W.A.R. vs. AIAS

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Abstract

In this paper I show that Myron Evans' - representing AIAS - commentary in reference to a paper that I authored with A.L. Trovon de Carvalho entitled: "The non sequitur mathematics and physics of the 'New Electrodynamics' proposed by the AIAS group", published in the journal *Random Operators and Stochastic Equations* **9,** 161-206 (2001), can be classified as: (i) mathematical and/or physical nonsense and fallacies, (ii) lies. Detailed proofs of the above statements will be given due to the fact that Evans and the AIAS group have succeeded in publishing in some journals (including, e.g., *Found. Phys. Lett., Optik, Physica A* and *B*, etc.) a remarkable potpourri of nonsense mathematics and physics. Most recently Evans has announced widely that new papers are in publication and others are submitted. Among the many lies told by Evans - representing AIAS - is that of the paternity of the superluminal X-waves solutions of the homogeneous and Maxwell wave equations. This issue is discussed in an Appendix.

1 Introduction

In this paper we show that almost all the comments [1] of Evans, representing AIAS, on a paper[1] [2] that I authored with my former Ph.D. student, Dr. A.L. Trovon de Carvalho, entitled: "The non sequitur mathematics and physics of the 'New Electrodynamics' proposed by the AIAS group", published in the journal *Random Operators and Stochastic Equations* **9,** 161-206 (2001), can be classified as: (i) mathematical and/or physical nonsense, (ii) lies. Detailed proofs of the above statements are given because Evans and the AIAS group have succeeded in publishing in, e.g., *Found. Phys. Lett., Optik, Physica A* and B, etc., a remarkable potpourri of nonsense mathematics and physics. Further, and most

[1] In [2] a hard criticism is given on a series of papers published in [55] and also other papers of the AIAS published in other journals and books.

recently, AIAS/Evans has announced that new papers are in publication and others are submitted.

Evans' AIAS paper has two parts. In the first he claims to have found 26 errors in [2]. However, he is unable to identify a single mathematical or physical error, choosing instead to focus on spelling errors and a grammatical error, for which I apologize.

In doing so, however, I wish to explain that English is not my mother language and if spelling and grammatical errors are to be brought into scientific work as a criterion for good science, then most of the authors of published scientific papers will be, in the view of AIAS-Evans, guilty of "bad science." (This present paper has an English editor so that I may be certain of conveying my point with a minimum of difficulty.)

Traditionally, scientific papers in Mathematics and Physics have rested most securely on a foundation of good Mathematics and Logic, not the judgments of the "grammar police."

Therefore, I do not think that the grammatical errors are evidence of any confusion concerning the mathematics and physics of [2], whose title announces its purpose. Indeed, in that paper, the genesis of which is described in its introduction, we reviewed several papers[2] published by AIAS group on a 'new electrodynamics' showing that the members of the AIAS group are incompetent in both Mathematics and Physics.

What is more, their continued efforts to vigorously push their incompetent work - including the vicious and aggressive way in which they do it - is leading to the obvious conclusion that they are dishonest and unethical as well.

That is the conclusion I state here and I am confident that those readers who are competent in the disciplines, after reading [1, 2, 3, 4, 5], and the present note will come to the same conclusion.

The second part of [1] (section 3) is called "Generally Covariant Equations of Electrodynamics". It is nothing more than a synopsis of other papers [3, 4, 5] and as the competent reader can determine, is a completely non sequitur collection of mathematical formulas, almost all of them being wrong. I prove this statement by writing the *correct* wave equations satisfied:

(a) by the tetrad fields generating a metric $g \in \sec T_0^2 M$ of a oriented and time oriented Lorentzian manifold M equipped with the Levi-Civita connection D of g and which satisfies Einstein's equation.

(b) by a 1-form field $A \in \sec \bigwedge^1 M$ representing the electromagnetic potential of the standard $U(1)$ theory of electrodynamics.

Before proceeding the reader may like to observe that the first error in [1] refers to the title of the journal where [2] has been published. It must be as above and not as written in [1]: "Random Optics and Stochastic Equations". The second observation to be noted is that Evans quotes taken from [2] in [1] refer to a pdf version of [2] (printed in letter paper)that he download from arXiv:physics/0302016.

[2] Some of those papers have been submitted to Found. Phys. I have been the referee and (of course) rejected the papers. Paper [2] is an expanded version of my referee's report.

I would like to bring to the readers attention the observation that [2] criticizes other authors in addition to the members of the AIAS group, as, e.g., Barrett due to his non sequitur papers [24, 25, 27, 26, 28] whose results have been used by the AIAS authors. However [2] is not only critical, it presents several new issues and mathematical tools. The table of contents which appears on arXiv:physics/0302016 reads as follows:

We come now to the delicate issue of *lies* in [1]. I wish to approach this subject as a scientist. 'Lie' is a harsh word. It ought never to be asserted casually, most particularly in scientific debate. Scientists, as a rule, are a breed apart from other people, able to criticize and debate one another's ideas, all in the interests of good science and truth. Scientists can be wrong; they can make mistakes; that is part of the history of science. Scientists generally do not charge a mistake as being a lie. Rather, they prefer to consider repeated errors among a member of the community as a 'mental aberration' or a 'quirk' or even some borderline mental illness that often accompanies genius.

We are not talking about any of those things here. A lie is defined as 'to make a statement that one knows is false, especially with intent to deceive; to make such statements habitually; to give a false impresion; anything that gives or is meant to give a false impression.' While I would like to find another explanation for the statements of AIAS as a group, and Evans in particular, when we look at several of the statements made by Evans, and then examine the proofs, I believe the reader will agree that the definition of 'lie' is entirely applicable. I will leave it to the reader - or his therapist - to determine whether or not Evans' lies are conscious or unconscious. In either case, lies are a disaster for science.

One of the claims made by AIAS-Evans is that [2] was published only as my own propaganda for superluminal X-waves, but that the discovery of these waves cannot be attributed to me as I claimed, but must be attributed to Barut, Recami and Maccarrone [6].

Why is this a lie?

For the simple reason that I *never* claimed to be the discoverer of the superluminal solutions of the homogeneous wave equation called X- waves, and this is explicitly stated in many papers [7, 8, 9, 10, 11, 12, 13, 14, 15, 16]!

Did Evans and other members of AIAS fail to read those parts of the papers they claim to know so well as to pronounce them propaganda for a claim explicity stated to be otherwise?

For example: I did state in [2] is that I found that *all* linear relativistic wave equations possess arbitrary speed ($0 \leq v/c < \infty$) solutions which are undistorted progressive waves (*UPWs).* In particular in [9] (a paper that I wrote with J. Y. Lu), the results of the first experiment showing that peaks of finite aperture approximations of *acoustical* X-waves can travel [3] with $v/c_s > 1$ are given.

The real discoverers of X-waves are J.Y. Lu and J. F. Greenleaf [17, 18].

Paper [6] has nothing to do with scalar or electromagnetic X-waves. There, a doubtful theory is utilized to attempt to show (see my criticisms in [12]) that the appearance of the shape of a tachyon (which when at rest in a "superluminal frame" has the form of a ball) is an hyperboloid as seen by any inertial bradyonic observer. Thus we see that Recami's claim in [19] that on the basis of [6] he predicts the existence of X-waves must be considered a joke. I have explicitly stated thus in [2].

Moreover, I have further stated that [19] is essentially plagiarized from a preprint (ref. 5 in [9]) written by Lu and Greenleaf which was never published. The reader can easily satisfy the call for proof of this statement by reading the letter that I sent to Professor Chapel, editor of *Physica A* in 1998, which is included as Appendix[4].

Many more details on superluminal wave motion and X-waves will be made available in a book that I have written with E. Capelas de Oliveira that will be published by Springer-Verlag by mid-2004 [16].

2 Comments on the supposed errors found by AIAS-Evans in [2]

In what follows my comments are numbered in order to correspond to the numbered comments of section 2 of [1]

1. AIAS-Evans claims that my statement in [2] that the group $U(1)$ is not isomorphic to the group $O(2)$ is wrong. He quotes that in Ryder's book (second edition) [20] it is written that $U(1) \approx O(2)$.

[3] c_s is the speed of sound, i.e., the velocity parameter appearing in the homogeneous wave equations

[4] All documents quoted in that letter are available upon request.

However I have the second edition of Ryder's book and on pages 92 and 105 it is stated that $SO(2) \approx U(1)$. On page 95 I could not find any statement as quoted by AIAS-Evans.

As an aside, I will point out that Ryder's book contains wrong statements concerning the groups $SU(2)$ and $O(3)$. This will be discussed in **10** below.

Now, $U(1)$ cannot be isomorphic to $O(2)$ for the simple reason that $O(2)$ is not connected. The connected component to the identity element is $SO(2)$. It is trivial as shown in many books, e.g., in Frankel's book [21], that both groups, $U(1)$ and $SO(2)$, as topological spaces are the unit circle in the plane, and as such there is a bijective correspondence (a 1-1 onto map), i.e., they are isomorphic. This result then implies that since $O(2)$ is disconnected, it is impossible to have a bijective correspondence between $U(1)$ and $O(2)$.■

2. AIAS-Evans has said that I claimed incorrectly in [2] that longitudinal components of vacuum electromagnetic radiation can be described by a $U(1)$ group.

What was actually claimed by me was that there are infinitely many families of *exact* solutions of Maxwell equations in vacuum (which as well known can be put in the form of a $U(1)$ gauge theory) which will have *longitudinal electric and/or magnetic* components. I explicitly exhibited many solutions of this kind in ([7]-[16]).

The remainder of AIAS-Evans comment no. 2 shows explicitly that he does not understand - even up to the present moment - the meaning of the $U(1)$ group in the standard theory of electrodynamics. He confuses the abstract gauge transformation associated with $U(1) \approx SO(2)$ with rotations in a plane in real physical space. This confusion is compounded and exacerbated in his papers and papers of AIAS groups to the point that nothing correct remains and his theories become simply an ongoing set of absurdities as proved in [2].

More on some new absurdities of recent papers [1, 3, 4, 5] will be discussed below.

3. AIAS-Evans has said that I claimed in [2] that classical electrodynamics cannot be a Yang Mills gauge theory ($YMGT$).

Now, $YMGT$ are usually associated with non abelian gauge groups and what I actually claimed is that standard electrodynamics in a vacuum is an abelian gauge theory. I even described the gauge theory of classical electrodynamics in detail in a section of [2]. Of course, the intrinsic presentation of electrodynamics in terms of of the operators d and δ (differential and Hodge codiferential) or the Dirac operator $\partial = (d - \delta)$ is, when understood properly, that is when diffeomorphisms carry the metric structure as well, diffeomorphicaly invariant (generally covariant) contrary to statement by AIAS-Evans. Maxwell equation (no misprint) becomes $\partial F = J$, where $F \in \sec \bigwedge^2 M \subset \sec \mathcal{C}\ell(M, g)$, where F is the electromagnetic field, $\mathcal{C}\ell(M, g)$ is the Clifford bundle of spacetime and $J \in \sec \bigwedge^1 M \subset \sec \mathcal{C}\ell(M, g)$ is the electromagnetic current.

4. Comment **2** answer this comment.

5. AIAS-Evans said that I claimed in [2] that *his* $O(3)$ gauge theory can reduce to a $U(1)$ gauge theory.

The fact is that I never claimed that.

What I did was to show that the proposed $O(3)$ gauge theory of the AIAS group is completely misleading. Competent Mathematicians and Physicists, with knowledge of gauge theories, will agree with my statement.

6. AIAS-Evans wrote that I claimed incorrectly in [2] that the "Maxwell Equations"(sic) possess exact solutions corresponding to electromagnetic "fields configurations"(sic) in vacuum (sic) that can "move with arbitrary speeds" (sic). He said that my sentence is scientifically and grammatically incorrect because the Maxwell Heaviside field theory is by definition a $U(1)$ symmetry gauge theory in which the electromagnetic waves in vacuum are transverse to the axis of propagation, and which always move at the speed of light in vacuum

Well, my sentence may be grammatically incorrect, but my statement is still correct. AIAS-Evans statement simply displays his ignorance of the papers ([7],[16]) and even the paper [19] of his friend (?) E. Recami. I will have more to say about Recami's paper [19] below.

AIAS-Evans has also said that in [2] I postulated subluminal and superluminal solutions of Maxwell equations and that I claimed that these solutions are *physical*.

This is getting repetitious, but again, the fact is that I never said that. And even though it is repetitious, I will again say that there is no other solution for Evans' claims than to conclude that they are lies. Simple mathematical operation. As to whether or not Evans is deliberately or unconsciously lying, I cannot say.

What I did say is that finite aperture approximations to these superluminal electromagnetic waves have been launched in physical space and it has been experimentally verified [22, 23] that their peaks travel at superluminal speeds. The reason for that is a generalized reshaping phenomenon that exists even in vacuum and which is described in my papers [13, 14, 15].

Also, in the case of sound waves, as quoted in the introduction, an analogous phenomenon has been observed for the first time on an experiment done in 1997 and reported in [9], a paper that I wrote with J. Y. Lu, which together with J. F. Greenleaf are the real discoverers of the X-waves [17, 18].

AIAS-Evans claims furthermore that "the inference of X waves was made originally by Barut and Recami [6], not by Rodrigues, as apparently claimed in ref. [1]."

Tediously, I never claimed that, and I here state that this claim is a lie.

I have already said, in the introduction, that Recami and Barut findings have nothing to do with X-waves, despite the fact that Recami tried in [19] to hypnotize his readers into believing that he and Barut are the discoverers of X-waves.

Recami's claim is a non sequitur, as I note in [2] and I also discuss that issue with more details in [12]. In that paper, I also corrected a crucial error concerning the claim that Schrödinger equations have X-wave solutions, that

Recami forgot to correct when plagiarizing the paper of Lu and Greenleaf in [9]. More about that entertaining episode can be found in the Appendix where I reproduce a letter that I wrote in 1998 to Professor Chapel, editor of *Physica A*, where [19] has been published.

In all fairness, I must mention that in the last few years Recami and collaborators have published some good papers [29, 30, 31, 32, 33] on superluminal wave solutions of the wave equations. Unfortunately, however, he and his collaborators have yet to understand that there is a crucial distinction between solutions of the wave equation and solutions that can represent physical signals. This important point is discussed in ([13]-[15]) and with many more details in my forthcoming book (with E. Capelas de Oliveira) that will be published by Springer Verlag [16].

7. I claimed that Whitakker's theory of electromagnetism is a particular case of Hertz potentials theory. Evans has said that this may or may not be true.

The fact is: I proved my statement and I even gave in [2] a new approach to Hertz theory that has recently been used in my paper on the relationship between Maxwell, Dirac and the Seiberg-Witten equations [34].

AIAS-Evans has said that my statement is irrelevant to the published work of the AIAS.

This is an unfortunate circumstance considering the stated focus of AIAS. As it happens, I went to some length in [2] to develop Hertz theory to show that Maxwell equations have solutions with longitudinal components in a vacuum.

8. AIAS-Evans has said that it is claimed surprisingly in [2] that "Our claim is not to discuss if (sic) the concept of the $\mathbf{B}(3)$ field is of some utility to physical science". He then said: "If so, whither physical science? One wonders what purpose the authors of [2] have in mind".

So far, Evans has mis-stated, mis-quoted and outright lied about everything we have discussed here. Now we come to a point where he also quotes out of context.

In section 2 of [2] it is shown following [35] that the $\mathbf{B}(3)$ field as introduced originally by Evans [36] is related to the third Stokes parameter.

Is this detail *important* to physical science?

This is a question that is not discussed in [2], whose real purpose was to denounce the scientific fraud of the AIAS group. However, somewhere in [2] patience was lost and it is stated that $\mathbf{B}(3)$ field is completely superfluous and irrelevant. I continue to have this point of view, until some proof is given to the contrary.

9. As said in **8** I stated that $\mathbf{B}(3)$ field is completely superfluous and irrelevant. Evans said in this respect: "In objective science however, the $\mathbf{B}(3)$ field is a repeatable and reproducible observable of for example the inverse Faraday effect (2-10), and of physical optics (1), and the $\mathbf{B}(3)$ field is a key to general covariance of electrodynamics (11,12)".

Now, the references quoted by Evans refers to papers by him and associates. As mentioned in [2], in papers [38, 39], Hunter shows that results from real

experiments (e.g., [40, 41]) do not endorse Evans point of view concerning the meaning of $\mathbf{B}(3)$. It is quite true that Evans referred to Hunter, and in this context see my comment **19** below. Evans statement that $\mathbf{B}(3)$ is a key to general covariance of electrodynamics is a non sequitur as I already discussed in **3**.

10. Here I will quote Evans' entire comment 10:

"It is claimed incorrectly that $SU(2)$ cannot be the covering group of $O(3)$, whereas on page 432 of ref. (13) it is stated that "The group space of $O(3)$ is obtained from that of $SU(2)$ by identifying opposite points on the 3-space, S^3, since they correspond to the same $O(3)$ transformation". It is typical of the unscientific material published in ref. (1) that having made these incorrect and obscure claims, all AIAS members of staff are branded as 'incompetent'. One wonders whether the authors (1) have a dictionary, i.e., know the meaning of the word, or have a mirror at hand, i.e., ever look at themselves".

Now, as it is stated in [2] every competent mathematician or physicist knows $SU(2)$ is the *universal* covering group of $SO(3)$, not of $O(3)$. The operative term here is "competent."

What seems to be the case is that Evans and AIAS - in addition to being incompetent and propagating lies - do not know the meaning of the word "covering" and it would certainly be a good idea that they go immediately and purchase a good mathematical dictionary. And, while they are at it, they should definitely obtain a few good books on Mathematical Physics. For their benefit, since most readers of this discussion will already know it, here, from ([21]

Definition 1 *A connected space $\bar{M}$ is said to be the covering of a connected space M, with covering or projection map $f : \bar{M} \to M$ if each $p \in M$ has a neighborhood U such that the preimage $f^{-1}(U)$ consists of disjoint open sets $\{U_\alpha\}$ of $\bar{M}$, each diffeomorphic under $f : U_\alpha \to U$.*

It is not necessary to give here the definition of a universal covering space (see, e.g., page 570 of [21]) to understand why $SU(2)$ cannot be the covering group of $O(3)$. The reason is that $O(3)$ is not connected and thus does not satisfy the requirements of the definition.

Now, ref. (13) quoted by Evans is from Ryder's book [20], and indeed Ryder's statement is *unfortunately* incorrect as further investigation has demonstrated. This incorrect statement appears in many physics books. In addition to the error in Ryder's book I also read the wrong statement on page 47 of [57].

Now, even if English is not my mother language, I know very well the meaning of the word "incompetent". It is a word that certainly applies more appropriately to Evans and the other members of the AIAS group.

And finally, I have indeed, a mirror on my office. It is a magical one. I just ask it: who is the biggest crackpot of them all?

The answer the mirror gave me: Myron Evans.

11. In his comment 11 Evans said that "it is not made clear in (1) that Recami and Barut (16) inferred X-waves and not Rodrigues."

Now, Evans ref. (1) is of course, [2]. Evans ref. (16) consists of two papers: [6] and a paper by F. Cardone and R. Mignani appearing in [56], which according to Evans contains the TRUE history of X-waves.

Well, I did not read the paper, but I wrote directly to Dr. Mignani, asking him what he claimed as being the true history of X-waves, and he answered as follows :

"I never stated that Recami discovered X-waves. I only acknowledge that (years before the interest for the X-waves, and their superluminal behavior) he established (in his paper with Barut and Maccarrone) an intriguing connection between tachyons and X-shaped objects. On the other hand, Recami always stressed this connection but never stated (at least officially) that he discovered X-waves."

Having already discussed this issue of the X-waves above, I only ask the reader of this paper to examine the letter in the Appendix which I sent in 1998 to Professor Chapel, concerning paper [19].

12. See **8** and **9** above.

Contrary to what Evans claims I did not claim that the longitudinal components of the *exact* electromagnetic X-waves are observable. The reason is that (as discussed extensively in my papers [13, 14, 15]) the exact solutions are like plane waves, i.e., have infinite energy and cannot be produced in the physical world. However finite aperture approximations to these waves can and indeed have been produced, at least in two experiments [22, 23]. Moreover, as predicted their peaks travel for a while with superluminal speeds. The mechanism behind this phenomenon is called *reshaping*. It is discussed in ([13]-[15]) and more in my forthcoming Springer-Verlag book [16].

13. In his note 13 it is said that it is stated incorrectly in my paper [2] that the well-known longitudinal and time-like photons of Gupta and Bleuler do not have "a physical status"(sic).

Evans claims that "on the contrary, the observable $\mathbf{B}(3)$ field when quantized become the photomagneton, and is essentially the longitudinal photon (2-10)".

Well, I refer to physical status as real particles. And indeed I said explicitly in [2] that longitudinal and timelike photons in Gupta and Bleuler theory have only mathematical status in my view, used to produce a covariant description of quantum electrodynamics.

Now, Evans statement that $\mathbf{B}(3)$ field when quantized is essentially the longitudinal photon is nothing more than wishful thinking.

14. See **8** and **9** above.

15. Evans said : "It is claimed subjectively in [2] that the fundamental $\mathbf{B}(3)$ component of the generally covariant electrodynamics is "sheer nonsense" and "simply wrong". If so, general relativity is sheer nonsense and simply wrong. Whither physical science?"

When I maintain that Evans theory as presented in his papers with the AIAS group is sheer nonsense and simply wrong, this does not imply that it can be

inferred that general relativity is sheer nonsense and simply wrong. But Evans statement is important, because it reveals the kind of "logic" that he uses. With that logic, Snow White, because she associates with 7 dwarves, must also be a dwarf.

16. Evans said that I quote Silverman [35] out of context. This is not the case and it is worthwhile to quote Silverman again[5]:

"Expression 34 is specially interesting, for it is not, in my experience, a particularly well-known relation. Indeed, it is sufficiently obscure that in recent years an extensive scientific literature has developed examining in minute detail the far reaching electrodynamic, quantum, and cosmological implications of a "new" nonlinear light interaction proportional to $\vec{E}^{(1)}\times\vec{E}^{(2)}$ (deduced by analogy to the Poynting vector $\vec{S} \propto \vec{E}^{(1)}\times\vec{B}^{(2)}$) and interpreted as a "longitudinal magnetic field" carried by the photon. Several books have been written on the subject. Were any of this true, such a radical revision of Maxwellian electrodynamics would of course be highly exciting, but it is regrettably the chimerical product of self-delusion—just like the "discovery" of N-Rays in the early 1900s. (During the period 1903-1906 some 120 trained scientists published almost 300 papers on the origins and characteristics of a totally spurious radiation first reported by a french scientist, René Blondlot)."

I said in [2] that, of course, Silverman was referring to Evans, which with some colleagues (the AIAS group) succeeded in publishing several books edited by leading publishing houses and also so many papers even in respectable physical journals.

17. Evans said that in [2] the authors disingenuously quoted Hunter ([38],[39]), but no formal replies to Hunter. Well, this is another of Evans tedious lies. The formal reply that I knew at the time [2] has been written has been quoted. Please, see ref. (78) and footnote 24 in [2].

18. See **8**, **9** and **14.**

19. Evans said that in [2] an incorrect description is made of the following statement by AIAS authors:

> "On the $U(1)$ level there are longitudinal propagating solutions of the potentials $\vec{f}$ and $\vec{g}$, of the vector potential $\vec{A}$ and the Stratton potential $\vec{S}$, but not longitudinal propagating components of the $\vec{E}$ and $\vec{B}$ fields. So, on the $U(1)$ level, any physical effects of longitudinal origin in free space depend on whether or not $\vec{f}$, $\vec{g}$, $\vec{A}$ and $\vec{S}$, are regarded as physical or unphysical".

Well, in [2] it is explicitly shown that: "this conclusion is wrong and results from the fact that the *AIAS* authors could not grasp the elementary mathematics used in Whittaker's paper[2]. Moreover, it is important to quote here

[5] I observe that expression 34 of Silverman is Eq. (12) in [2] and it relates (as explained in [2]) Evans original definition [36] of $\mathbf{B}(3)$ with the third Stokes parameter.

that recently[6] finite aperture approximations to $SEXWs$[19−22] (i.e., superluminal electromagnetic X- waves) have been produced in the laboratory[36] and that these waves, differently from the fictitious $\vec{B}^{(3)}$ field of Evans and Vigier, possess real *longitudinal* electric and/or magnetic components."

Evans said in his comment that AIAS statement should be interpreted to mean that a generally covariant methods are needed for a self-consistent description of electrodynamics. This is again an example of the logic he uses: Snow White et al...

Now, in the rest of his comment Evans makes an accusation. He claims that:

"The motivation behind [2] becomes abundantly clear, it is a diatribe intended to claim subjectively the unverified physical existence of superluminal X-waves, and to dismiss subjectively the many independent experimental and theoretical verifications of the $\mathbf{B}(3)$ field (2-10)".

Well, [2] is not a diatribe to promote X-waves. It is a public denunciation of a scientific fraud and its perpetrators. The reader is invited to give his judgment by reading [2] and the AIAS papers quoted there. The proof of the pudding is in the tasting: simple mathematical operation!

Indeed, in [2] I have exposed a fraud, and those perpetrating it as doing it deliberately which leads to the obvious conclusion that they are not merely incompetent, but dishonest as well. That is certainly not a subjective observation. I have marshalled numerous proofs to support it as an objective phenomenon. Regarding these proofs and exposing fraud in our world, and in the realm of science in particular, I would like to make a few remarks that apply directly to Evans and his colleagues at AIAS.

Proof is a familiar concept to scientists - those used to conventional logical thinking. However what passes for proof in cultural, social, and even legal terms often bears only a superficial resemblance to what would be considered proof by scientists. In mathematics, proof rules are established - postulates are set out and a structure is built based on the postulates and the theorems. Mathematical proof is pretty much inarguable: once a proof is accepted as true it is added to the pool of known truths.

In the social realm, specifically the world of legal proofs, there is a set of rules and a theory which the prosecution presents, and attempts to prove by clever argument. Truth is not the objective. Getting other people to believe the theory IS the objective.

However, the prosecution's theory is whatever the prosecutor believes that he can get away with based on what is known about the case, or what he can prevent from being known. What legal 'proof' does is serve as a structure

[6] The following quotation between " " refers to the original footnote no. 15 in [2], so the references in the quotation are the ones in [2]: "In the first version of the *AIAS* **1** manuscript received by W.A.R. from *Found. Phys.*, E. Recami, one of member of the group (at that time) certainly knew about the results concerning the X-waves quoted above. Indeed, [26] quotes [19,21]. To avoid any misunderstanding let us emphasize here that the finite aperture approximations to $SEXWs$ are such that their peaks can travel (for some time) at superluminal speeds. However since these waves have compact support in the space domain, they have fronts that travel at the speed of light. Thus no violation of the principle of relativity occurs. More details can be found in [37]."

for convincing a group of people of the guilt of a person, about whom they may know nothing. What is more, there is a another significant difference: Mathematical proofs are judged by experts in the particular case who are free to study any and all information about the case. Legal 'proof' is judged by people who are guaranteed to be ignorant of the case, who are only allowed to study the information presented during the formal trial, and who are not even allowed to consult the texts for what the rules say.

The realm of academic science seems to have been invaded by individuals whose approach to science is so drastically different from what has been the established norm for a very long time that we, scientists that is, are ill- prepared to deal with their tactics of the "plausible lie" of the "legal argument" system.

Those who use this unscientific, "legal argument" approach amount to little more than con-artists: the one who is the slickest at using the structure for convincing a group of people of something, is the one who is believed.

Because this "legal argument" system is also a part of our culture, when it invades our scientific work, we normally do not recognize it immediately. As scientists, we have been accustomed to assume that other scientists are - at the very least - trying to do good science. And so, very often, we do not take the time to obtain hard facts by carefully studying any and all information about a situation such as the case of Evans and AIAS. We automatically fall into the cultural assumption that in any conflict, one side is partly right one way, and the other is partly right the other, and that we can form opinions about which side is mostly right or wrong. Because of our exposure to the "legal argument" norms, when any dispute arises, we automatically think that the truth will lie somewhere between two extremes.

In this case, I would like to apply a little mathematical logic to the problem of the legal argument: let us assume that in a dispute, one side is innocent, honest, and tells the truth. It is obvious that lying does an innocent person no good; what lie can he tell? If he is innocent, the only lie he can tell is to falsely confess "I did it."

But lying is nothing but good for the liar. He can declare that "I didn't do it," and accuse another of doing it, all the while the innocent person he has accused is saying "I didn't do it," and is actually telling the truth.

The truth - when twisted by good liars, can always make an innocent person look bad - especially if the innocent person is honest and admits his mistakes. The basic assumption that the truth lies between the testimony of the two sides always shifts the advantage to the lying side and away from the side telling the truth. Under most circumstances, this shift put together with the fact that the truth is going to also be twisted in such a way as to bring detriment to the innocent person, results in the advantage always resting in the hands of liars. Even the simple act of giving testimony under oath is useless. If a person is a liar, swearing an oath means nothing to that person. However, swearing an oath acts strongly on a serious, truthful witness. Again, the advantage is placed on the side of the liar.

A careful reading of Evans' comments shows that they are "legal arguments" that have absolutely nothing to do with science. I state here that Evans and his

colleagues at AIAS are perpetrating a fraud and that the above tactics are being used against the scientific community. Whether it is conscious or unconscious, I cannot say. I am dealing with lies and proofs in a scientific way and psychiatry is not my speciality.

Let us now return to the real issues: scientific proofs based on scientific logic and evidence.

20. I maintain my statement that the electromagnetic potential field has "no ontology" in *classical* electrodynamics. Of course, I know very well its status in quantum theory, where it can be considered real if we use Feynman's definition of reality [42].

21. I claimed in [2] that AIAS authors are unethical (besides being incompetent) because they did not quote certain of my papers that, as proved in [2] they knew very well at the time they wrote the papers that I subsequently criticized. Evans said that it is however ethical for scholars not to cite diatribe.

22. I did not write any equations of higher symmetry electrodynamics in [2]. I write the equations of a $SU(2)$ gauge theory and proved that AIAS used these equations in their new electrodynamics without understanding their meaning. In fact they wrote in their many papers a collection of absurdities that are only superceded by the ones in the new Evans' papers ([3, 4, 5]), that I will briefly criticize in the next section.

23. Evans said that from page 37 [7] [2] is dogma, since I stated that Barrett, Vigier, Recami, Crowell and other eminent AIAS members are incompetent.

I observe that I referred only to the AIAS members and Barrett (see **24**). My mention of Recami in [2] has to do with his paper [19], as I already commented above. However, I do not want to classify Recami as incompetent. He indeed quickly realized that AIAS papers submitted to *Found. Phys.* (with his name as author) was a potpourri of nonsense and asked for his name be withdrawn from that papers. The history of this affair (that I know because I have been referee of some AIAS papers submitted to *Found. Phys.*) is described in [2].

24. In page 38 of [2] (see previous footnote) I did not say that it is impossible to identify "ρ_e with ρ_e" as Evans said in [1]. Instead I said (concerning Barrett's paper):

"Also, it is quite obvious that it is impossible to identify ρ_e with $\boldsymbol{\rho}_e$. The first is the zero component of a vector in Minkowski spacetime, being a real function, whereas the second is a real function (a zero-form) taking values in isotopic vector space."

So, Evans claim shows explicitly once again that he did not understand simple Mathematics and did not read papers carefully.

[7] Of course, Evans refers to the page numeration of the pdf version of the paper [2] that he downloaded from the Los Alamos arXiv.

25. I claimed in [2] that the Sagnac effect can be trivially explained with $U(1)$ electrodynamics. Evans said in [1] that I give no details. Well, the details correcting a large amount of wrong statements on the subject, some from AIAS and others by Barrett [25, 28] are given in my recent paper [43].

26. Evans said that I falsely claimed that the AIAS group has not deduced the $O(3)$ Coulomb law correctly.

Well, what AIAS call Coulomb law has been deduced using non sequitur Mathematics. Details of the mathematical fallacies used by AIAS were given in [2], and the reader is invited to read that paper and the AIAS ones [55] to see the evidence.

At this point, having gone over all comments by Evans, showing that none of them are correct either in content or context, it can be said that this only proves that he does not know Mathematics. Nevertheless, there is something further to say. I stated in [2] that, as it turned out, some of the authors of the AIAS papers that I criticized in [2] did not know that they were authors of those papers.

Evans said in the acknowledgments of [1] that this is not the case.

However, as said in [2], at least one of the supposed authors confirmed in my presence and the presence of dozens of witness at a conference in the USA that he did not knew that his name was included as AIAS author.

The ethics behind the AIAS group is revealed the instant the competent scientist reads one interview with Crowell (past AIAS author who gradually came to the realization that the "science" of AIAS was all nonsense) on [52] . He said explicitly that he did not authorize inclusion of his name as an AIAS author in the *absolutely nonsense* AIAS paper on the MEG machine [44] of Bearden.

In this respect the following sites are worth reading:

http://groups.yahoo.com/group/SarfattiScienceSeminar/message/2538

http://groups.yahoo.com/group/free_energy/message/5640.

http://tinyurl.com/fwvz.

3 Comments on section 2 of [1]

This section of Evans paper is called "Generally Covariant Equations of Electrodynamics". It has, of course nothing to do with my criticisms in [2] and indeed is propaganda for some recent papers by Evans [3, 4, 5].

These papers contain so much nonsense that to comment on all of them would be the equivalent of Hercules cleaning out the Augean stables. So, I will comment only on three of them.

(i) The first is that Evans said in [3] that the metric tensor $g = ds^2 = g_{\mu\nu} dx^\mu \otimes dx^\nu$ is a 1-form. Worse, he said that $g_{\mu\nu}$ can always be written as[8]

[8] According to Eq. (8) in [3] the h_μ are functions that are the norm of some tangent

$g_{\mu\nu} = h_\mu h_\nu$, which as well know is not the case. Next he said that the (would be) "1-form" g is the dual of the 2-form

$$dA = -g^a_{\mu\nu} dx^\mu \wedge dx^\nu,$$

where $g^a_{\mu\nu}$ are the matrix elements of the following antisymmetric matrix (that Evans called the antisymmetric metric)

$$\begin{pmatrix} 0 & -h_0h_1 & -h_0h_2 & -h_0h_3 \\ h_0h_1 & 0 & -h_1h_2 & h_1h_3 \\ h_0h_2 & h_2h_1 & 0 & h_2h_3 \\ h_0h_3 & -h_3h_1 & -h_3h_2 & 0 \end{pmatrix}.$$

This claim, beyond any doubt, is sufficient proof that Evans does not know anything about differential geometry and that, of course, his physical theory based on this kind of "mathematics" is sheer nonsense.

(ii) Let us recall some facts. Einstein's field equation is

$$Ricc - \frac{1}{2} gR = -\kappa T,$$

where *Ricci* is the Ricci tensor of a spacetime (M, g, D), (M, g) being an oriented and time oriented Lorentzian spacetime and D the Levi-Civita connection of g. R is the scalar curvature and T is the energy momentum tensor of matter.

Now, let $\{x^\mu\}$ be the coordinate functions associated to a chart covering an open set U of the maximal atlas of M. Let $\{\partial/\partial x^\mu\}$ and $\{dx^\mu\}$ be a pair of dual basis , i.e., $dx^\nu(\partial/\partial x^\mu) = \delta^\nu_\mu$, $\mu, \nu = 0, 1, 2, 3$, and $\partial/\partial x^\mu \in \sec TU$ and $dx^\mu \in \sec \bigwedge^1 M \subset \sec \mathcal{C}\ell(M, g)$. [9] Consider now the pair of *orthonormal* dual basis $\{e_a = h^\mu_a \partial/\partial x^\mu\}$ and $\{\theta^a = h^a_\mu dx^\mu\}$, with $\theta^a(e_b) = \delta^a_b$. We have

$$g = g_{\mu\nu} dx^\mu \otimes dx^\nu = \eta_{ab} \theta^a \otimes \theta^b.$$

Now, Evans claims in [3, 4, 5] that the θ^a satisfy the equations[10]:

$$(\Box + T)\theta^a = 0, \tag{1}$$

where $\Box = g^{\mu\nu} \frac{\partial}{\partial x^\mu} \frac{\partial}{\partial x^\nu}$.

However this is absolutely incorrect. As shown in details in my papers [45, 46] the correct wave like equations satisfied by the θ^a are:

$$-(\partial \cdot \partial)\theta^a + \partial \wedge (\partial \cdot \theta^a) + \partial \lrcorner (\partial \wedge \theta^a) = T^a - \frac{1}{2} T\theta^a. \tag{2}$$

coordinate vectors. I will not expand on comments of the nonsense that Evans makes with the concept of tangent vectors.

[9] Details of the Clifford bundle approach to the geometry of Riemann-Cartan-Weyl spaces can be found in [44, 45].

[10] I use units such that $\kappa = 1$ in what follows.

In Eq.(2) $\partial = \theta^a D_{e_a} = \partial \wedge + \partial \lrcorner = d - \delta$ is the Dirac (like) operator acting on sections of the Clifford bundle $\mathcal{C}\ell(M, g)$. The operators $\wedge$, $\cdot$, $\lrcorner$, respectively the exterior, the scalar and the contraction product are defined below. First recall that the fundamental *Clifford product* (which is denoted by juxtaposition of symbols) is generated by $\theta^a\theta^b + \theta^b\theta^a = 2\eta^{ab}$ and if $\mathcal{C} \in \sec \mathcal{C}\ell(M)$ we have

$$\mathcal{C} = S + V_a\theta^a + \frac{1}{2!}B_{ab}\theta^a\theta^b + \frac{1}{3!}t_{abc}\theta^a\theta^b\theta^c + P\theta^5 \ , \tag{3}$$

where $\theta^5 = \theta^0\theta^1\theta^2\theta^3$ is the volume element and $S, B_{ab}, T_{abc}, P \in \sec \Lambda^0(M) \subset \sec \mathcal{C}\ell(M)$.

Let $A_r, \in \sec \Lambda^r(M), B_s \in \sec \Lambda^s(M)$. For $r = s = 1$, we define the *scalar product* as follows:

For $a, b \in \sec \Lambda^1(M) \subset \sec \mathcal{C}\ell(M)$.,

$$a \cdot b = \frac{1}{2}(ab + ba) = g^{-1}(a, b), \tag{4}$$

where $g^{-1} = \eta^{ab}e_a \otimes e_b \in \sec T^0_2 M$. We define the *exterior product* ($\forall r, s = 0, 1, 2, 3$) by

$$\begin{aligned} A_r \wedge B_s &= \langle A_r B_s \rangle_{r+s}, \\ A_r \wedge B_s &= (-1)^{rs} B_s \wedge A_r \end{aligned} \tag{5}$$

where $\langle\rangle_k$ is the component in $\Lambda^k(M)$ of a Clifford field. The exterior product is extended by linearity to all sections of $\mathcal{C}\ell(M)$.

For $A_r = a_1 \wedge ... \wedge a_r, B_r = b_1 \wedge ... \wedge b_r$, the scalar product is defined *here* as follows,

$$\begin{aligned} A_r \cdot B_r &= (a_1 \wedge ... \wedge a_r) \cdot (b_1 \wedge ... \wedge b_r) \\ &= \det \begin{pmatrix} a_1 \cdot b_1 & ... & a_1 \cdot b_r \\ ... & ... & ... \\ a_r \cdot b_1 & .... & a_r \cdot b_r \end{pmatrix} \end{aligned} \tag{6}$$

We agree that if $r = s = 0$, the scalar product is simple the ordinary product in the real field.

Also, if $r, s \neq 0$ and $A_r \cdot B_s = 0$ if r or s is zero.

For $r \leq s, A_r = a_1 \wedge ... \wedge a_r, B_s = b_1 \wedge ... \wedge b_s$ we define the left contraction by

$$\lrcorner : (A_r, B_s) \mapsto A_r \lrcorner B_s = \sum \epsilon^{j_1 \cdots j_r}_{1 \ldots r} (a_1 \wedge ... \wedge a_r) \cdot (b_{j_1} \wedge ... \wedge b_{j_r}) b_{j_{r+1}} \wedge ... \wedge b_{j_s}, \tag{7}$$

and extended by linearity to all sections of $\mathcal{C}\ell(M)$. We agree that for $\alpha, \beta \in \sec \Lambda^0(M)$ the contraction is the ordinary (pointwise) product in the real field and that if $\alpha \in \sec \Lambda^0(M)$, $A_r, \in \sec \Lambda^r(M), B_s \in \sec \Lambda^s(M)$ then $(\alpha A_r) \lrcorner B_s = A_r \lrcorner (\alpha B_s)$. Left contraction is extended by linearity to all pairs of elements of sections of $\mathcal{C}\ell(M)$, i.e., for $A, B \in \sec \mathcal{C}\ell(M)$

$$A \lrcorner B = \sum_{r,s} \langle A \rangle_r \lrcorner \langle B \rangle_s, r \leq s. \tag{8}$$

We need to recall also that

$$A_r B_s = \sum_{k=0}^{m} \langle A_r B_s \rangle_{|r-s|+2k},$$
$$m = \frac{1}{2}(r + s - |r - s|) \tag{9}$$

With these formulas we can write

$$\partial^2 = \partial \cdot \partial + \partial \wedge \partial,$$
$$\partial \wedge \partial = -\partial \cdot \partial + \partial \wedge \partial \lrcorner + \partial \lrcorner \partial \wedge \tag{10}$$

with

$$\partial \cdot \partial = \eta^{ab}(D_{e_a} D_{e_B} - \omega_{ab}^c D_{e_c}), \tag{11}$$
$$\partial \wedge \partial = \theta^a \wedge \theta^b (D_{e_a} D_{e_B} - \omega_{ab}^c D_{e_c})$$

Note that $D_{e_a} \theta^b = -\omega_{ac}^b \theta^c$ and it holds,

$$(\partial \wedge \partial)\theta^a = R^a, \tag{12}$$

where $R^a = R_b^a \theta^b$ are the Ricci 1-forms. Also $T^a = T_b^a \theta^b$ are the energy momentum 1-forms and $R = R_a^a = -T = T_b^a$. I observe also (that for the best of my knowledge) $\partial \wedge \partial$ that I named the Ricci operator has no analogue in classical differential geometry.

Note that Eq. (2) can be written after some algebra as

$$R^\mu - \frac{1}{2} R \theta^\mu = T^\mu, \tag{13}$$

with $R^\mu = R_\nu^\mu dx^\nu$ and $T^\mu = T_\nu^\mu dx^\nu$, $\theta^\mu = dx^\mu$.

Eq.(13) looks like an equation written several times by Evans, but Evans equation is a non sequitur because in place of the coframe 1-forms he uses scalar functions !

(iii) As last example of Evans nonsense I quote that he explicitly wrote several times in [3, 4, 5] that the electromagnetic potential $\mathbf{A}$ of his theory (a 1-form with values in a vector space) satisfies the following wave equation,

$$(\Box + T)\mathbf{A} = 0. \tag{14}$$

Now, this equation is incorrect even for the usual $U(1)$ gauge potential of classical electrodynamics $A \in \sec \sec \bigwedge^1 M \subset \sec \mathcal{C}\ell(M, g)$. Indeed, in vacuum Maxwell equation reads,

$$\partial F = 0, \tag{15}$$

where $F = \partial A = \partial \wedge A = dA$, if we work in the Lorenz gauge $\partial \cdot A = \partial \lrcorner A = -\delta A = 0$. Now, since we can also write

$$\partial^2 = -(d\delta + \delta d) \tag{16}$$

and we have that

$$\partial^2 A = 0 \tag{17}$$

Now, a simple calculation shows that in the coordinate basis introduced above we have,

$$(\partial^2 A)_\alpha = g^{\mu\nu} D_\mu D_\nu A_\alpha + R^\nu_\alpha A_\nu \tag{18}$$

and we see that Eq.([34]) reads in components

$$\Box A_\mu - R^\nu_\mu A_\nu = 0. \tag{19}$$

Eq.(32) can be found, e.g., in Eddington's book [53] on page 175.

4 Conclusions

Evans rebuttal [1] to my *ROSE* paper [2] (written with my former Ph.D. student A. L. Trovon de Carvalho) is a potpourri of nonsense and lies. It is very disturbing to realize that Evans - with so much evidence of incompetence in the view of all scientists - still manages to get his work published, (like [3]) in *Found. Phys. Lett.* and other journals. This certifiable nonsense may certainly damage the reputations of those journals - perhaps irreparably.

However, it is my hope that this report, that I will submit to the editors of all Physical journals where Evans has published papers, will serve the purpose of stopping the proliferation of this fraud and nonsense.

I would be remiss if I did not ask the members of AIAS to meditate upon their role in the corruption of science. Moreover I will suggest to them that they should undertake a careful study of Mathematical Physics, in order to realize the large amount of mathematical nonsense that they have produced. References ([21],[47] -[51]) will certainly help. It is not a shame to make mistakes in Mathematics. Even famous mathematicians have produced errors [54]. However it is dishonest to write about things that we do not understand, and in this respect I charge all members of the AIAS as dishonest men, until proof is produced to the contrary.

I mention also, Evans' statement that he did not know about [2] is not true. The proof is that he mentions some of my equations in [2] (without quoting the source) in the series of papers that AIAS published in a special issue of the Journal of New Energy (*JNE)* [55]. I even sent copy of the first version of [2] to Hal Fox, editor of *JNE,* and he even suggested that he would publish my paper in his journal with a replica by Evans. I did not accept his offer, of course, since I did not wish my name to be associated with that publication and told him that I was going to publish the paper in a Mathematical journal. Additionally,

there is another proof that Evans knew [2]. Indeed, that paper originally served as a referee's report that I wrote for *Found. Phys.* (concerning some papers that AIAS submitted to that journal, some of them published in *JNE*) at van der Merwe's (the editor of *Found. P*hys.) request. Of course, the papers were rejected. Evans and some of his associates wrote several nonsense replies to my report at that time.

Finally, I mention that my paper published at *ROSE* [2] has been reviewed in *Math. Rev.* MR 2002d:78002. The reviewer, P. Anglès, a reknowned mathematician agrees with all my criticisms. Indeed, his review concerning my *ROSE* paper reads :

"The paper under review is a sound and thorough presentation of important facts concerning the theory of the electromagnetic field.

The authors want to point out some mistakes, misconceptions, misunderstandings and flaws appearing in many papers published by a group of 15 physicists known as the AIAS group. Their statements are proved by using a modern presentation of Maxwell theory including Clifford bundles and principal and associated vector bundles for the presentation of gauge theories.

It is convincingly proved by the authors of the paper under review that, for example, the following affirmations of the AIAS group are wrong: (a) "The contemporary view that classical electromagnetism is a U(1) gauge theory, relies on the restricted received view of transverse plane waves, U(1) being isomorphic with O(2), the group of rotations in a plane" [sic]. (b) "If there are longitudinal components available from the Heaviside-Maxwell equations then these cannot be represented by a U(1) gauge theory."

After a long analysis of their paper, the reviewer has to confirm his agreement that their text is mathematically correct, and the given arguments well structured."

Acknowledgement 2 *The author is grateful to Professor Arkadiusz Jadczyk for many useful discussions and to Laura Knight-Jadczyk for her careful edition of the manuscript and important philosophical observations.*

A Copy of a letter sent to Prof. Chapel concerning 'paternity' of *X*-waves

Campinas, August 18, 1998

Professor H. W. Chapel

Chairman of the Editorial Board

Physica A

Dear Professor Chapel,

I'm sending enclosed the following papers:

(1) J.-Y. Lu and J.F. Greenleaf, Limited diffraction solutions to Maxwell and Schrödinger equations, preprint Biodynamics Research Unit, Dep. of Physiology and Biophysics, Mayo Clinic and Foundation, Rochester, MN 55905, USA, submitted to *Journal de Physique* (01/31/96).

(2) J.-Y. Lu, J.F. Greenleaf and E. Recami, *Limited-diffraction solutions to Maxwell and Schrödinger equations*, preprint INFN/FM-96/01 10/23/96

(3) E. Recami, On localized "X-shaped" superluminal solutions to Maxwell equations, *Physica A* **252**, 586-610 (1998)

(4) W. A. Rodrigues Jr. and J. Vaz Jr., "Subluminal and Superluminal Solutions in Vacuum of the Maxwell Equations and the Massless Dirac Equation", in J. Keller and Z. Oziewicz, The Theory of the Electron, Proc. Of the International Conf. on the Theory of the Electron, Sept. 24-27, 1995, Mexico City, *Advances in Appl. Clifford Algebras* **7**(S), 475-466 (1997).

(5) W. A. Rodrigues Jr. and J. Y. Lu, On the existence of Undistorted Progressive Waves (UPWs) of Arbitrary Speeds in Nature, *Found. Phys.* **27**,435-508 (1997).

(6) V. Barashenov and W. A. Rodrigues Jr., Lauching of non-dispersive sub- and superluminal beams, *N. Cimento* **B** 113, 329-338 (1998).

Now, what these papers have to do with each other?

Unfortunately the answer is: (2) is an unauthorized version of (1) which includes a new section VII and an appendix written by Dr. Recami. (3) is almost identical to (2), with the main differences:

(i) The suppression of the names of J.-Y. Lu and J.F. Greenleaf,

(ii) The wrong section V of (2) claiming the existence of X-wave solutions of the Schrödinger equation is substituted by section 3.5 (with another title) which is also completely wrong[11] , showing incidentally that Dr. Recami didn't understand what he copied.

The proof that (2) is an unauthorized version of (1) can be found in the attached messages that Dr. Lu set to me on 04/27/1997 and 04/28/1997 as part of the answer to my message of 04/24/1997 (enclosed)

The proof that (1) has been submitted to *J. Physique* can be found in paper (5) quoted above. Indeed (1) appears there cited as reference 5 (see also footnote at page 438).

I'm proud to have published (5) with Dr. Lu, who is a great experimentalist and is the real discoverer of both the acoustical and electromagnetic X-waves. (5) contains important experimental and theoretical results concerning the existence of arbitrary speeds solutions for all the relativistic wave equations. I claim here that Dr. Recami is unable[12] to obtain by himself any of these solutions. (5) also proves that section 5 of (3) is completely misleading and a non sequitur. This is one of the reasons why Lu, being also author of (5), could not permit his name-and also Dr. Greenleaf's name- to appear as authors of (2).

It is intolerable what Dr. Recami did, but I'm not going to take any action against him. I'm satisfied for having putted him out of my Institute a few years

[11] In (6) it is proved that there is no X-wave solution to the Schrödinger equation. Paper (6) appeared as IMECC-UNICAMP preprint in October 96 and has been submitted for publication in 12/12/96. Originally reference [17] of (6) was paper (1), but when I revised the proofs of the paper I changed it giving as reference paper 2), in order to leave a record of Recami's fraud described in the present letter.

[12] This note is note part of the original leltter. Its proposal is to emphasize that the statement was true at the time I wrote the letter to Professor Chapel. I'm sure that now Recami can derive some of the equations.

ago for equally reprovable acts. Here, I want to mention, in particular, that his remark on the acknowledgments in (3); " The first three figures of that Report, and of this paper, will be used- by permission of Lu, Greenleaf and Recami- also in a paper by W. A. Rodrigues Jr. and J. –Y. Lu (submitted to *Found. Phys.*)", shows very clearly his character. Indeed, the note added in proof in paper (3) has been written after November 97, since it cited the Saari and Reivelt paper published in *Phys. Rev. Lett.* of November 24, 1997. At that time Dr. Recami knew very well that my paper with Lu already appeared in Found. Phys. in March 97. Instead of citing correctly, he only wrote in the acknowledgement (as quoted above) that the paper was submitted... It is also amazing to read that Dr. Recami gave permission for Lu (and me) to use figures of paper (20) in paper (5) .

My final comment concerning (3) is that it has new and good things: the goods are not new and the new ones are not good. In particular the pretension of Dr. Recami that he predicted the existence of superluminal electromagnetic X-waves from his (nonsense) tachyon theory is a disrespect to the intelligence of any thinking man and it is a pity that your journal published such a low quality material.

I hope that this letter will open your eyes concerning future submissions by Dr. Recami to your journal and I finish with a question: how is it possible that the submission date of (3) to your journal could be 03/01/96 when (2) appeared illegally on October 96 and (1) has been submitted in January 96?

Sincerely yours,

Professor Waldyr A. Rodrigues Jr.
Director
Institute of Mathematics, Statistics and Scientific Computation
IMECC-UNICAMP

Observations:

(i) Copies of anyone of the documents mentioned in the above letter can be send to anyone under request.

(ii) Despite the fact that it has been necessary to disclose to the community the letter that I sent in 1998 to Professor Chapel I state here that I already pardoned Dr. Recami for his past weakness.

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