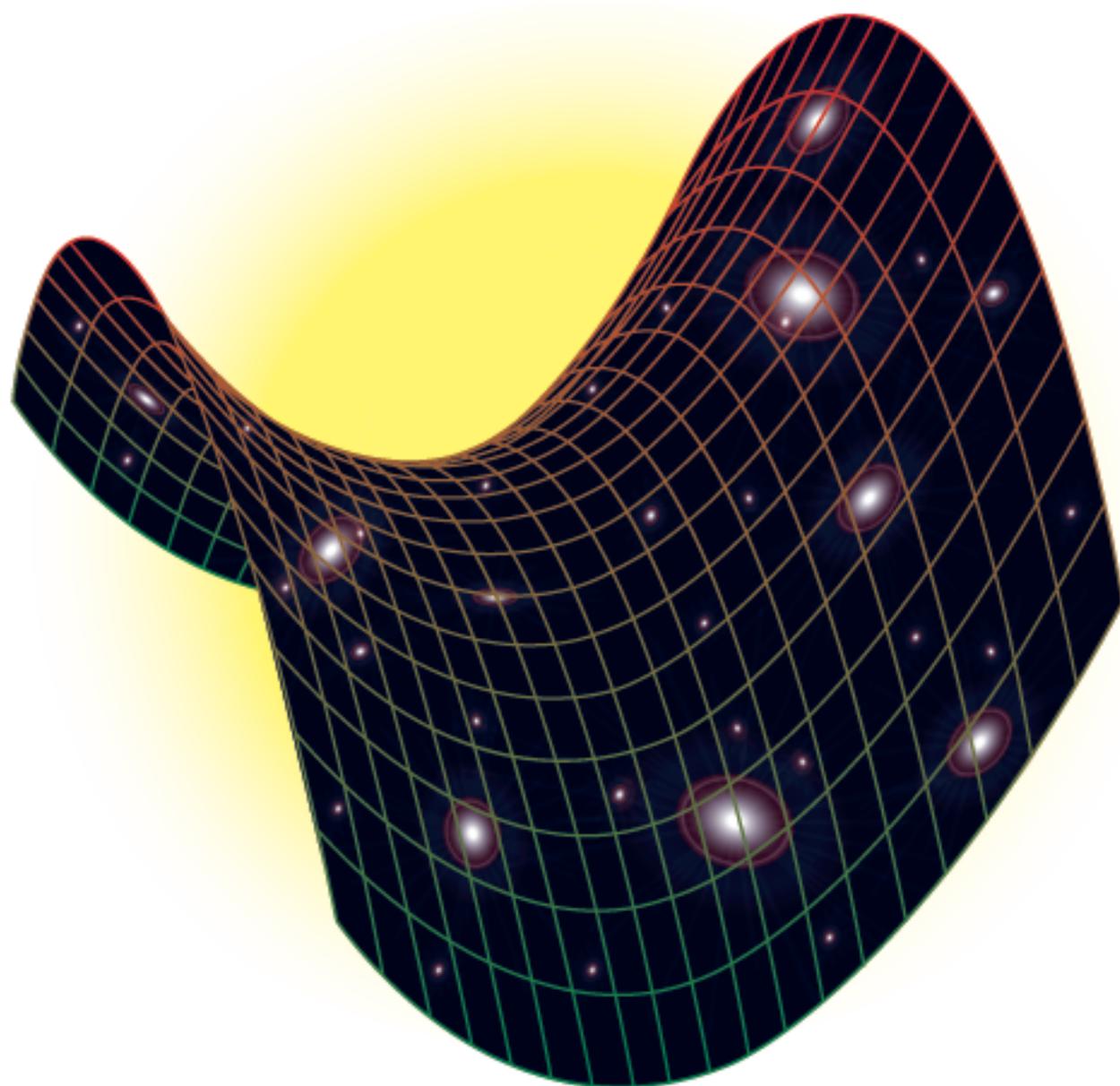


THE GOLDEN CENTURY

- Science and Scientists -

year I - N. 6



Field Equations

The Speed of Light and its Paradoxes

Mathematical Equality of Time and Space

Preface

On the front cover I presented a rough sketch, very approximate sketch, of what science calls *hyperbolic space*. I wanted thus to recall, for the benefit of the reader, one of those half a dozen inconsistencies that crowd the so-called God's equations. I used the plural as it should have also done the author of the book.

The equations themselves are a different thing altogether. Even if the universe were to be spherical as it is a ball and as believed in 1917 Einstein and his contemporaries, the *parallel transport* could not have been equally used because of the fact that the physical structure of the universe was not and it is not idoneous for such an exercise.

In primis, I shall say that hyperbolic space is generated: ① by its complex physical structure, and ② by its physical size. The physical structure consists of electromagnetic radiations, of the entire band of electromagnetic radiations which in their nonlinear conformation may be and are represented by the electromagnetic spectrum. The physical size is thus extended to present its own circumference as an almost straight line, or if one wants: its universal surface as a parallel plain which for the living or nonliving substance maintains a thickness that goes from 1-millimetre wavelength (the blue end of microwaves) up to the wavelength of 299 million 792 thousand 458 metres. Below these wavelengths (the world in which we live in) there are the time and/or space sub-dimensions which go from 1-millimetre wavelength down to Planck's distance. These sub-dimensions are accessible through electromagnetic means to find out the oscillatory frequency which indicates the electromagnetic compactness of the space taken in consideration and the wavelength of the oscillations which indicates the unit measure of time of that space.

In addition, as per our (my) 3 axioms time and space are physically created instant by instant everywhere and everywhen. This signifies that we have a universal space where the observer, wherever he may be, he is the centre, the apex, and the limit of the universe. He is the centre (Science and Scientists make him live in a isotropic world), he is the apex (Science and Scientists make him live in an homogeneous world), he is the limit (for Science and Scientists this third condition does not exist). For me on the contrary this third condition is of paramount importance. The observer represents what in my work I have labelled the *absolute present*. In his back he has just left in the past the temporal world, now he is living the present still in the temporal world, and in front of himself he has the spatial world, the entire spatial world from Planck's distance up to the wavelength of 299 millions 792 thousands 458 metre where the future has not been created yet.

As for the other two arguments that will follow, the reader should not find any difficulty save the mathematical equivalence of time and space. One may always go back to the zero number of this work of mine. I am referring to the essay that I called *The physical process of Creation*. The right triangle of that good oldman Pythagora was it should clarify all the doubts one might have had.

At our next meeting I shall entertain the reader with the inner structure of the microworld which is being woven instant after instant by the laborious filaments of electromagnetic radiations in their nonlinear conformation. And it is this structure telling us, beyond any doubt, that the quantum mechanics' non-locality does not exist, and it never did.

... o ...

May the 1st 2018

Domenico Idato

info@idato.it

domenico.idato@gmail.com

Scientist
Lexicographer
Novelist
Poet



Field Equations

Argument

The physical assumptions underlying the theoretical framework and the mathematical formulation of the field equations of gravitation are essentially a workable proposition. These *physical assumptions* and *mathematical formulations* must be identified with the brilliant mind of Einstein, Grossmann, perhaps Weyl, and most certainly Hilbert. These distinguished physicists and mathematicians at the time envisaged, and the scientific community today envisage, the field equations as the right mathematical machinery to describe the gravitational field and its complex space-time structure. In order to pass some useful comments on these most famous equations, let me recall them at once in their compact form. Here they are: 16 of them in their full glory:

$$\mathbf{R}^{\text{ik}} - \frac{1}{2} g^{\text{ik}} \mathbf{R} = -\kappa \mathbf{T}^{\text{ik}}$$

I shall begin with by saying that an equation is a form of equality. Rigidly speaking, the left-hand side must satisfy the mathematical quantity of the right-hand side. With this in mind, I will now pass my comments.

The whole of the left-hand side is called the Einstein tensor and it consists of the Riemann four-dimensional curvature scalar \mathbf{R} with its $4 \times 4 \times 4 \times 4$ independent components (256 equations), which will reduce to 16 and finally to 10 after the antisymmetric parts cancel each other, and of the Ricci tensor \mathbf{R}^{ik} formed from the said Riemannian \mathbf{R} , both governed by the metric tensor, or field tensor g^{ik} . The Einstein tensor ① must vanish when operates on a pseudo Euclidean flat space, ② must be symmetric to satisfy the right-hand side, and ③ must have zero-divergence ($\nabla \cdot \text{Einstein tensor} = 0$) to satisfy the conservation laws. At the time, Einstein promosse con un certo successo the idea of empty space and the zero-divergence satisfied in full his request. Further, I would like to add that we may think of a tensor as some sort of a mathematical tool giving form or configuration to certain elements applied in a tensorial operation.

On the right-hand side of the equations we have: ① the constant κ (kappa) representing the electromagnetic field of Maxwell and ② a mathematical tool called the *energy stress tensor*, or *matter-energy tensor* \mathbf{T}^{ik} representing the atomic density ρ (ro) of matter as well as the rest mass of the space-time under consideration. I must now stop short to decode the physical function of the \mathbf{T}^{ik} . When the field equations were formulated, and in order to conform to the *principle of equivalence*, Einstein found it necessary to put together the rest mass of the space-time under consideration (the inertial energy of free space) and the mass of matter exercising the real gravitational pull. He did so by assigning the role of representing inertial and gravitational mass to one and the same \mathbf{T}^{ik} . This was quite a natural step to take in particular if one thinks that Einstein, with some influence from the Austrian philosopher Ernst Mach, came to think that inertia was a manifestation of matter. Here too, let me recall that just as the field tensor g^{ik} corresponds to the Newtonian gravitational potential whose $g_{44} \approx 1 + 2\phi/c^2$ so the energy stress

tensor corresponds to the energy density distribution in the space-time region of concern. As I have just said, in order to satisfy the principle of equivalence the matter density and the energy density of the given space region have been put together, and together they represent the total gravitating mass operating on the metric tensor g^{ik} .

Here, suffice it to say that the physical performance of inertia and gravitation is fundamentally different. This physical performance corresponds to modified manifestations of the properties of matter whenever inertia is associated with it. Inertia, however, is not a manifestation of matter, as Mach wanted us to believe. On the contrary; inertia is the rightful offspring of the electromagnetic point-source and as such is pure energy. Inertia is only aggrandized by matter and it shows as inertial forces because of the contracted energy within any ponderable matter.

At this point in time, I must leave the main trail to point out that what I am arguing is not the equivalence between energy and mass; my argument is that energy by itself and in itself is repulsive. To make electromagnetic energy attractive and be eligible to be represented by a mass density at a given location, there are a few compulsory steps dictated by nature itself; they are: ① a train of waves must be torn away from the time-fabric to materialize as a particle, ② given enough time the particle becomes a hydrogen atom, ③ given enough time the hydrogen atom is taken in and fused to similar atoms by small and big stars, ④ the stellar bodies, given enough time, will collapse and will throw off their elements, ⑤ given enough time, these stars will reach the end of their main sequence at which time some of them will become novae or supernovae and their content will be ejected to enrich the formation of planets.

In the course of these events, a given amount of free (optical) space has been compressed to become what is called matter and has the properties of mass. It seems to be clear, then, that one cannot just take a given region of free (optical) space and assign to it a quantitative value in the sense of mass. Allow me to say that free (optical) space is the seat of expanding energy moving at the speed of electromagnetic radiations and it is also the seat where we may want to know the gravitational forces operating at a certain point whose coordinates (once chosen) imply that energy at that point can only be repulsive.

Before going back to the field equations, I would like to mention Einstein's choice of adopting the generalized expression for the square of the interval (invariant) ds^2 taken from Gauss theory of surfaces; and his choice of the specialized Riemann spherical geometry which generates a positive curvature and therefore portrays with veritable mathematical precision our 1st and 2nd axioms. A misleading and therefore undesirable side effect unintentionally caused by these timely choices, thought at the time to be convenient, was that the dynamics of time have gone *tout ensemble*, or lock, stock and barrel to space. Another choice, or rather a condition, that Einstein wanted to impose on the field equations was the usage of covariant tensors to retain the same physical properties of those quantities which were supposed to represent the properties of nature, and the usage of the *contracted Bianchi identities* to satisfy the demand that the gravitational curvature would not interfere with the physical laws when the coordinate system is in motion. The covariance, as we shall see, is valid only if the coordinate system stays in our world.

Back to the field equations. The way these equations are meant to operate is that the gravitating bodies from one side are affecting Euclidean space (flat space with no curvature) causing geodesic deviations to the other side. Likewise, the affected flat space would in turn influence the gravitating bodies. In brief, it is a mutual interaction between the four-dimensional space-time continuum on the left-hand side and the gravitating bodies on the right-hand side of the equations. Both sides, in keeping with the *belief*, held those days that space was empty and in order to satisfy

the conservation laws, as I have just said, are given zero-divergence. The whole construct, theoretically speaking, works and... it works well.

I would now like to say, and I hope the reader will appreciate my constructive comment, that the mass-energy equivalence, which is beyond dispute, has been wrongly enforced on this set of equations. In point of fact, it is an unfortunate thing that the free (optical) space energy which strictly speaking belongs to the left-hand side is represented by the energy stress tensor sitting on the right-hand side of the equations. Let me be more historically articulate. When the equations were formulated the concept of energy was associated to matter with some energy present in space as a consequence of an action usually thought to be dynamic or electromagnetic in nature. At the time no one ever thought and today no one thinks of the possibility that energy and mass (ponderable matter) might be running counter to each other. Accordingly, the move of putting energy and mass together originally proposed by Einstein and afterwards supported by the so-called relativists finds a plausible explanation in the emptiness of space whose physical property is described by Riemannian geometry and given by the g^{ik} , the metric tensor of the equations. In addition to the above, and this is the highlight of the mathematical construct, to put the geodesic line, which belongs to the linear field, under control of the metric tensor g^{ik} , Einstein had to resort first to the parallel transport and to the so-called affine connection, and then to retain not only the direction, but also the length that is, the scalar product between two given points in space-time, he made the choice to formulate the whole thing with the Christoffel symbols. Here, I must point out that the mathematical representation of the physical properties of the field given by the Christoffel symbols is conceptually independent; that is, it persists even when space is devoid of matter. In point of fact, Einstein was never happy about it and would have preferred to see the *field* vanish identically in any space region devoid of matter. As I have just hinted, this is due to the fact that the space-time curvature was built in part on the physical concept of geodesic deviations.

For the reader lacking scientific luggage altogether, I shall point out that a geodesic line is defined to be the shortest distance between two points on a curved surface. This, for example, makes sense when we are dealing with solid geometry, or with a sphere such as our planet where a geodesic line may be identified with a meridian line running from the north to the south pole. In fact, in a situation such as this the meridian line cannot be forced to penetrate underground, and must of necessity be the shortest distance between two given points on the sphere. It is indeed for this reason, that the curvature *cannot go away*. It seems to be clear that, notwithstanding any amount of ponderable matter that one may inject in the right-hand side of the equations, the left-hand side must always give a minimum of positive curvature which is proper of a geodesic line. In brief, once that Einstein resorted to the geodesic line to complement the geometric surfaces of Riemann, and obtain what he called the space-time curvature; as a starting point, he found himself with a two-dimensional line (geodesic) which by its own nature is a curve (it has a curvature), and which can never be shorter (one-dimensional). It can never be shorter; that is, lose its curvature because it is coming from solid geometry and as such could not have been applied to free (optical) space within which the physical conditions are altogether different.

If, however, the same equations are taken into consideration keeping in mind our 2nd axiom, all conservation laws will be obeyed without the aid of a zero-divergence tensorial form. Another important thing is that the mass-energy equivalence no longer applies. Further, (i) the g^{ik} is no longer an *ad hoc* parameter, and (ii) the expanding energy of free (optical) space is physically and mathematically the antithesis of the compressed energy of gravitating bodies. The former

is free energy and generates a positive curvature, the latter called mass is under the constraint of matter and as such generates a negative curvature. These two forces, moreover, put there by mother nature, oppose each other and their counteraction must be equated, not put together to be represented by a single member on one side of the equations.

Before plucking different chords of the same harp, I shall address a reverential thought towards Albert Einstein and his so-called *God's equations* and towards Claudius Ptolemy and his almagest. The reader will have to agree with me first on how Einstein conceptually identified the gravitational field with the Christoffel symbols, despite the fact that it could have been possible to have non-vanishing Christoffel symbols in flat space-time; and then on how he entertained himself and others with parallel transport thinking, along with his contemporaries, that the universe is a big ball. Today, we know, beyond any reasonable doubt, that the universe has a hyperbolic nature and as such is unsuitable to any kind of parallel transport. And the reader will also have to generously agree with me on how Ptolemy with his epicycles and deferents together with mathematical extrapolations described, unaware as he was, a fictitious state of things and was able to enchant the world for almost 1500 years. The fact that these great men lived prior to the rigid scientific disciplines does not make them lesser men, far from it; they will always remain amongst the top geniuses of antiquity... and of all times.

At this point in time, I would like to show the way the gravitational field is seen by the theory herein proposed. The conditions imposed and the underlying assumptions are: ① the universe is isotropic; that is, it looks the same in all directions, ② the universe is homogeneous; that is, it would look the same from any vantage point, and ③ the universe looks the same at any given time; that is, the concepts of isotropy and homogeneity are extended to the time dimension. These conditions when put together determine the metric $e_{\mu\nu}$ ($e_{\mu\nu}$) of the local field. This field is the result of two forces in opposition to each other: free energy generating a positive curvature and compressed energy (mass) generating a negative curvature. The reader will here appreciate that our condition ③ clashes with the field equations and therefore with Relativity on two points: (i) in special relativity absolute simultaneity has no meaning, and (ii) in general relativity there are no global frames of reference which is to say that in both special and general relativity there is no room for physical time as a product of nature. I shall now proceed to construct a mathematical framework for the field equations of the theory herein presented, these equations may be put in the form:

$$R - \frac{1}{2} e_{\mu\nu} \Psi_{\text{time}}^{-1} = -4\pi G m_{\mu\nu} \quad ..1$$

These equations must be applied keeping in mind that the maximum positive curvature, hence the expansion that governs our universe exists as a physical property and it is part of nature itself; gravitation, therefore, does not create geodesic deviations from flat space. It does not create them because a geodesic line which is proper of the linear field cannot be associated with the *time curvature* belonging to the nonlinear field. Before proceeding, I would like to specify some points: ① unlike Einstein's field equations where the curvature is not time-dependent, the curvature here is a time and not a space curvature, it cannot be anything else; ② there is no necessity for the Ricci tensor since there is no need for covariance and above all because parallel transport does not find application in our hyperbolic universe which the theory herein advanced represents as an open curve and not as a sphere (see figure 1); and ③, the tensorial forms with which Einstein, who believed in an empty space, tied up the various quantities to specify the properties of nature, are not required since equation (1) is applicable only to a space hosting a permanent non-zero source of energy.

To help the mind by way of the eye, I am now showing in figure 1 the picture I have in mind of our hyperbolic universe which I am representing as a celestial vault in the form of an open curve built by many branches extending to infinity in all directions, and where there are embedded many universes of different physical size belonging to a single domain.

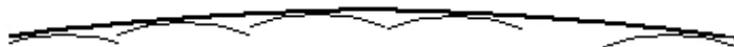


figure 1

These universes are under control of the finite speed which physically creates time and space. Because of this, they have a visible horizon up to, and not exceeding, 15 billion light-years and must, therefore, be considered as independent units embedded in the hyperbolic plane of the universal *great domain*. I put in relief a possible space *pocket* where may be formed nebulae or nebulae clusters with which, and with the passing of billions of years, the universe keeps on renewing itself. If this is a pristine description of what we call universe; then, the big bang supporters should multiply n -times the age of our visible universe to obtain a rough picture of the universal *great domain*. Back to our equations.

On the left-hand side we have, then, three important parameters: the first is the scalar \mathbf{R} which provides the curvature and the trace of its temporal warp. The second one is the energetic tensor $e_{\mu\nu}$ which gives the metric to the nonlinear field; that is, the temporal distance of the curvature imposed by the gravitating bodies in the neighbourhood. The third one is the electromagnetic process of creation free-from-matter which generates the positive curvature at full strength and which is represented by the expansion constant of the universe and this will exempt us from chasing a hypothetical cosmological constant. In addition to it, the expansion constant will have to be identified with time Ψ_{time} with temporal dimension when the equation is applied locally and it must, on the other hand, be identified with space Ψ_{space} with spatial dimension, or with time Ψ_{time}^{-1} with inverse time dimension when the equation is applied on a cosmological scale. Here, I must say that the postulates of isotropy and homogeneity, being extended to the time dimension and to the equivalence to all world-points specify adequately the metric.

As for the energetic tensor $e_{\mu\nu}$, it operates as a physical entity when gives information: (A) on the temporal coordinates, relatively to free (optical) space, of one and all electromagnetic point-sources, (B) on the amount of warp existing in-between two given temporal points infinitely close to each other, and (C) on the nature of the curvature (positive, negative, or zero). It operates as a mathematical entity when gives information: (a) on the geometric structure of the electromagnetic process for the creation of time and/or space, and (b) on the gravitational field which modifies the geometry between two given energy levels infinitely close to each other in the nonlinear field. It is noted that in the case of zero curvature, the Minkowski tensor is not required because the zero curvature implies the annulment of the existing positive curvature and this in turn implies the presence of a gravitating body. As to the $e_{\mu\nu}$ tensor, I will say that the name is all mine since I believe it portrays better the physical action of this tensor. And finally, the whole of the left-hand side, that is:

$$\mathbf{R} - \frac{1}{2} e_{\mu\nu} \Psi_{\text{time}}^{-1} \quad \dots 2$$

has zero divergence and it is constructed entirely from the energetic tensor $e_{\mu\nu}$ which in turn is linear in the second derivatives, hence it fits pretty well with the linear mathematical structure of the invariant Ψ_{time} , while it stays nonlinear when operates along the electromagnetic process of creation. As for the right-end side of (1), we have the universal gravitational constant G representing a radial (4π) repulsive force of the electromagnetic field which multiplies the mass

density represented by the matter-energy tensor $m_{\mu\nu}$. The matter density is given solely by the internal energy of the body under consideration; this energy, includes the kinetic energy, the potential energy, and the compression energy (energy of nuclear binding). From this, it follows that the strength to counteract the positive curvature of the time expansion must be supplied by the matter present in the space region of concern. The inertial energy, or negative energy of free (optical) space cannot come to the aid for two reasons: first because its physical function is the opposite of that performed by gravitational energy, and then, even if the energy, in the impossibility-type postulate, were to be positive, hence eligible to be on the right-end side of the equation, we would not equally be in a position to localize it with temporal points and consequently the energetic tensor $e_{\mu\nu}$ could not supply the coordinates needed to position the origin causing the time warp.

I shall now apologize for having put into play the principle of equivalence and its non applicability to the specific case of the field equations. My solicitude was necessary, since I wanted to portray with accuracy the existence of negative energy = positive curvature in free (optical) space.

Notwithstanding the necessary elimination of some terms from the field equations of general relativity and of some inapplicable concepts such as parallel transport, geodesic deviations, covariance etc., the reader will have realized that, just as the others, in my endeavour to formulate a set of equations to describe the gravitational field, I was guided by Einstein's genius. I wanted to make treasure of his long and labourious hours spent searching for the solution of his complex field equations. Following on his foot steps, I have myself referred to Newtonian mechanics, to Newton's field gravitational potential, to Poisson's equation for a bit of work on matter density and for some cosmological considerations of mine. To the line element ds^2 to fix the instantaneous distance (metric) in-between two points in a space where time and matter exercise their own dynamics and to construct the trace for the curvature change of my energetic tensor $e_{\mu\nu}$, and to all the rest.

I come now to the end with some necessary remarks, first of all, to understand and accept the talent of Einstein and then to excuse my numerous revisions. Now then, Einstein in 1908 declared the ether to be unnecessary and he preferred a space absolutely empty to support his own special relativity. Afterwards, he opted for a space with topological and metric properties in support of his general relativity and the ongoing field equations. At the time, and up to the arrival of Edwin Hubble (1929), he himself together with his contemporaries believed in a static universe. And then the expansion changed it all save the spherical universe to satisfy the parallel transport of his "God's equations". And lastly, came in the new century and with it the hyperbolic universe to enrich the new world and to continue demolishing the old.

Demolition! Just a way of saying. The rubble, or what should have been rubble, didn't make blush the fathers of quantum mechanics and/or the relativists and are not making blush their sons and/or grandsons. The uncertainty principle, the law of chaos, the wave-particle duality, the principle of complementarity, etc... are being discussed by Science and Scientists alike under the same breath with which is being mentioned the atomic clock at very high precision. I said *atomic clock* the last model of which it is said to lose 1 second for each 14 billion of years. It shouldn't lose not even that second since the atom is the sole component of the temporal world as the wave is of the spatial world. Both characterized by certainty, precision, determination, constancy, and uniformity. Characteristics they possess today and which they are taking along from the dawn of time. How can one marry the atom that belongs to nature's determinism with the Science and Scientists of the indeterminism supposed to all accounts to be describing nature?

27th March 2018

Domenico Idato

info@idato.it

domenico.idato@gmail.com

Scientist
Lexicographer
Novelist
Poet



The speed of light and its Paradoxes

Foreword

The following three fundamental axioms are the foundation pillars upon which the proposition herein put forward rests.

- I. Time and space are physically created by an electromagnetic process of temporal expansion and/or spatial extension to be identified with the existing electromagnetic spectrum.
- II. Time and space have their origin in each and every electromagnetic pointlike point-source in free (optical) space as well as in matter.
- III. Given (I) and (II), it follows that the speed at which time and space are created: (a) is the upper limit and dictates the physical laws in the world we live in (fully expanded time dimension), and (b) it is a function of linear and nonlinear motion in free (optical) space.

In particular, axiom (II) implies that space is permeated by an all-pervasive and permanent substance which I shall herein label *time-fabric*, meaning to say: a permanent non-zero source of energy. From this we may deduce that space is filled by pointlike point-sources which are magnetized by the finite and uniform speed of the expansion and/or extension. These point-sources during their decaying process form all lengths of time and all lengths of space. These lengths are the effective volume containing energy. The entire free (optical) space is, therefore, a universal unsaturated sink with continuous absorption because of the finite and uniform speed of expansion and/or extension.

Argument

With this brief essay of mine, I intend to clarify the why and the wherefore Science keeps on imposing to its own children paradoxes galore. The exact definition of the speed of light, the way it was drafted in 1983, will help us understand all those paradoxes that were in *illo tempore* caused by Relativity and Quantum Mechanics. Paradoxes that, as it is known, have infested last century physics, and are infesting today's physics.

The second as the basic unit measure of time, which not very long ago was determined with reference to the rotation of our planet, it is nowadays officially defined as: "the time required for the speed of light to travel a distance of 299.793 kilometres in vacuum". The definition, if I am allowed the freedom of thought, must be put in the following manner: "the time required for the electromagnetic wave to complete its extension along a distance of 299.793 kilometres in free (optical) space". A real long distance runner our beloved light, that is why paradoxes are piling up by the dozens.

I would now like to put in evidence what is the function of the so-called speed of light either in the linear field or in the nonlinear field. Let us see first what happens in the radiative field of Maxwell. In the linear field, all electromagnetic radiations are characterized by the linearity of

the field which does not possess a binding energy and which runs transverse to the expansion of the universe. This is herewith clearly shown in the description of the photon, there we go:

$$\left. \begin{array}{l} \text{momentum } p = E/c \\ \text{wavelength } \lambda = h/p = hc/E \end{array} \right\} \quad 1$$

and in general in all equations describing telecommunications and in those that handle linear optics, such as:

$$t = \frac{n \times}{c} \quad 2$$

where t is the transit time of a light ray through a given substance x and n is the refraction index of that substance. In the nonlinear field we see nothing of the kind; that is, it does not exist the so-called ray of light, what we have instead is the *process of creation*. Moreover, in this field or else in the nonlinear field (gravitational field), the adoption of the speed of light “ c ” with its implicit meaning of *distance runner* it does not express what is actually happening in the physical action described by a nonlinear equation and it is, one might say, altogether theoretically misleading and otiose. In order to specialize my discourse, I shall forthwith recall the Lorentz transformation in the form in which the radical is more evident in the eyes of the layperson:

$$\sqrt{1 - v^2/c^2}$$

to find myself in front of a physical contraction whose meaning is not appropriately rendered by a linear operation, and to note that the adoption of the speed of light with its implied meaning of “distance runner” is not conveying what is happening in the physical action described by the formula.

Whether we use the Lorentz transformation (i) for the linear length of a rigid rod, or (ii) for the radial length of one second of time, or (iii) for the mass of a steel ball, it makes no difference whatever. The answer we get is the contraction concept; and this, needless to say, entails the nonlinearity of the field. In addition, if this field is represented by the speed of light not as a linear parameter, but rather as “a standard length”; then, the linearity coming from optics and from Maxwell equations is no longer there.

Let us see now the physical relationship that ties the speed of light c to the linear velocity, the angular velocity, and the gravitational potential. Let us look closely at this relationship and, at the same time, quantify the previous paragraph. I shall forthwith recall the formula for the contraction of lengths, viz.,

$$l = l' \sqrt{1 - v^2/c^2}$$

to obtain my first equality of the series. The above expression tells us that the velocity v is causing (in the direction of its motion) a linear contraction of l . The formula for the time dilation is:

$$t = t' \sqrt{1 - \omega^2 r^2/c^2}$$

where t is the proper time in the rotating frame, t' the time coordinate of a stationary observer, ω (omega) the angular velocity and r the radius of the rotating frame, and where $\omega r = v$. The above expression is my second equality and is telling us that the angular velocity ω is causing a contraction of the process of temporal expansion. To close the circle, here is my third and last equality:

$$f = f' \sqrt{1 + \phi^2/c^2}$$

where f is the frequency in which the signal was received, f' the frequency at the origin and ϕ (phi) the gravitational potential, and where $\phi = \gamma r$ where γ (gamma) is the acceleration of gravity

and r the radius of the celestial body. The above expression is telling us that the gravitational potential ϕ causes a contraction to the frequency f . To assist the mind with the sight faculty, let us now put together v , ω , and ϕ to finally obtain the following expression:

$$l = l' \sqrt{1 - v^2/c^2} \sim t = t' \sqrt{1 - \omega^2 r^2/c^2} \sim f = f' \sqrt{1 + \phi^2/c^2} \tag{3}$$

where we see that the three equalities of (3) have in common: (i) the concept of contraction, (ii) a length has been detracted from the electromagnetic process for the creation of time and/or space (c^2), and finally (iii) the transformation group has the task of enforcing the contraction. To come to the aid of my discourse, I now recall the reader's attention on the mathematical relation:

$$\Delta E_b = \Delta m c^2 \tag{4}$$

putting thus in relief the difference that exists between the radial speed of (3) and (4) and the linear speed of light of (1) and (2) and point out that their physical function does not explain the fact that they are today, and always were, mathematically treated on the same footing. For example, although the laws of physics use the same symbol “ c ”, the physical meaning of the linear speed of light that we see in (1) and (2) and that of the radial speed that we see in (3) and (4) is totally different. As for the physical function of that “ c ” symbol, I would like to make clear that a ray of light may be stopped, warped and also bent by a common mirror for domestic use. As we all know, and as experience tells, an ordinary sheet of lead can stop, in the linear field, X-ray radiations; radiations which are much more energetic of those characterizing a ray of light.

The nonlinear field is another thing altogether. In order to define equation (4), I shall say that usually the total nuclear mass is always less of its own constituent particles. If, as a given example, we bombard with gamma radiation and split a deuterium called also deuteron or heavy hydrogen (${}_1^2\text{H}$) whose molar mass is $2.01355 \text{ g mol}^{-1}$ into a proton and a neutron as specified by the expression:



the sum of their respective masses (proton and neutron), that is: 1.00728 and 1.00867 is $0.00240 \text{ g mol}^{-1}$ less than the nuclear mass as a whole; even if the equation for the scission maintains the equality, as it is shown in (5), between the first and second members of the atomic weights as well as the nuclear charges.

As a matter of fact, the noted difference in energies may be conveniently ascribed to the left hand side of (4) which for intellectual formality I shall now put in a clear quantitative form. Thus, I will write:

$$\left. \begin{aligned} \Delta E_b &= 0.00240 \text{ g mol}^{-1} \frac{1 \text{ kg}}{10^3 \text{ g}} \cdot (3 \times 10^8 \text{ m s}^{-1})^2 \\ &= 2.16 \times 10^{11} \text{ kg m}^2 \text{ s}^{-2} \text{ mol}^{-1} \\ &= 216 \times 10^9 \text{ J mol}^{-1} \\ &= 216 \text{ gigajoule} \end{aligned} \right\} \tag{6}$$

where ΔE_b , known as the binding energy, can be thought of as the change in internal energy needed to split the nucleus. The obvious implication of equation (5) is that to split a heavy hydrogen atom (${}_1^2\text{H}$) *fission*, it would require the absorption of a great amount of energy; something like 2.16×10^8 kilojoules mol^{-1} . Likewise, the binding energy of a given nucleus is the measure of how much energy is released upon the formation of a nucleus from protons and

neutrons *fusion*. Once again, we see an enormous amount of energy; something like a million times more than that experienced in molecular bonding.

For example, the relevant scientific literature has often represented and it represents, for the benefit of the specialists and non-specialists, the sketch of a ray of light, in a candle-like re-entry towards a black hole, or if you prefer, becoming bent by the gravitational force exercised by a black hole. All of this, as I have just said, may be done by a plain mirror, there is no need, I say *we necessitate not at all* a black hole to do it. The spectacle that a black hole would offer, if it were to exist, it would be to shorten, up to invalidate, the process of temporal expansion and/or spatial extension and this would simply mean to render null and void, in the given space region of interest, the physical creation of our universe which is expanding in time and extending in space. To put it in another way, it would stop the filaments of electromagnetic radiations from doing their job.

Conclusion

In conclusion, the above argument should leave no doubts in our mind that the physical action of the “c” symbol that we see in (1) and (2) and the one that we see in (3) and (4) is not the same. In other words, the speed of light in the form we have got it from the days of Maxwell, and with its linearity tag acquired and promoted by relativity, it does not belong in equations operating in the nonlinear field. Better still, when the speed of light is being used as a unit measure of time in a mobile frame of reference it must of necessity vary; the faster the object the smaller becomes the unit measure of time. For example, in the Lorentz’ transformations the speed of light is not a linear velocity as presented in special relativity, but it is a unit measure of time put in the denominator of the fraction and against which are made mensurations that can obviously give only paradoxes.

I have also used Einstein’s famous equation to show that what happens in the atom’s nucleus is masterminded by the speed of light (c^2) which is not allowed to enter the nucleus since, paradox of paradoxes, its wavelength is much too long (it would be like wanting to insert the chain of an anchor into the eye of a needle) and its energy would not even tickle a proton comfortably poised in the inner nucleus. Here, I recall to mind that ① no one has ever seen, touched, heard or taken a picture of an atom; let alone its nucleus, and ② the physical concept of charge, mass, energy, and time, to name just a few, have never been scientifically defined in simple, straight forward, understandable terms. For this reason, in the mind of a scientific scholar, they keep on remain and are meaningless.

When all is said and done, it is not hard to see that the speed of light as a *distance runner* (linear field) is not the same speed of light used as gravitational potential or as *standard dimension* to obtain nothing else but paradoxes (nonlinear field). In brief, while the former is an expression of electromagnetic radiation whose constant energy is frequency-dependent and which runs transverse to the time expansion and/or space extension; the latter is the process itself covering the full range of frequencies and whose main characteristic is a binding energy alien to any electromagnetic signal.

... 0 ...

April the 7th 2014

Domenico Idato

info@idato.it

domenico.idato@gmail.com

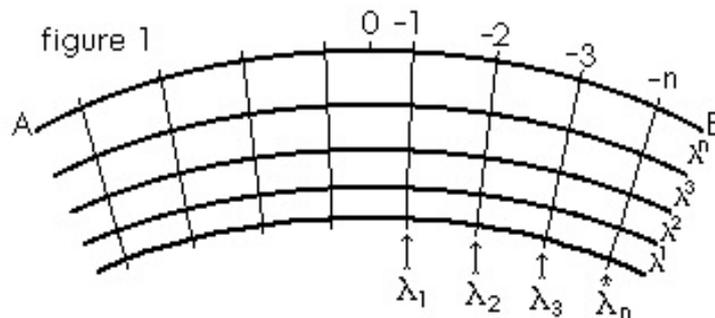
Scientist
Lexicographer
Novelist
Poet



Mathematical equality of Time and Space

Argument

Our three fundamental axioms, although by definition are statements of truth, when the case demands it, they will be given the appropriate mathematical support. I shall here give a simplified view of the geometrical and topological structure of space which is the natural arena where time is performing its own dynamics. Let me now give to the second axiom a geometrical identity.



Let $\lambda_1, \lambda_2, \lambda_3, \lambda_n,$ be a sequence of electromagnetic sources generating electromagnetic waves to process time and/or space along the temporal curvature $A \Rightarrow B$ where λ (lambda) is the space length in-between the pointlike sources. Further, let $\lambda^1, \lambda^2, \lambda^3, \lambda^n,$ be the new space lengths acquired along the process of time expansion and/or space extension. Given these conditions, as shown in figure 1, if we want to measure the distance between A and B, we soon come to realize that (i) no matter what length is used the total summation from A to B is always the same since the more the space length is expanded the larger the distance between A and B becomes, and (ii) no matter what length is used the line must of necessity be a curve due to (I) the radial nature of the temporal and/or spatial-process, and (II) the spatial discreteness of the electromagnetic pointlike point-sources at the origin. Further, the spatial discreteness would be the cause of the time-fall in-between point-sources. The zero at the top centre of the diagram is what in my work I have labelled “zero-point maximum time expansion” to indicate the apex as well as the centre of a given frame of reference. Over and above, if in-between point-sources we accept Planck’s length which is a mere 1.6×10^{-35} metres, we see at once that free (optical) space is filled with electromagnetic waves, hence filled with energy.

As a matter of fact, evidence of resident energy in free space is given by the action-at-a-distance type of force, be it gravitational or electrostatic, felt without the presence of any material (direct) connection between two given points; and it is also given by the expanding space between clusters of galaxies which is to say by spaces vacated by the galactic recession as observed via the cosmological redshift. We would, then, have free (optical) space chock-full of waves from Planck’s

length to the length of 300 million metres with each one of them being an expression of energy, as indeed I am suggesting.

With reference to the nature of space itself, Science has clearly demonstrated that the universe is expanding. If the speed of the expansion is finite and constant it would cause each small pointlike point-source in free (optical) space to magnetize. The magnetized point-source would instantly induce (according to Faraday) an electric field which in turn will induce a magnetic field which in turn etc. etc.

Over and above, if we accept that time and space are created by a natural electromagnetic process; then, we must see the field, that is free (optical) space as a substance in expansion made by infinitely many electromagnetic point-sources which auto-generate energy each of which it has its own unsaturated sink with continuous absorption because of the finite and constant expansion in time (the wavelength proper of the process of creation of time and/or because of the finite and constant extension in space (the oscillatory frequency proper of the process of creation of space). These point-sources must therefore be considered inertial frames moving with velocity $1/(\epsilon_0 \mu_0)^{1/2}$ (speed of electromagnetic radiations) and consequently their slope is $1/c$, or 3.335×10^{-11} centimetres per second.

At this point in time and without becoming discursive, I must say that the laws of nature valid for and operating in the world of existence are rational; that is, comprehensible to reason. With this rather provocative piece of learning, I have taken the liberty to formulate a newcomer on the scene:

$$c = \frac{1}{\sqrt{\epsilon_0 \mu_0}} = 3 \times 10^8 \text{ m/sec}^{-1} = 1 \text{ second} \quad \dots 1$$

and draw the attention to that equality sign put in-between a length of space and a length of time, which length, in both cases, and in line with the theory herein proposed, is an expression of energy and it is created by one and the same electromagnetic process. The parameters ϵ_{zero} and μ_{zero} are respectively the electric permittivity and the magnetic permeability of free (optical) space while “c” is the speed of light in *vacuo*. If by *vacuo* is meant something devoid of content; I would, then, be hard put to understand the significance of $(\epsilon_0 \mu_0) = \text{vacuo}$. Notwithstanding the above, I believe I have succeeded in putting forward the physical concept of “free (optical) space” as against “empty space” with the underlying assumption that free (optical) space is permeated by an all-pervasive and permanent substance which in my work I have labelled *time-fabric* and I have identified it with the electromagnetic spectrum which assembles electromagnetic radiations in their nonlinear conformation, meaning to say: a permanent non-zero source of negative energy expanding in time and extending in space

I come to the end now amplifying a consideration of mine made earlier on. Recently I read somewhere that the latest model of atomic clock to lose 1 second of time it takes the entire age of our visible universe. From where its “inventor” put the big bang down to our days. How can one talk about time and space if he does not know their physical structure? By the same token: how can one speak of the precision marked by an atom knowing that the atom is to all effects the milestone of the universe, and sustaining at the same time that the universe is governed by uncertainties, indeterminations, dualities, and all the rest.

Mystery of faith! Science is a cheap religion. This is what I had to say many years ago talking about non-locality: *You see, quantum theory predicts, but it does not explain. It is more or less like a religious institution, you are asked to believe blindly and you are also told that if you ask questions you will go to hell.*

... 0 ...