On Albert Einstein and his Relativities

Dan Romalo
intr. Rigas 29 B, Bucarest, 010152, ROMANIA
e-mail vadarom@pcnet.ro

This essay presents the author's point of view on Albert Einstein's complex personality and on his relativistic philosophy. Yet, the true aim of the exposé is to remind some older but still significant questions concerning the basics of the Theory of Relativity, and to suggest a set of alternative explanatory hypotheses. The essay tries to**: 1)** Review the reported morphologic anomalies in Albert Einstein's brain, conjecturing if those explain the laxity of logic in his Relativist principles; **2)** Analyze the fundamentals of Einstein's theories of relativity; **3)** Compare Einstein's relativist philosophy with that of H.E. Ives based on intuitive explanatory principles developed by G.F. Fitzgerald, H.A. Lorentz, and H. Poincaré; **4)** Propose some suggestions for a more intuitively principled Theory of Relativity; **5)** Sketch the base-lines for a tentative model of the Universe supposed born inside a bubble of ether. The essay leans on a demonstration delivered long ago by Ives, widely despised or neglected, and now seemingly forgotten**;** it is *The Fitzgerald Contraction* [Scientific Proceedings of the Royal Dublin Society, new series, 26 (1052, pp. 9-26] and on the more recent article of H.E. Wilhelm, [Z.f. Naturforschung, **45 a**, 736-748 (1990)] who demonstrated, or just confirmed, that the Fitzgerald-Lorentz contraction **has to be real** because *it is a strict consequence of the electromagnetic field theory itself.* The author hopes the essay suffices to introduce the reader to the profound meaning of Ives works, and encourage the reader to study it.

1. Introduction to Einstein's Cerebrum

The study here presented is focused on Albert Einstein's relativistic philosophy and on how one could shape a formalized relativist description of nature's phenomena in a more simple and intuitive manner than Einstein offered us. The subject is approached from a very *personal* point of view, meaning, one of a non-believer in Einstein's relativity principles but still eagerly in search of how to shape a formalized relativist description of nature's phenomena in a more intuitive manner than that offered by the Theory of Relativity, the General one in particular.

The present research endeavors to investigate Albert Einstein synthetically, or more clearly expressed, as the author of his two 'relativities' with their subsequent philosophy and basic logic imperatives but also in connection with part of his biological substratum as well as its consequent social behavior. His relativist philosophy is compared with H.E. Ives' theoretic works and, also, with the model of an ether Universe suggested by the author.

About the Biologic Substratum

The upheaval rose – and sustained along nearly a century now in the scientific community as well as in the laymen public – by Albert Einstein's opinions and published scientific works is too well known to be reminded. Yet, worthy to be mentioned is the division in opinions born at the Theory of Restricted Relativity's appearance, the motive being its non-intuitiveness. In spite of this upheaval, perhaps just because it, Einstein persisted in extending his relativist philosophy from the particular class of *inertial frames only* towards a most general formulation, *i.e.* one embracing the whole class of physical phenomena. It is the General Theory of Relativity, largely accepted today as being of a nearly-absolute generality and considered capable to become a scientific certainty in the very near future.

All the above is widely known. Much less known are the adventures suffered by Albert Einstein's brain after his death in a hospital, as well as the morally-abusive manipulations exercised afterwards upon that anatomic piece. The word 'abusive' is not out of place, if one considers that the great physicist's brain was taken away in a declared scope of subsequent scientific study, but was manipulated afterwards as a common object, as a personal possession. The brain was handled under arbitrary will, *i.e.* taken away, transported surreptitiously in a glass-jar to a non certified, or a very poorly professionally attested laboratory, to be, at last, cut in bits of arbitrary shapes and dimensions and preserved in an uncontrolled way during many years, the declared intent being a desire to study the link between the human creative intelligence in correlation with the morphology of a brain largely known as having been of an exceptional thinking power. If judged with scientific seriousness, it certainly was a harsh authoritarian action not yet wholly understood or justified.

The subject "*Einstein's Cerebral*" was offered to the public immediately after the physicist's death, only to be soon forgotten afterwards. It was recalled in attention, not long ago, due to the impact-power of an article considered by some specialists as scandalous because it associates to the title "*Le cerveau d'Einstein*" the subtly inquisitive question "***Une étrange malformation peut-elle expliquer son génie?***" A question forwarded to the public by the French revue *La Recherche* [1].

The question – if looked-at in a causal, materialistic spirit – appears to be only natural**;** in fact it is a normal consequence of the seriousness of the studies and observations on the topic of Einstein's brain morphology. Even more**:** the question seems of real importance because some serious investigations worked-out till now have shown a very clearly defined malformation of Einstein's brain *as compared to the morphologic brain-structure considered to be the normal one***.** Normal is, in this case also, defined as *the most frequently ascertained brain-structure* ***statistically*** *attested.*

The inquiring problematic so engaged was roused – after forty years of silence and total lack of information on the subject – by the advent in the specialized review *Lancet* [2] of an article of uncontestable professional interest, yet immediately harshly argued. In that article the authors raise some specific problems of serious concern. Of certain interest are the following findings**:**

1) Albert's Einstein brain showed, in both its hemispheres, a "… *moderate atrophy around the principal sulcus* …" [3].

2) The weight of the brain at take over was less than the average registered by statistics, *i.e.* 1230g versus 1400g**.** On that regard, W.H. Calvin considers this negative difference some 10% low compared to the average, that even if account is taken of the owner's age ([4] p.42).

3) The clear absence of a parietal operculum in both cerebral hemispheres of Einstein's brain**.** "*Einstein's brain did not detain a parietal operculum while this occupies a surface of 6,1 and 3,6 cm² in the left, respectively right hemispheres on the archetypal brain*" ([2] p. 34 and [5]). Such a "*by lack*" malformation compulsorily implies a significant shortening of the sulci of Silvius, meaning those sulci which delimit on one side the parietal opercula.

From the above quoted observations really significant seems to be the *shortening of both sulci of Silvius.* It is so because such an anomaly **compulsorily** implies *a significant reduction of the cortex area*. A finding which, if associated with M.C. Diamond's *et al*. reported observations [6] – in essence that Einstein's encephalon showed an excess of glial cells concomitant with a thinning of the frontal cortex [7] –suggests that the total cortical area and/or volume of Einstein's cortex was inferior to the statistic average considered by the specialists as defining normality.

In conclusion of their article, published in the Lancet, the authors cautiously state that the reported results are *only of a heuristic value*. Also granted as simply *heuristic in intent* are the author's following comments.

As a first significant observation one may observe that all the above quoted anomalies – if compared to the statistically registered mean brain morphology – are deficiencies. Especially important seems to be the reduction of the cortical area as consequence of the absence of parietal opercula. Absence due to the morphologic anomaly pointed out by S.W. Witelson et alt., *i.e.* "*the confluence of the ascendant branch of Silvius' sulcus with the post-central sulcus*" ([2], p33).

The importance here bestowed to the cortex-extent problem is motivated by the premise that intelligence, in whatever way defined, depends on the cortex's area – or volume – extent. An assumption drawn from the observation that in all species' evolution from simple to complex – as well as in the more restricted frame of the human evolution in particular – the cerebrum's circumvolutions complexity evolved from simple to complex to. A comment to be correlated with the very particular way Albert Einstein established his Special Relativity Theory.

2. The Rational-Scientific Aspect

About Einstein's Restricted Theory of Relativity; the Conceptual Basis

The reason for a so insistent analysis of the morphologic shortcomings of Einstein's cerebrum is the supposition that the referred-to particularities may explain – or could eventually be correlated with – the very special way in which Einstein founded his Relativity Theory. Of special interest is the Restricted Relativity, because, if that one falls short, the principled motivation of the General Relativity will have to be fundamentally rethought.

Characteristic for Einstein's mode of thinking relativity is its unrelenting endeavor to understand physics in a most general way, even at the price of **abandoning** the essential logical requirement for an energy transmitting medium extended in the whole perceivable space. Actually, its refusal to accept the ether's existence hypothesis, whatever its imagined form of existence could be.

As a matter of fact, Einstein, lured by the lack of evidence of a transport effect in a *strongly particular* type of experiences – meaning the ones of Michelson's type – developed a mathematical formalism based on peculiar principles by which he affirms the absolute inexistence of any form of ether allowing an intuitive understanding of the electromagnetic wave-propagation phenomena. Instead, to fill the logic gap so created, *he attributes physical properties to the empty space* by redefining it on the basis of an *ad hoc* constructed metrics. But the so initiated theory appears to be weak by that it neglects a fundamental logic guideline, generally respected by all pre-Einstein scientists**;** it is the assertion**:** *absence of evidence should not be taken as evidence of absence.* It is an imperative of logic that has to be respected *till all possible alternative explanatory hypotheses* ***are exhausted***. And even then it is not granted that imagination did not sufficiently well "flipped its wings" to certify *it has worked* ***exhaustively***.

Yet, it is obvious that, from the very appearance-time of Einstein's Relativity and up to now, the whole bunch of plausible explanatory-hypotheses in the above exposed sense have not been exhaustively investigated. The evident proof of this assertion is that Fitzgerald and, afterwards, Ives, just in view to respect the above-mentioned desideratum, adopted the dual hypothesis of the *specific* contraction of all moving material lengths concomitantly with a corresponding slowing-down – *in an absolute-time conception* – of all electromagnetic oscillators moving together with the looked at material system.

Even if it is unthinkable that Einstein did not know, from the very elaborative phase of his relativist theories, the Fitzgerald's hypothesis and Poincaré's theoretical works, he never mentioned them in any way. And, along his whole life, he never mentioned or quoted Ives' works**;** a behavior which may be evaluated as morally doubtful. In fact he upholds, more or less rigidly, his previous conviction declared in 1905, specifically the one of the "***obvious*** *inutility of the ether*". By consequence, he places his explanatory argumentation into the motivational-space of an *arbitrarily* redefined notion of simultaneity – that at the price of imposing physical properties to the very notion of geometric space – building on this so principled base a geometrized physics enslaved to a general metrics which he assumes to be, factually, universally valid.

Yet, by adopting that very special way of reasoning, Einstein introduces in his demonstration an element of obvious logic incoherence, namely**:** he does not observe that *all experiences of the Michelson class* are absolutely independent *of any kind* of **time-measurements** – being 100% pure, quasi-stationary, interference events – following that no **by simultaneity** conditioned comparisons of lengths or structures intervene in whatever way.

Obviously, an experience of the said kind implies, simply, the self-building of an interference spectrum on a material support. What Einstein fails to see is that in experiences of a Michelson-Morley type no *measurements* of whatever imaginable kind are performed. Their only purpose is to show, *qualitatively,* if the spectrum's position on the material support depends from its orientation in space. It is, obviously, an observation that **is independent** of *any kind of measuring procedures*. More plainly expressed**:** experiments of the mentioned kind implies only *checking if the interference specter's* ***position*** *moves* on the generating/ displaying structure when its orientation changes relative to an arbitrarily assumed absolute reference frame. It is a phenomenon clearly similar to the one which modifies the waves' interference pattern off-shore of a containing sea-border when the wind's direction changes. In that case also – *i.e*. a phenomenon that implies only wave propagation in a given container – the problem is to find out if the *stationary specter's* ***aspect*** built under the influenced of an external factor *changes or not* when the influencing factor varies.

The above chosen example shows that reliable conclusions may be drawn without using any sort of measuring-procedures *explicitly* conditioned by simultaneity. The phenomenon could be ascertained, for example, by simply superposing photos taken at different moments, meaning different parameter's values, to draw qualitative conclusions. In a more condensed form expressed**:** in both cases one looks at the same physical phenomenon, in essence the evolution of a stationary wave-field configuration dependent on some specific parametric factor.

Seemingly, it is just that logic aspect of the problem that Albert Einstein was unable to master when conceiving and, afterwards, generalizing his Special Theory of Relativity. Inexplicably, he refused to amend his point of view in spite of the fact that some first class scientists – to name only H. Poincaré and H.E. Ives – refused to consider *acceptable* his restrained-relativity *philosophy*. Einstein kept his point of view until he published the Generalized Theory of Relativity when he alleviates it, yet without renouncing *to geometrize physics on a non-intuitive principles basis*.

The duality of opinion so created divided the scientist's world in two opposed groups**:** on one side a strong majority of supporters of Einstein's point of view, on the other side a small minority of opposing physicists. From the last group the most consequent and, perhaps, the most logic-oriented one was H.E. Ives who, puzzlingly, was systematically ignored by Einstein along his whole life.

Due to the immense number of studies devoted to the subject – abundance which hinders any hope to synthesize the expressed points of view – the following analysis resorts to a drastically schematized argumentation. As a result the here adopted analytic-argumentative procedure will be somehow restricted to Albert Einstein's assertions, as they result from his published works, and the ones of H.E. Ives, as they result from his collected papers reproduced and commented by R. Hazelett and D. Turner in *The Einstein Myth and Ives Papers* [8].

E.H. Ives *vs*. A. Einstein

Attempting a short inquiry in the subject's logic, one will observe that characteristic in Albert Einstein's *Weltanschaung* is that he takes as granted all results coming out from experiences essentially based on propagation of electromagnetic waves in void *should not depend* on the source's and observer's *common inertial movement*. So, he "decrees" the propagation-velocity of electromagnetic waves in empty space – generally known as c – to be an ***absolute*** *constant.* He means by that a physical entity assumed to keep *permanently* the same value *whatever* the **inertial** reference-frame could be.

Yet, by so doing, he ignores the essential difference between the ***representative*** *value resulted from an arbitrarily defined measuring procedure* and the ***real*** *physical sense* of the measured entity.

On that *arbitrary* base – in fact a simple convention of a *pure* ***metric*** *nature* – and by assuming a strongly-particular definition for the notion of non-local *simultaneity,* he deduces – in fact he simply recovers – the Lorentz formulae, more precisely the formalized system of a kinematical nature which **describes** a very particularly shaped metric transformation.

Being aware that Maxwell's equations are *describing* electromagnetism in its totality – even if they do not justify it causally [12] – and that they are intrinsically invariant relative to the Lorentz transformation, Einstein **postulates** a generalized-equivalence principle, which forcibly assumes the *equivalence* of **all** *inertial reference frames* in describing **all** *nature's phenomena*.

Yet, by that very assumption, Einstein adopts – and by consequence of his scientific stature – **imposes** the assumption of the *physical impossibility* of discerning a privileged reference frame or system. An impossibility he thinks is *phenomenological, i.e. physically real,* not simply *a descriptive convention*. Yet, precisely because this philosophical belief, Einstein loses the meaning that he offers a simple *depiction* of the real world and not its real working scheme. In fact he pretends to *impose* – by means of an arbitrary, *purely metric* procedure – a composed descriptive image he assumes to be the ***factually*** real thing.

Einstein expresses one consequence of that mode of thinking in his early works. In 1905 he writes**:** «*Die Einführung eines Lichtäthers wird sich insofern als überflussig erweisen, als nach zu entwikelnden Auffassung weder ein mit besonderen Eigenschaften aussgestatteten "absolut ruhender Raum" eingeführt, noch einem Punkte des leeren Raumes, in welchem electromagnetische Prozesse stattfinden, ein Geschwindigketswector zugeordnedenet wird*» ([10], p. 892) or, in Ives' translation «The introduction of a 'luminiferous ether' will prove to be superfluous, in as much as the view to be here developed will not require 'an absolutely stationary space' provided with special properties.» ([11], p. 217).

Albert Einstein maintains that point of view at least until 1920 when, in a lecture delivered at Leiden [9], imagining two reference frames K and K', he slightly amends his initial point of view in a rather strange way. He states**:** "*If we suppose the ether at rest relative to K, the physical equivalence of K and K' seems to me, from a logic point of view, not only evidently incorrect, but yet undoubtedly unacceptable*".

This is w quite prophetic assertion when correlated with his 1905 principles. In fact it is a quite unconvincing statement, because everyone has the right – if not the rational obligation – to imagine and afterwards to verify by adequate means if it is not the system's very movement which influences its materiality in such a way as to *physically determine* a general independence of all phenomena – or, at least, that of the electromagnetic phenom-

ena alone – with regard to the inertial movement of the reference frame in which the system is immersed. It is a plausible hypothesis which can explain **in an intrinsic way** the relativistic covariance factually observed, at least in the whole electromagnetic domain.

The same lecture, more deeply investigated, reveals him remembering that there was a time when he thought that: *"The ether does not exist at all. The electromagnetic fields are not states of a medium, and are not bound down to any bearer, but they are independent realities which are not reducible to anything else …"*.

Yet, he adds**:** "*More careful reflection teaches us, however, that the special theory of relativity does not compel us to deny ether. We may assume the existence of an ether; only we must give up ascribing a definite state of motion to it, i.e. we must by abstraction take from it the last mechanical characteristic which Lorentz has left it.* And, generalizing**:** "*There may be supposed to be extended physical objects to which the idea of motion cannot be applied*". And, a little further**:** "*But on the other hand there is a weighty argument to be adduced in favor of the ether hypothesis. To deny the ether is ultimately to assume that empty space has no physical qualities whatever. The fundamental facts of mechanics do not harmonize with this view*".

Finally, he concludes by affirming**:** "*…. Space is endowed with physical qualities; in this sense, therefore, there exists an ether. According to the general theory of relativity space without ether is unthinkable; for in such space there not only would not be no propagation of light, but also no possibility of existence of standards of space and time(measuring rods and clocks), nor therefore any space-time intervals in the physical sense.*" [9].

The above-quoted argumentation, if looked at from a strictly logical point of view, may determine somebody to wonder if Einstein's Restricted Relativity philosophical basis is not defective **by lack** of logic coherence**;** this however without putting under doubt the validity of its *formalism's descriptive* power. It is amazing to find out that, due to a strange trick of fate – or by power of a natural motivation not yet quite well understood in spite of enlightening studies as Wilhelm's one, for example [10] – its *mathematical formalism* **is the same** as the Lorentz-Poincaré one. By this very fact, and against the fundamental differences in their philosophic base, Einstein's formalism becomes congruent with the Fitzgerald-Lorentz-Poincaré-Ives one.

Commenting in a more extended way on the above expressed point of view, one may affirm that it is allowed to imagine any kind of abstractly formalized arbitrary metric and apply it *to formally describe* a chosen phenomenon on the condition the resulted description is assumed only as a convenient describing facility. In fact, that the so obtained results have not to be assumed as realities *if the so imagined metric is not* ***factually*** *applied* – meaning *physically put to work* into the studied physical process. More precisely stated**:**

a) the measuring means used in practice **must** correspond, physically/*materially* with the ones in abstractness imagined and,

b) the in theory implied procedures must be **effectively** put to use in the studied processes.

Without that, any drawn conclusions will forcibly remain simple imagism.

The above commentary's intent is to make clear how Einstein *defined,* and used, the notion of non local simultaneity. It is critical because, obviously, not one single explicit simultaneity procedure is present in interference experiences in general, more evidently in the ones of a Michelson-Morley type.

Arguing in a somehow ironic style**:** trying to motivate in Einstein's mode the negative result of the above mentioned experiences seems annoyingly alike to an event in which a guy, looking at the beautified image of a rather dumpy young lady, *image* delivered by a device so devised to *show* her well turned-out, would decide**:** I have to marry her! No doubt that would be an imprudent decision simply because it neglects the fact that *to transform an image does not implicitly transform the reference object also.*

Or, in a more sober, technical, illustration**:** it is known that the force acting, in flight, on a plane's wing of a given profile can be theoretically evaluated by **formally** applying a particular conformal-conversion – in essence some particular mathematical coordinate transforming relations – upon a *geometric* **circle**. Here "*geometric circle*" is to be understood as a conventional figure in abstractness referred at, not a physically real one. A decision to fly with circle-sectional wings could be a harmful experience. Only by a lack in reasonable thinking – in fact a distorted understanding of the modeling process' meaning – could such a conclusion be adopted.

Would it be inadequate to wonder – here, at the end of the above-unfolded analysis – that the lack in logical rigor of Einstein's relativist philosophy could have been linked to the absence of opercula on his brain?

Yet it is certainly not here that the question could find an answer.

3. Ives' Solution to Einstein's Problem

The Premises for an Axiomatic Approach

In search of the deep meaning of – or for – a theory intending to formalize the observed relativism intrinsically hidden in nature's phenomena, especially in those belonging to physics, the easiest approach seems to be the one which takes as reference E. H. Ives' works and method of reasoning, mainly his *"The Fitzgerald Contraction"* article [11]. Without doubt, due to the generality of its premises, its rigor in formalization and clear logic motivations, it is one of the most enlightening of the gender.

In a first step, Ives summarizes the stages by which some scientists succeeded to validate the formal bases of their relativist philosophies. The historic evolution, as he describes it, may be sketched as follows:

a) G.F. Fitzgerald, in view to explain the negative result of the Michelson-Morley experiment, forwarded the hypothesis of "*the simplest compensatory comportment*", in essence the fact all material lengths contract along the moving direction by a factor expressible as $\beta = \sqrt{1 - V^2 / c^2}$.

Many years later, Ives, commenting Fitzgerald's hypothesis, shows that such a physical condition *is not sufficient* to explain, in a **univocal** manner**,** the observed phenomenology. The same result would be obtained by a $1/\beta$ proportional transverse dilation. Hence he underlines that the most general condition of a true invariance of the interference spectrum relative to the system's movement is the modification in a $1/\beta$ proportion of the

material lengths along the moving direction compared to the ones perpendicular to that direction.

b) Which variant is the physically correct one cannot be decided merely on a Michelson-Morley experiment basis, affirms Ives. Yet, a decision could be drawn from precise measurements of the time needed for light to go and return along a given straight segment under different orientations. Assuming that the so measured time will be found invariant relative to the system's moving-speed, *the Fitzgerald hypothesis requires that the clock also* ***must*** *suffer a change, in essence, by running slower by a factor of* $1/\beta$.

An adjacent fact of some significance is that Fitzgerald's hypothesis was never published by him self; the contraction hypothesis being signaled by Sir Joseph Larmor in its essay *Ether and Matter* [13].

c) The above mentioned motivations proves the thoroughness of Fitzgerald's mode of thinking, in particular in what concerns the fact that *the measuring instruments are* ***material objects****, not idealized entities*. From here the corollary**:** when endeavoring to understand, by means of explanatory models, nature's phenomena, one must bear in mind the *physical/material comportment* of the implied measuring means. It is so, says Ives, because *only by measuring instruments can the theory's predictions be confirmed*.

d) Stepping further, Ives mentions H.A. Lorentz who approached the problem from a different point of view. Lorentz endeavors to identify the form of a *specific coordinate transformation* relative to which any electromagnetic event's description remains invariant in form *whatever the* ***inertial*** *movement* of the reference system may be. At that aim Lorentz assumes – "invents" says Ives – the notion of "*local time*", (*cf.* [14], [15]) ***arbitrarily*** *defined* so as to ensure the invariance *in form* of the describing equations of any electromagnetic event, whatever the inertial reference system chosen. About the same time Poincaré demonstrates that the so obtained formal transformation can be established by simply imposing the condition, *of a metric nature*, that "**C**", the propagation speed of light, to have the same value in any inertial system, the local time being determined by way of light signals. Of some interest is that Poincarè did not felt the need to distinguish between the one-way and the double-way speed of light.

e) Somehow concomitantly with Lorentz, Poincaré, endeavoring to establish a generally-synthetic principled formalism in physics, asserts a "*relativity principle*" he forwards as**: "***The principle of relativity, according to which the laws of physical phenomena should be the same, whether to an observer fixed, or for an observer carried along in an uniform motion of translation, so we have not, and could not have, any means of discovering whether or not we are carried along in such a motion.*" [16]. Using it, Poincaré develops the form of that particular coordinates-transformation system, naming it *the Lorentz Transformation*, setting it up into a more general form – in essence as "*a mathematic group*" [16].

The Analytic Demonstrations

On the so, by Lorentz and Poincaré, established foundations Einstein composes his *Restricted Relativity Theory* in its well known classic form. He grounds the theory by adapting Lorentz's notion of *local-time* – assumed by Poincaré as an axiom – to the requirements of a very particular definition of non-local simultaneity combined with a generalization of Poincaré's relativity principle. Einstein does that in intent to extend the validity of his principles so as to cover *all nature's phenomena*, not only the electromagnetic ones, as in the case of the Lorentz-Poincaré axiomatic.

On the science's stage so furnished by his predecessors comes E. H. Ives with his system of premises, arguments and motivations. His intent is to define, in physics, a strictly-logic, coherent, concept of relativity based on material interdependencies. A system essentially different of Albert Einstein's one because he wants it *implemented directly from undeniable experimental results*, namely**:**

a) the light's propagation speed is *independent of the source's movement* whatever the inertial-reference system may be,

b) the interference spectra in any kind of experiences of a Michelson-Morley type are invariant whatever the equipment's inertial movement may be.

He adopts those premises as an *enlarged* ***physical base*** compared to Henry Poincaré's **mathematical** one. To that new, axiomatic, mode of thinking he associates a widely general *methodological* conditioning**:** the acceptance and respect of an "*operational principle*" he particularizes by defining velocity as " to *mean the quotient of divisions on the platform by time as indicated by the single clock fixed at the origin*" ([8], p.168).

Stepping in a very prudent axiomatic mode of thinking, Ives states that it *is not allowed* to assume *as granted in an a priori mode* that the velocity of light on the go and on the return is the same. Instead, he assumes they will reveal themselves as knowable *only after part or the entire investigative reasoning process has been passed through*.

Worth to be acknowledged here is the remarkably clear, logically-consequent, and … cautious way in which Ives, in view to demonstrate his point of view, applies the general thinking-mode used in algebra**;** specifically, the mode of thinking by which, *ab initio***:** I) one identifies the problem's determinant unknown entities, II) one assumes they are independent variables or dependent parameters conditioning the solution, III) one note them down arbitrarily and work with the notations as if representing known entities, for, *under that provisory condition*, to, IV) correlate them in equations *expressing the phenomenon's causality in an as large as possible physical generality*.

Respecting step by step that mode of axiomatic thinking, Ives shows that it is the Relativity Principle itself which, intrinsically, imposes the need of a **physical** modification of the measuring units**;** *a modification induced by the system's movement itself*. Still, wisely, he keeps the value of the quotient **length-modifying factor/time-modifying factor** *as a mathematical unknown entity* ***to result naturally*** *somewhere on the demonstration's course.* He does that as an elementarily logic precaution against the fact that, at that day, no experimental or factual evidence for a relationship between the lengths' deformation along and perpendicular to the system's moving direction was put in evidence directly.

As for the *material lengths* measuring methods, whatever the reference-system may be, he assumes them achievable by alignment end to end of material standards, without feeling the need to elaborate on the procedure.

It seems adequate to insert here a comparative comment: while Einstein deduces his Restricted Relativity's formalism by means of premises *in abstractness defined*, Ives works out *the same formalism* exclusively by means of imagined physical operations, *practically* executable and *precisely defined*. This represents a fundamental progress in relativist philosophy as well as in theoretic processing in deep contrast with the precarious manner in which Einstein justifies his Restricted Theory of Relativity.

So, by careful thinking-steps advancing, Ives reaches the sensitive problem of digging out the true sense of *non-local simultaneity* and to shape a consistent definition for this concept. Consequently, he shows that endeavoring to find, by way of the indications of a single unmoving clock, the time at which a remote event takes place constitutes an **undetermined problem**. In strict respect of the *operational principle*, he imposes to the describing equations of phenomena *to be free of terms representative of non-observable* or *non-measurable* entities**.** At this purpose he imagines and intrinsically defines a clock transportable from one end of the reference-platform to the other. By "*intrinsically definable*" he means**:** defined by the function representing the quotient**:** number of divisions traveled on the platform by the clock/travel-time indicated by that clock. He designates the so defined cinematic-ratio – particular to the adjusting clock – as the *rod-clock ratio*, plots it as q and, prudently, considers it an *unknown* parameter dependent not only on the properties of the clock itself, but also on two factors modifying the lengths/time measurements, noted $f_1(w)$ and $f_t(w)$. By that he minds for an eventual metric dependency of the procedure on the speed w of the moving platform relative to the one considered at rest.

Ives, by adopting this generalizing mode of demonstration, avoids the hazard of including some hidden – meaning implicit or non-evident – logic restraints in his theoretical assumptions. A precaution he strengthens by adding a supplementary parameter χ of a not-yet determined value he *operationally* defines as the difference in indications of two clocks situated at the ends of the moving platform *when traversed by the same signal of an arbitrary nature*. Under these assumptions the rod/clock quotient, proper to both clocks, becomes $1/\chi$, a parameter considered as having an initially unknown value.

After so many protective premises aiming at ensuring an as wide as possible generality of his demonstration, Ives approaches the solution by requiring *the absolute constancy of the simple-way as well as the double-way* speed of light, condition he extends over *all inertial* referential frames.

At this point it is of some significance to observe that the above conditioning does not rely on results of some specific experiments**,** but implies a whole class of phenomena. Knowing that and applying some complex reformulations [17], [18], Ives succeeds to show that the rods as well as the clocks-pulsing' rhythm **have to be** affected by modifying factors of a *same* functional form.

The extraordinary subtlety of Ives' demonstration comes here out by that he does not impose for the speed of light relative to a particular referential frame to take some preconceived value. By his way of reasoning he avoids the hazards of hidden or implicitly intervening conditionings to interfere into the problem's solving degrees of liberty. One gets an indication on the generality of the demonstration so unfolded observing that the above-mentioned length's modifying factors may represent contractions as well as dilations, the determinant parameter being *the value assigned to the out-going waves' speed* c_o *and the in-going one,* c_b, both proper to the moving platform involved. When $c_o = c_b$ – a condition that obviously corresponds to the platform being at rest relatively to the light's transmitting medium – it results that the lengths' modifying factor $f_d(w)$, together with the temporal one $f_t(w)$, have to be equal and dependent on the platform's movement *in the exact way Fitzgerald suggested*. In fact it is precisely the by Lorentz and Poincaré deduced factor and also the one by Fitzgerald assumed one to represent the *true physical reality*.

Of outmost importance is to observe that in Ives' demonstration the lengths' and time's modifying factors depend on the light's propagation premises adopted. That observation proves, without any doubt, that particularizing in a preconceived way the light's propagation mode **can** deliver arbitrarily-shaped solutions. Ives, by adopting a ***complete*** set of descriptive parameters and ***maintaining them undetermined along the whole demonstration,*** *till the point where the very logic of physics determines them*, avoids that arbitrariness.

Also remarkable in Ives' demonstration is the fact that he splits in *two conceptually distinct components* the **meaning** – *i.e.* the physical sense – of the invariance-condition of the light's speed relative to the reference frame. In fact he considers differently the *double-way* propagation mode from the *simple-way* one. It is not the first one, says Ives, but the second one *alone* who is the conceptual motivation of the Theory of Restricted Relativity.

From the so assumed set of premises Ives deduces the *general* – and complete – form of the system of equations able to describe the same phenomenon when investigated on two different inertial platforms. He does that in strict respect of all symbols intervening in his demonstration, imposing that all of them should represent ***performable*** *operations with results* ***observable*** *on well defined measuring instruments* ([11], p.18). Yet the so deduced equations – worked out in successive studies as [19], [20] – are of "a considerable complexity" evaluates Ives himself, commenting**:** "*Complexity of this sort is the price we have to pay for equations which tell a complete and unambiguous story in symbols all of which have a definite operational meaning*" ([11], part II, p. 19).

But the complexity so arisen, specifies Ives, can be eluded by means of an adequate change of variable which transforms the symbolic-complex system in the very form of the Lorentz-Poincaré one. Yet in that last form, warns Ives, the transformation only "mimics" in an imperfect way the physical reality. On the contrary of the so obtained condensed form, the complete one models accurately the real phenomena. It is so because in the complete equations one finds only "*operational variables*" ([11], p.18).

Deepening his analysis, Ives observes that Poincaré's Relativity Principle asks – in fact imposes – that**:**

1) the double-way light's speed measured on two differently moving inertial platforms have to be equal,

2) the measured one-way speed of light has to be the same on both platforms.

Yet, affirms unequivocally Ives, those two premises do not mean that by these distinct measuring modes – who presume different instruments and handling – *one should obtain identical results*.

As regards Einstein's relativist pretence that any light's speed measurement should always and forcibly show the same value c, Ives does not accept it as a proven experimental fact. His motivation to do so is that no one-way-determinations, precise enough to certify with fair probability of truth that uniqueness, were till that moment reported.

At the end of his exposé, Ives, not willing to conclude his demonstration on a true Theory of Relativity as a most general theoretical construct built only in abstractness, starts a series of subtle experiments by which he thinks the Fitzgerald-Lorentz-Poincaré thesis would be proven *without any possible doubt*.

Leaning on the theoretical requirement – by him previously demonstrated ([11], p. 17) – that *if any single one of the two relativistic modification* – meaning either the slowing-down of clocks, or the material-lengths contraction – *is* ***factually*** *proved, that sole result implies, compulsorily, the* ***physical-reality*** *of the second one also*.

In view to confirm, by way of unequivocal experimental evidence, the reality of the slowing-down of moving clocks phenomenon – in those days only suspected – Ives imagined and built a device – based on hydrogen canal-rays – by means of which he **proves** the ***physically-real*** existence of a Lorentz-Poincaré relativist modification of the rhythm proper to rapidly moving atomic oscillators ([8], pp.176-78, [21], [22]).

From the whole bunch of the previously presented motives Ives draws a widely general conclusion**:**

> *the slowing down of moving atomic clocks,* by him demonstrated as a reality, together with *the Fitzgerald-Lorentz material-lengths contraction* – for theoretical reasons compulsorily linked to the first – **have, both, to be real phenomena,** not just simple appearances by measuring-procedures induced.

The so drawn conclusion motivates the following statement**:** because the mathematical *formalization* of Einstein's relativity – in spite of a logic accident in its demonstration – is the same as Ives' approximate one, Einstein's formulas are able to ***describe*** physics as Ives' simplified ones do. *Yet they immensely differ in the way they explain physics.*

A natural conclusion to the here presented general survey on the Relativity's problematic is that, if in search for a deep *understanding* of physics, one should resort to Ives-Poincaré's Relativity – which is founded on solid facts and strict logic reasoning – not to Einstein's one; that because Einstein's Relativity was developed on logic hazardous bases, being, in essence, a simple descriptive facility, even if pretending to be explicative. Intensely in contrast with Einstein's one, Ives-Poincaré's Relativity shows itself as a solid axiomatic-principled theoretic construct in physics. It is an archetype able to foresee, with fair chances to be correct, all materially observable events *of a* ***purely*** *electromagnetic nature.*

Yet, as a collateral observation**:** one should not extend, *without supplementary experimental evidence*, the so assumed theory to phenomena eventually mixed with strong *gravitation or inertia influences*. That point of view has been put under question in some of the author's previous articles [23], [24], [25].

An Astonishing Chain of Question Marks

Somebody who is convinced of the exactness, correctness and widely-extended generality of Ives demonstration and, by consequence, on the *phenomenological reality* of the slowing-down of moving atomic clocks also, may be surprised by Albert Einstein's total lack of perception on the real value of Ives' works. Even more surprising appears the physicists' world-wide adhesion to the abstract, intensely non-intuitive, Theory of Relativity of Einstein if compared with the total indifference shown to Ives' one, wholly rational and intuitively sustained.

A tentative explanation would be that Ives' demonstration was not widely perceived at its appearance time, nor taken into account afterwards. Seemingly, by influences and on purpose, it was neglected and, at last, totally forgotten. Yet there exist doubtless proofs that Einstein **did know** Ives' activity in the Relativity domain, but, perhaps by lack of fair-play or by overgrown egocentrism, Einstein decided not to mention publicly Ive's works, nor quote them in any way. A striking comment on that matter is due to Dan Turner which, in his *A Scientific Priesthood*, writes**:**

> "Speaking to a reporter, Einstein lauded the Ives-Stilwell experiment *as the most direct proof that has been brought forth in support to relativity"*. His one, of course!

And further:

> *"…. So far as I have been able to determine, Einstein after that never again publicly mentioned Ives or his theoretical works. It cannot be said by way of excuse that Einstein was ignorant of Ives' theoretical work. A relative of Ives told me that Ives had a number of friendly meetings with Einstein, some at Princeton and other at scientific conferences, at which Ives' theoretical work was discussed".*

And also**:**

> *"The Ives-Stilwell experiment supports equally either relativity or the Absolute Space and Time Theory of Ives. Nevertheless, by discrete silences, Einstein allowed both scientists and laymen to come to believe that this experiment supported relativity and nothing else. Was this stealing? No, not actively. It is better called passive kidnapping."* ([25], part I, pp.84-85).

Messages like the ones above-quoted nurture disquieting ethic queries. To record them as indicating a possible – or more likely a *quite probable* – weakness in moral fiber of Albert Einstein is hardly avoidable. If so seen, to consider them acceptable is a matter of personal tolerance at the inquirer's end. Gauged as an individual's moral weakness it certainly is disappointing – unfortunate by its very nature and the stature of the individual in cause. But much more regrettable they appear when observing that, now, their consequences became irreversible.

Now, if weighed at the social level, the fact is much more disturbing**;** that because so many first class physicists did not intervene to correct the scientific as well as moral anomaly so grown. The only at hand explanation for such a group-attitude – prolonged along a so wide period – seems to be the compliance to a rule of "political correctness" **–** political to be understood here as an attitude privileging an elected group, or a "guild". It is allowed to think that the prolonged steadiness of that behavior

proves the presumption may be true. To worship Albert Einstein as a science's divinity – meaning**:** no opposed inquiries favored, no work contesting his statements published – certainly ensured real and extended advantages, along a century now, to a large, elitist community.

Why was Ives not accepted as belonging to that elite?

An easy explanation could be**:** Ives, by his works, was iconoclastic, non-respectful of the dogma and of the social-philosophy correctness.

Why did Ives not fight back?

Perhaps, even if not convinced by the dogma, he felt he had to be respectful of the *correctness*'s discipline.

An interesting conclusion on that matter was offered by Dean Turner. Alluding to *Encyclopedia Americana* (1976), he mentions that the article on **Ives** "*has 27 lines on Ives but does not mention either the Ives-Stilwell experiment or Ives' basic theoretical work on light, space and time. Other negative examples could be mentioned. Evidently, Ives'* ***prying into such holy matters was thought to be indiscreet.***" (cf. [26], particularly note 137).

So, one may wonder if the 21st century is fated to keep the previous century's "*holy matters*" thinking stile in physics? Does the will of god – whatever one's gift to imagine the divinity – manifests itself in this way**;** a way impenetrable to the non-initiated, yet, perhaps, crystal-clear for the selected ones?

If the scientist's world will remain so dichotomized one may wonder if that fact will favor a sane scientific evolution of mankind. If a partisan scientific determinism may increase the human species' rationality in a wise and responsible sense? Increase it in the sense of an evolution from homo sapiens-sapiens towards homo *wisely* sapiens (not to be taken as a pleonasm.)?

An example of such a challenge is the fathomless difference in fate of the two physicists of genius here comparatively scrutinized. It is a precedent which makes the author fear that, framed in the trend of the up to date researches, studies as Ives' ones and/or, in a minors register, as [23], [24], [25], may be considered "indiscrete", even harmful, or …… simply useless, ridiculous ones?

4. Inferring Geometrized Physics

Seemingly, geometry was the first science primitive man learned to master. It was probably so because geometry is the most straight-forward intuitive science**;** obviously, geometric points are like little holes in a plank, planes are like flat-cut timber, straight lines are like well stretched threads between houses or between two holes in a plank etc., *a lot of subtleties pending*. It was also easy because geometry can be imagined independently of the cinematic/dynamic changes in the surroundings, those two parts of reality being, in those times, attributed to the gods' might.

Physics began when man felt the need for intrinsic logic motivations in view to *understand* the phenomena's evolution. He invented physics by somehow mixing the dynamics of events with purely geometric **motivations.** As far as I know – but historians certainly know better – a first reduction of a physical phenomenon to pure geometry appears when geometric-optics is imagined. A nice example is Heron's of Alexandria demonstration – some 125 years before our times – of the law which governs the reflection of light on mirrors. He assumed that light-rays are straight **lines** and inferred an innovatory **principle** of *shortest total* ***length*** of the rays between the source and the observer, via the reflecting surface.

Is that a true explanation of the phenomenon?

Certainly not; it is a simple reasoning-facility, a kind of thinking- recipe.

Many centuries later, Fermat, stepping lightly out of geometry, extended that kind of thinking facility to the domain of the refraction of light, stating**:** *The path of a ray of light between two points is the path that minimizes the travel time.*

None of the two above-mentioned statements are causal explanations. The true, solid and intuitive explanation of those phenomena is offered by the wave theory of light, in essence by means of a general wave-propagation model.

The next attempt to formulate, in the easiest way, a part of physics by means of a seemingly geometric procedure belongs to Lorentz and Poincaré. Their coordinate-transformation formulas ensure that **all** electro-magnetic phenomena can be expressed *in exactly the same form* whatever the inertial reference systems adopted, in fact by Maxwell's equations written in their classic form. It is a mathematical method by which electromagnetism as a whole can be *expressed* with a set of equations *invariable in form* whatever the inertial reference system adopted.

Is this attempt an explanatory one? In essence one by cause linked to effect motivated?

Again, certainly not**;** it is merely a mathematical methodology which, by adding a fourth *well* ***chosen*** – meaning adequately defined and formulated – temporal dimension to the three spatial ones, creates an *abstract,* ***descriptive*** *space* in which the study of some phenomena can be handled, *theoretically, in a more easy way*. Being defined as an arbitrary geometry, it can **describe** physical events and evolutions, even foresee future events, but cannot *justify* them on a *straightforward causal base*. Nature's true determinism stays buried much deeper into nature's running-conditionings.

A more direct by cause/effect understanding was attempted by assuming that the whole causal explanation of the electromagnetic phenomena is condensed, somehow intuitively, in a dually principled assumption, meaning**:**

1) The **physically induced** *change of lengths* – in a specific mode conditioned by the system's "absolute" movement through space – of all material structures belonging to the system, as well as a concomitant **slowing-down** of all to the system belonging electromagnetic oscillators, as shown in detail by Ives, cf. [19].

2) the assertion of the electromagnetic-induction phenomenon intrinsically caught in Maxwell's classically formulated equations. One has yet to observe that if so formulated the equations can not adequately represent – by cause/effect logic – all electromagnetic phenomena. **C*ausally*** *representative, not simply descriptive,* are the spatial density of electric charges and their displacements in space, as Jefimenko convincingly shows (cf. [12], chapters 1-2, and equations 1-4.1, 1-4.2).

Without doubt Lorentz, seemingly Poincaré also, were conscious of those facts, especially in what concerns the first mentioned point. The mixing up of things began when Albert Einstein, elaborating his Restricted theory of Relativity, attributed a real, *i.e.* a physical, not simply mathematical, significance to the

by him *anomalously redefined* time-dimension. More precisely**:** when he assumed that the *local-time* coordinate, by him in an ad hoc manner redefined, should be *real and physically true,* meanwhile refusing to recognize any reality to the second relativist phenomenon, namely the *material-lengths contraction* phenomenon, assuming this phenomenon to be the simple *result of the measuring processes*, *i.e.* determined by the new definition of simultaneity at a distance. More specifically**:** when he assumes that the so defined time-coordinate **may** be put, *operationally*, on the same level of significance as the three spatial dimensions, believing that in that way he has put in evidence a ***real, operative,*** *geometric hyper-space*.

A strict-logic analysis shows that Einstein's point of view is justified only as far as his assumptions/deductions imply *purely-mathematical* ***representations*** of the phenomena. It is, of course, an adequate mode of operating – *in an abstractly defined space* – with *representations* of the facts**;** yet it remains a thinking-process unable to explain, via Einstein's motivations, the phenomena by cause versus effect argumentation.

Pursuing the Restricted Theory of Relativity's trend of mind – "restricted" standing for**:** *limited to inertial systems of electromagnetic nature only* – Einstein framed in the same philosophy his General Theory of Relativity. He did that by a straightforward extension of the restricted invariance, previously assumed only for inertial systems, towards a general one. In fact he assumed that **all** physics' laws **have to be *invariant*** whatever the reference-system adopted. Concomitantly he takes as granted the *equality of the inertial and gravitational masses*. To configure this new theoretical model he defines an abstract four-dimensional space in which, operating with tensors, he deduces some new laws of physics. In that way he builds an abstract construct by which one can analyse and predict the evolution of nature's most general phenomena.

It is only fair to acknowledge here that this is a thinking mode of a terrific power. Inventing the General Theory of Relativity, Einstein convincingly proved his genius, offering a *foreseeing* instrument of an astounding operative power, *if well interpreted and understood***;** a theory widely confirmed, yet not factually *exhaustively* and thoroughly verified.

What really surprises in Einstein's attitude of mind is he never, *explicitly,* affirmed that intent. On the contrary, he constantly insisted that his general relativity **explains** physics, without understanding it does not explain it**;** it only describes and predicts the evolution resulting from a momentary physical state, especially one of a cosmic nature. The true novelty and riches in Einstein's point of view is *not phenomenological, but methodological*. It is the idea that by an *only descriptive model* lacking any deep explanatory power one can predict general consequences even if a real understanding of the phenomenon's intimacy remains obscure.

That mode of thinking is equivalent to the classic with "black-box" reasoning, in essence by assuming the natural phenomena known by their actual manifestations – *i.e.* without an intimate knowledge of their internal functions – the "linking wires" between them being assumed to be physical laws under test. To those laws Einstein imposes one general condition**:** to take the same form whatever the "platform" adopted.

It can be seen as wizardry, but it worked! Tremendous progresses were registered in that way in modern physics. An immense number of physicists work now with more and more "elementary" particles as "black parcels" with rather unknown content and internal laws, inter-wired by program-equations imaginatively invented so as to fit *possible* worlds and universes no more – or not yet – by experiences entirely verifiable. It seems that our present state of investigating and understanding fundamental physics looks uncomfortably like Herman Hesse's invented *Glass Bed Game* (*cf*. his novel with that title).

Yet, one may wonder**:** what fuels such a powerful thinking instrument?

Surprisingly, it is the simple assumption that, obviously, a natural phenomenon evolves, at the macroscopic level, independently of being looked at – and described – from one or another platform. This simple fact and the statement of the equivalence between heavy and gravitational mass – equivalence Einstein assumed to be **causally-significant** – made him assume the very general statement**:** *the laws of nature* ***must*** *be expressible in a same and unique form, independently of the coordinate system in which* ***they are written***.

Still, perhaps not only a single person considers such a statement as a hazardous jump over a logical gap. Nothing grants that pictures – if not holographic – of a certain plot, if taken with different cameras and from different locations, **have** to be identical. The same argument stands for the assumed invariance of **all** mathematically expressed laws of physics when written in *different coordinate systems***;** until proven by solid consequences, it remains a simple guess. It may be true or it may be not, depending on the factual consequences reality will confirm. What seems to be sure is that one may not assume this as an ***a priori*** **certitude**. Till thoroughly proven, it remains like a by computer-program generated movie-script**:** a script ambitioning to show the whole Universe's evolution on basis of an imagined tale.

But – and in that resides the power and value of Einstein's theory – it is possible to foresee the phenomena's evolution as a **true** story, on condition one knows the true links between events; this even if one does not know the exact **content** and **running laws** into the boxes, just imagining possibly adequate **programs** running trough the connections between the black-boxes.

May such a theory be considered explanatory in a cause-to-effect mode?

Obviously not**;** factually, because it does not show how inertia comes out from mater – or from something waiting to be specified – how gravitation is generated, what is the intimate way by which it fills the whole geometric space which frames – or contains – the cosmos, why the heavy mass is equal to the inertial one.

So being, Einstein's reasoning-construct is, at the moment, a working instrument**;** a clearly useful methodology *still without explanatory power*. Or, more explicitly expressed**:** Einstein's real merit in starting the *General Theory of Relativity*'s trend is that he instinctually felt that the progress in Physics *is not fenced in imagining intuitive models*, but that Physics can *evolve* by just imagining **adequate mathematical operators and formulas** able to **describe** the physical world's evolution. He did not affirm explicitly that point of view, but always affirmed that both his Relativities **are** *causally explanatory*. In fact, they are not more explana-

tory than an aircraft pilot's knowledge to read the panel's displays and feel the responses of the aircraft, manoeuvring the commands in consequence but without understanding in depth how the air-flows maintains the plane in flight. Meaning by that the pilot will not be able to react with adequate ability to all possible unexpected events which could eventually affect the plane's system.

It seems that, if one looks for a deeper by cause versus effect understanding of the Universe, one has to dig for deeper physical motivations.

So, what would be the clues for a more explicative, more comprehensible, theory? What philosophy may lead to a broader and deeper understanding of the Universe?

In a synthetic view, one may wonder if searching explanations in various n-dimensional spaces, with n>3+1, is not the proof of an insufficient knowledge about the laws of the Universe, or of ignoring some simpler known ones. A useful hint in that direction may be gathered observing that**:**

a) geometric-optics turned out from pure geometry towards phenomenology causally-explained when the electromagnetic nature of light, with its wave-propagation laws, was assumed,

b) the four-dimensional geometry proper to Lorentz-Poincaré's coordinate-transformation – identical in form with Einstein's Restricted one – can be reduced to the usual Euclidian space and absolute time by assuming two physical realities, namely**:** the Fitzgerald-Lorentz-Poincaré *lengths-contraction* together with the Ives-Stilwell's *slowing-down of all electromagnetic oscillators* phenomena when the material system they belong to is inertial and moving relative to an assumed absolute one.

Observing that on the contrary of the above-assumed hypotheses the actual trend in explaining the phenomenology of the Universe is by means of non-intuitive formulas expressed in many more than three plus one dimensions, one may wonder if this is not a consequence of an insufficient knowledge of the intimacy of the world's phenomena? If an endeavour towards a more classic kind of understanding, *i.e.* by a more intuitive cause/effect motivation, than by simply (or hardly?) adding more and more dimensions to the descriptive space in which physics is interpreted would not be rewarding.

5. Suggestion for a New Principled Approach

Seeking an approach in the spirit of a philosophy based on ether, the author imagines – by extension of the approach suggested in [23] – a theoretical model structured on the following hypotheses**:**

1) The of the energy-transmitting medium, by tradition named ether, which should fill the entire classically defined space is aphysical reality.

2) Any point-like concentrated matter behaves as an ether-sink, which determines a radial inflow with a $\sqrt{kM/R}$ velocity-profile, with k being a constant factor, M the assumed point-like body's mass, and R the vector-radius to the body's center. The form of the flows of different masses distributed in space being mathematically derivable from a potential, it follows that they are additive, determining a unitary potential flow.

3) A point-like mass free of any influences other than its own inertia, unavoidably immersed in the local ether flow, moves such that

$$\delta(\mathbf{v}_{et} + \mathbf{v}_m) \equiv 0 \qquad (A)$$

with δ symbolizing the variation operator, and $\mathbf{v}_{et}$ and $\mathbf{v}_m$, respectively, the ether's and the concentrated-mater's velocity relative to a coordinate system defined by linkage with the kinematical mean state of the Universe, presumed to be the most general *absolute* reference system. Or expressed in a more intuitive but less rigorous mode**:** $(\mathbf{v}_{et} - \mathbf{v}_m)$ represents the velocity of the observed point-like mass *relative to the local ether*.

Considering, as a first step of analysis, the particular case of a local uniformly flowing ether, principle (**A)** asks that $\mathbf{v}_{et} = \text{const.}$ and, by consequence, $\delta\mathbf{v}_m = 0$ which implies $d^2\mathbf{r}/dt^2 \equiv 0$.

From an axiomatic point of view, one sees that the above-assumed thinking procedure simply mimics Newton's inertia principle. What is new in the above suggested hypothesis is that it implicitly defines a *physical* absolute reference element, *i.e.* the ether flow assumed to be, locally, nearly uniform.

Actually the world is not running so quietly. The current realities show that, most often, $\delta(\mathbf{v}_{et} + \mathbf{v}_m) \neq 0$ is the rule. The explanatory cause of the so observed inequality is the intervention of the electromagnetic phenomena, and this at two levels of manifestation: one by macroscopic electromagnetic fields, the other by material restraints – in fact it is the same manifestation at a microscopic level.

To get a useful and generally valid statement, one has to specify the value of the inequality. Here also copying Newton, in essence his second principle of mechanics, is useful: one defines a specific electromagnetic force – specific in that its value refers to the unity of mass of the implied body – which acts on the not freely moving body considered. By that, one obtains the most general principle of mechanics at the macroscopic level, *i.e.*:

$$\delta(\mathbf{v}_{et} + \mathbf{v}_m) = F_{em}/m$$

where m means the mass of the body acted upon.

Perhaps interesting to observe is the fact that that choosing to define a single constant, m, specifically linked to the electromagnetic phenomena, rather than to adopt two distinct constants linked respectively to $\mathbf{v}_{et}$ and $\mathbf{v}_m$ – in intent of a more extended hypothetical generality – may explain the observed fact of reality, *i.e.* the *perfect equality in value of the inertial and gravitational masses*. That fact was experimentally confirmed (*e.g.* Oetovos) and assumed as a principle by Albert Einstein.

That last conclusion is not deductive. It is more like the result of a philosophical trend – in the etymologic sense of *esthetic thinking* – particularly in 'principializing' (sorry for the invented term).

Interesting also may be to see that the above-adopted way of thinking somehow follows Ives recommendation to operate in theory only with materially instrumental realities. Acceptance of

the idea of a really-existing ether, intuitively understandable, is a step forward in that direction.

Intending to initiate researches to test the so-framed philosophy, the author submitted for publication a set of three theoretical studies [23], [24], [25], with some specific astronomical observations.

Searching for an Ether-Determined Universe

The above made suggestions aim, visibly, at 'igniting' the search for a wholly consistent and coherent ether theory. To be coherent the theory should consider the ether as part of our Universe and, as such, part in the big-bang phenomenon as this could have been. Most likely the ether should be conceived as an exotic kind of gaseous medium expanding with the whole Universe in a yet unknown, still compulsorily well defined way.

Why should we think so?

Mostly because of the galaxies' red-shifting phenomenon – *i.e.* the Hubble effect – which is a non-contestable reality of our world. And because its explanation by a ***Time****-stretching* effect – the solution adopted by the General Relativity's fans – is not quite convincing. Its explanation in terms of an ***ether****-stretching* phenomenon – a phenomenon proper to an expanding *bubble-like* Universe - is much more easily comprehensible.

In the above adopted mode of thinking, in essence the above 1-4.b assumptions, the cosmos's evolution may be looked at as determined by the ether's own conditionings. If so, it is the very mode in which the cosmic ether-bubble expands who will set, *implicatum modo*, the stage on how inertia and gravitation will generate the whole cosmos' structure and kinematics. By that, if the ether hypothesis is seriously taken into consideration, the field of possible by cause/effect explanatory factors should be so enriched it could explain the expansion between galaxies in its now evident very wide complexity. A cunningly imagined ether-based model of the Universe may, perhaps, lead to extended answers.

Is this a too daring program?

Daring it certainly is. Even much so if one becomes conscious that the model imperatively requests an answer to the now so long asked question**:** What is the true meaning of *Time*? Not simply what time it is, but what *Time*, as a *categorical concept,* really means. **What** *Time* **really means.**

About the Concept of *Time*

Answers to that question were worked out on different thinking bases**:** personal feeling, belief, arbitrary assessment, astronomy indication, phenomenological norm or device's indication *etc*.

As for the author, his strong belief is that *Time*, as a conceptual category, is nothing more than a *mathematical parameter*.

That assessment is substantiated by taking into account that, in Fitzgerald, Lorentz-Poincaré and Ives's *physics* – well known to be framed in **absolute** space and time – the positions of material-parts are in any event expressed as *time*-dependent, the time-coordinate being assumed as the *independent variable*. Now, reversing the description –in essence by considering as *independent variable* the position-coordinate on its trajectory of **any one** of the items before expressed as temporally-evolving – one may describe the Universe's evolution in terms of that new independent variable of a spatial nature. In that case the time becomes the dependent variable, *i.e.* a simple abstract facility to correlate, in theory, the different events. Because no condition is imposed on the choice of the phenomenon producing the descriptive parameter which is considered as replacing the classical time, it results that the evolution of the Universe may be described using any one of the space coordinates usually considered as time dependent. A holistic view approach shows that essential in the endeavor to understand – by means of cause-to-effect links – the ambient phenomena, the spatial configuration of matter constitutes the key criteria. And, by consequence, it also shows that *Time* is, essentially, only a **convenient** *descriptive parameter* proper to theoretical physics and to mathematics, even if practically perceived and largely conceptualized as simple indications of variously adequate devices.

Framed in the here-assumed philosophy, the notion of ***Time*** appears as a ghost-like tool allowing a coherent and unitary, **description** – or modeling – of the phenomena in our Universe.

In that way perceived, *Time* loses its characteristic of **fundamental category,** merely becoming a mathematical notion definable, in practice, in innumerable specific modes by linking it to one arbitrarily chosen natural phenomenon. If so seen, *Time* is definable in as many forms as one may imagine – or define – by linking it to a particular phenomenon *evolving continuously and coherently* with the evolution of the Universe. The so-assumed *ad-libitum*-definable *Times* are convertible – by adequate transform-equations – to an as-wise-as-possible **absolute time,** which, indeed, will be a purely abstract notion, arbitrarily defined.

The ultimate conclusion coming from such a mind set – or personal philosophy – is that, if accepted and/or confirmed, causality will have its roots coming out from the very configurations of the distribution of mater in the physical-geometric classic *three-dimensional space*.

Is the above synthesis acceptable?

To believe and hope is human. But to believe is not at will. It is, perhaps, a gift – in some cases a sentence – of God.

6. A Model for a Universe Built by Ether

If venturing to believe our world may run on some fluid-ether determinations, the forwarded model should care explaining the origin of the Universe, beginnings and evolution phenomenology.

Trying to imagine such a theoretical model, one may suppose that the beginning of the Universe would have been of a Big-Bang type – as currently assumed. In that intent, one may imagine a bubble of ether which

a_1) is expanding into some externally preexisting geometric space**;** more precisely: expanding in a given geometric space and, by exactly that, creating *Time*.

What does that mean?

Let's say it is an image as in a school-boy's fairy-tale. Dare we pretend to know better?

Let's further suppose that, into the so imagined expanding ether-bubble, matter

b_1) is created continuously in the same – or in a similar – manner the Big-Bang theory assumes,

b_2) the so appearing matter evolves, by inertia and by gravitation, towards the aggregated celestial bodies we now observe**;** in fact, as material structures in cosmos – stars, galaxies, globular clusters *etc.* – most of them light emitting sources.

Part of the so emitted light – propagating in, or on, the ether – reaches us and, eventually, creates local images of far away material sources.

Indeed, all the so obtained images will be marked by the Hubble phenomenon.

In a so conceived model, how would the undoubtedly real Hubble effect be explained?

Most simply**:** interpreting the reddening of all incoming light from distant sources in Cosmos as influence of a "light-stretching" process determined by the ether's expansion.

Yet that very explanation calls for a clarification**:** is the ether-bubble expansion a phenomenon determined by

c_1) a continuous inflow from a to be imagined contiguous source,

c_2) or is it the consequence of a quasi-instantaneous delivery of super-dense ether .and its afterwards free expansion?

It seems important to observe that the Hubble Effect, as above understood, *imposes* the adoption of the second hypothesis *i.e.* c_2 . By that, the wave-length of any particular train of electromagnetic waves carried by the ether-continuum should grow continuously, wherever and whenever observed.

But how, and how much?

Essentially, in the way imposed by three significant factors, namely**:**

d_1) the mode in which the bubble is expanding**;** more precisely**:** as imposed by the ether's speeds distribution in the expanding bubble,

d_2) the ether-stretch value integrated all along the wave's whole path,

d_3) the waves propagation speeds relative to the local ether**;** "speed**s**" because one may not assume – by an *a priori* decision – the speed of light to be **ever** and **everywhere** the same.

Now, a more general question**:** is the Universe really **bound** to be expanding?

In the hypotheses assumed here, it must be so because**:**

e_1) the Hubble effect is a proven reality,

e_2) because of that and of the assumptions 2 and 3 from Section **5** – namely that matter aggregates, locally and continuously, into the ether field – all celestial bodies will have to follow, nearly, the *local ether movement*. That means they shall spread out in a more or less common movement with the local ether.

The above assumptions also implies that, if **e_2** is taken as true, one may wonder if the spiral shape shown by most of the galaxies is not due – in part or quite entirely – to the presence of gigantic vortexes in the ether field of flow and not only to gravitation. A hypothesis linked to the questionable supposition the ether may be viscous.

The next problem to be thought of is the extent of the so-imagined Universe. Based on the above assumed premises one may suppose that the boundary of the expanding ether-bubble must depend on**:**

f_1) the ether's velocity when out-flowing from its early singularity and also its eventual mode of afterwards local expansion,

f_2) the time ran between the "ether's big-bang" and the current state of expansion,

f_3) the rhythm of gravitational-mass generation (stars, planets galaxies etc.) and the distribution of the ether's density into the expanding bubble.

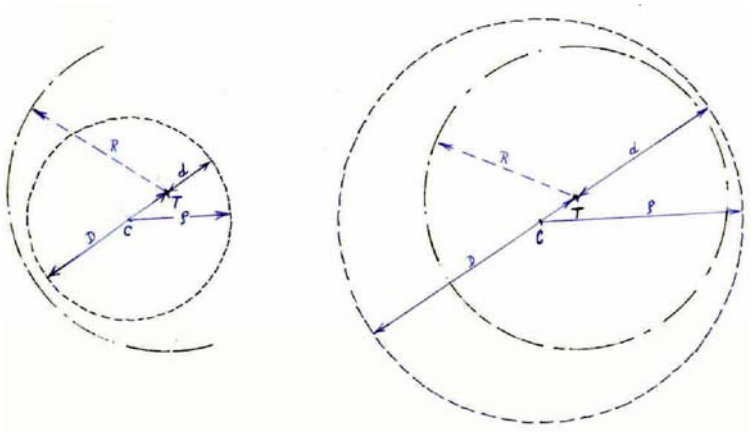
The so imagined hypotheses raise the question**:** How would the cosmos show itself if looked at from the earth imagined situated somewhere and sometime into the bubble?

Principally, two possible situations are to be considered**:**

1) If the Earth stays near the center of the expanding bubble the heaven will look evenly populated in all azimuths, whatever the time elapsed from the beginnings,

2) If the earth's position falls far from the bubbles' center and the cosmos is investigated not to long after its birth, the heaven may seem more densely populated towards the bubble's far border and less populated on the other side (Fig. 1.a).

Having no strong motives to assume the earth to be situated somewhere near the center of the Universe, and also observing that the celestial bodies are evenly distributed in all azimuths, the simplest explanatory hypothesis imaginable seems to be that the actual 'bubbled Universe' is significantly larger than the limited part our instruments are able to show (Fig. 1.b). Obviously the Hubble reddening affecting ancient stellar light could be the principal cause of that limitation. In consequence of such a truncation the seen part of the Universe will show a somehow even distribution of celestial bodies in all azimuths.



a) $D > d\ ,\ D + d < 2R$ **b)** $D > d\ ,\ D + d > 2R$

Figure 1. Assumed position of Earth in the ether bubble. **T** – Earth's position in bubble; **C** – bubble's center; ρ – bubble's radius; **R** – range of our instrumented perception

The evident conclusion to the hypotheses $\mathbf{a_1}$ to $\mathbf{f_3}$ is that a much deeper understandinglaws governing the ether's density, local and of the ether's intimate determinism, *i.e*. at the microcosm's level, is needed in view to con-general expanding speed as well as the figure a really consistent macroscopic model able to explain the mechanics of the Uni-rhythm of matter generation and its distribuverse. The author's ability goes no further than the above suggestions. A real under-tion inside the bubble.
standing of the Universe, if so imagined, is conditioned by an explicit formulation of the

7. Conclusions

The subject approached here is so general and, if analyzed in depth, so demanding, that the author was driven to a binary conclusion**:** the first one, an inference impregnated with doubt**;** the second one pleading for a more prudent approach to a so-demanding subject. In fact they are**:**

1) The author remains in doubt if he also, by ***prying into such holy matters, is not indiscreet.*** (In the author's country, the same saying is**:** *is he not whistling in the church?*).

2) He who tries to elaborate in physics, if dreaming to reach a deeper understanding of the world, should care not to overestimate his own stature.

Or, more concisely:

Acknowledgment

The author is grateful to Dr Cynthia Whitney for warning him of wrong formulae in his manuscript.

References

[1] *La Recherche*, Mensuel, nº 326, 1999.

[2] Sandra F. Witelson, Debra L. Kigar, Thomas Harvey. *L'exceptionnel cerveau d'Einstein*. În: *La Recherche*, nr. 326 (1999), p. 31. Reproduced, în translation, The Lancet, no. 353 (1999).

[3] B.E. Tomlison, "Ageing and the Dementias", in Greenfield's **Neuropathology**, 5th Ed. (Edward Arnold, London, 1992); see p. 33 in [2].

[4] Wiliam H. Calvin. *Par-delà les scisures et les sillons*. In: *La Recherche*, nr.326, 1999, p.42-43.

[5] S.F. Witelson and D.I. Kigar, **Handbook of Neuropsychology**, vol. I (Amsterdam, Elsevier Science, 1983), see [2].

[6] M.C. Diamond *et al*., Exp. Neurol. **88**, 198-204 (1985); see N. Chevassus-au-Louis, *La Recherche* 1999, no. 326, p.38.

[7] Anderson & T. Harvey, Neurosci. Lett. **210**, 161-164, 1996; see *La Recherche* 1999, no. 326, p.38.

[8] **The EINSTEIN Myth and the IVES Papers**. Edited and commented by Richard Hazelett and Dean Turner (The Devin-Adair Company, Publishers. Old Greenwich, Connecticut, 1979).

[9] Albert Einstein, "Ether and the Theory of Relativity", an address delivered on May 5th, 1920, in the University of Leiden. «http://www.tu-harburg.de/rzt/rzt/it/Ether.html»

[10] Albert Einstein, "Elektrodynamik bewegter Körper," *Annalen der Physik* **17**, 891-921 (1905).

[11] Herbert E. Ives. "The Fitzgerald Contraction", pp. 9-26 in: Scientific Proceedings of the Royal Dublin Society, new series, 26 (1952), reprinted in [8].

[12] C.D. Jefimenko. **Causality, Electromagnetic Induction and Gravitation** (Electret Scientific Company, Star City, 1992).

[13] J. Larmor, **Aether and Matter**, (Cambridge, 1900), See [8].

[14] H.A. Lorentz, **The Theory of Electrons**.

[15] H.E. Ives, Historical note on the rate of a moving atomic clock. In *Journal of the Optical Society of America*, **37**, 810-813 (1947), reprinted in [8].

[16] H. Poincaré. Sur la dynamique de l'électron, *Comptes Rendus*, 140 (1905), idem *Rendiconti*, **21**, (1906).

[17] H.E. Ives, "The measurement of light by signals sent in one direction", Journal of the Optical Society of America, **38**, 879-884 (1948), reprinted in [8].

[18] H.E. Ives, "Extrapolation from the Michelson-Morely Experiment", Journal of the Optical Society of America, **40**, .185-191 (1950), reprinted in [8].

[19] H.E. Ives, "Lorentz-Type Transformations as Derived from Performable Rod and Clock Operations", Journal of the Optical Society of America, **39**, 757-761 (1949), reprinted in [8].

[20] H.E. Ives, "Revisions of the Lorentz transformations", Proceedings of the American Philosophical Society **95**, 125-131 (1951), reprinted in [8].

[21] H.E. Ives and G.R. Stilwell. "An Experimental Study of the Rate of a Moving Atomic Clock. I", Journal of the Optical Society of America, **28**, 215-226, (1938).

[22] H.E. Ives and G.R. Stilwell, "An Experimental Study of the Rate of a Moving Atomic Clock. II", Journal of the Optical Society of America, **31**, 369-374 (1941).

[23] D. Romalo. "On This, Till Now, So Shy Universal Ether", presented in absentia, at the 12th Annual Conference of the Natural Philosophy Alliance (NPA). Abstract in: NPA Newsletter, April 18, 2005.

[24] D. Romalo. "Most Elementarily-Intuitive, Tentative Approach to Evaluate the Bending of a Light-Ray Pasing a Black Hole", presented *in absentia*, at the 12th Annual Conference of the Natural Phi-

losophy Alliance (NPA), Abstract in: NPA Newsletter, April 18, 2005.

[25] D. Romalo. "Questioning Einstein's Relativity Logic", in review for publication in Galilean Electrodynamics.

[26] Dean Turner, "A Scientific Priesthood", In [8], part I, pp. 84-85.

[27] Cf. [8], part I pp.109-110, note 137.