GALILEAN ELECTRODYNAMICS

Experience, Reason, and Simplicity Above Authority
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EDITORIAL POLICY

Galilean Electrodynamics aims to publish high-quality scientific papers that discuss challenges to accepted orthodoxy in physics, especially in the realm of relativity theory, both special and general. In particular, the journal seeks papers arguing that Einstein's theories are unnecessarily complicated, have been confirmed only in a narrow sector of physics, lead to logical contradictions, and are unable to derive results that must be postulated, though they are derivable by classical methods.

The journal also publishes papers in areas of potential application for better relativistic underpinnings, from quantum mechanics to cosmology. We are interested, for example, in challenges to the accepted Copenhagen interpretation for the predictions of quantum mechanics, and to the accepted Big-Bang theory for the origin of the Universe.

On occasion, the journal will publish papers on other less relativity-related topics. But all papers are expected to be in the realms of physics, engineering or mathematics. Non-mathematical, philosophical papers will generally not be accepted unless they are fairly short or have something new and outstandingly interesting to say.

The journal seeks to publish any and all new and rational physical theories consistent with experimental fact. Where there is more than one new theory that meets the criteria of consistency with experiment, faultless logic and greater simplicity than orthodoxy offers, none will be favored over the others, except where Ockham's razor yields an overwhelming verdict.

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The journal most values papers that cite experimental evidence, develop rational analyses, and achieve clear and simple presentation. Papers reporting experimental results are preferred over purely theoretical papers of equally high standard. No paper seen to contradict experiment will be accepted. But papers challenging the current interpretation for observed facts will be taken very seriously.

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The journal also publishes correspondence, news notes, and book reviews challenging physics orthodoxy. Readers are encouraged to submit interesting and vivid items in any of these categories.

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From the Editors: A follow-up letter received:

More on Minimum Contradictions in Physics

This letter is part of an on-going logical analysis of physical reality presented in GED-East [1], at international conferences [1-3], and in Journal of New Energy [3]. The line of research develops a central claim that physics can, at best, have minimum, but not zero, contradictions. The purpose of the present letter is to explore further the implications of the claim for minimum contradictions. On the basis of the claim and a theorem, this letter derives the conclusion that space-time is stochastic, a conclusion that is in stark contrast with general relativity theory (GRT).

The main points of the earlier papers that remain the same, or differ only slightly and without disturbing the spirit of what was mentioned in them, are the following:

1) Theorem I: "Any system that includes the logic Λ (Aristotlean logic plus Leibniz sufficient reason principle) and at least a statement A which is not theorem of logic Λ leads to contradiction."

2) Statement I: "Any system of axioms that includes the logic Λ and the anterior-posterior axiom leads to contradiction."

3) Our basic communication system consists of logic Λ and of a hidden axiom that postulates the existence of anterior and posterior. In fact, every word or phrase in our natural language is constructed in such a way that the letters or the words are put one after the other. Thus, the basic communication system obeys the statement I; However, we notice that statement I cannot be stated because it is based on the basic communication system which, according to statement I itself, is contradictory. *Thus, statement I imposes silence.*

When we communicate, we use a hidden claim according to which "*what is accepted as valid is what includes the minimum possible contradictions,*" since the contradictions cannot be vanished. According to this hidden claim, which we could name as "*the claim of the minimum contradictions*" [4], we obtain a logical and an illogical dimension. In fact, through this axiom we try to approach logic (minimum possible contradictions), but at the same time we expect something illogical, since the contradictions cannot be vanished.

4) The systems of axioms we use in Physics include the communication system and, therefore, their contradictions are minimized when they are reduced to the communication system itself. *Therefore, we have minimum contradictions in Physics when it is based only on the basic communication system i.e. on the logic Λ and on the 'anterior-posterior axiom'.*

In order that such physics be valid, a unifying principle is needed, since everything, *i.e.* matter, field, and space-time, needs to be described in anterior-posterior terms. Thus, *in a first sight*, for a least contradictory physics we can make the following statement:

Statement II*: Any matter space-time system can be described in anterior–posterior terms.*

It is noted that the existence of time implies the existence of anterior and of posterior. The existence of space does so, too. If I say 10 cm, I mean the existence of 1,2,...,9,10 *i.e.* the existence of anterior and of posterior. Therefore, the existence of anterior and posterior is the condition for space and time to exist and *vice-versa*. Thus, because of Statement II, for a least contradictory physics we can make the following statement:

Statement III*: Any matter system can be described in space-time terms.*

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More on Minimum Contradictions (cont. from p...)

Since everywhere there is space-time and not something else, space-time can be regarded as matter itself. A matter system, in general, has differences within its various areas. This means that a matter system, in general, is characterized by different rates of anterior - posterior (time) within its various points. Since space is also locally affected by the local rate of anterior-posterior, it can be expected to deform due to different rates of anterior-posterior. In a second sight, taking into account the above-mentioned, and applying the claim of the minimum contradictions, we conclude that matter-space-time can have logical and contradictory behavior at the same time; *this can be valid only if space-time is stochastic*. This idea contradicts Einstein's GRT. It is noted that Einstein himself said *"I consider it quite possible that physics cannot be based on the field concept; i.e., on continuous structures. In that case nothing remains of my entire castle in the air, gravitation theory included, and the rest of modern physics."* [5,6]

According to a previous work [7], statement III can imply the principles of QM, and under some simplifying hypothesis (continuity of space-time), it can imply the GRT; of course without this simplifying hypothesis, it is in contrast with the GRT. On this basis, the hypothesis of the Quantum Space Time [8] can be mentally verified; this hypothesis can be the basis for explanation of laws and of various phenomena that cannot be explained through a classical approach [3,8,9]. Thus, the question is raised: Can Physics be Regarded as a Consequence of the Principles of Thought? An answer to this question was given in [3].

Proof of Theorem I and of Statement I

Discussions about the GED paper [1] lead to the fact that the proof of Theorem I had some points yet to be clarified, mainly due to the use of 'logic Λ'. This logic includes Aristotlean logic, and beyond that, it also includes Leibniz' Sufficient-Reason Principle. For this reason, we need proofs of Theorem I and Statement I in which Leibniz' principle is used clearly. This is being done in the present communication according to what was presented in [2] and [3]. However, in the present Section, it can be noticed that the main part of the proof in [1] is correct.

From Aristotle it is known that the way in which we communicate obeys the rules of logic. These rules are the rules of identification. These rules are included in the following principle [10]:
Principle I: " A is A; A is not $\sim A$; It is not possible that something is A and $\sim A$ at the same time".

Apart from these rules Aristotle also stated the causality principle according to which for everything a reason-cause is needed. Leibniz expanded the causality principle and claimed more generally that something is valid if it can be logically proved by something else that is valid [11]. This means that we do not wonder only about the causes of things, but we also put under consideration the laws and principles that facilitate us with the interpretation of natural phenomena, and whose absolute validity nobody guarantees. So, Leibniz' principle could be written in the following form:
Principle II: "No statement is valid if it cannot be logically proved through some valid statements different from it."

Elucidation: Principle II is valid for any combination of statements; *i.e.* the statement: $A = A_1 \cdot A_2 \cdot ... \cdot A_n$ cannot prove that $A = A_1 \cdot A_2 \cdot ... \cdot A_n$ itself is valid, since proof of it requires some valid statements different from it.

We feel that our communication system obeys not only Aristotlean principles, but also the generalized Leibniz principle, which implies the Aristotlean causality principle. To avoid any misunderstandings in the text, the principles of our communication system are named logic Λ. We feel that logic Λ is valid, but we don't know a priori whether it is valid or not. When we already speak logically, it means that we have decided to communicate and we cannot but, most generally, think that:

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More on Min. Contradictions (cont. from p...)

$$\Lambda \vee \sim \Lambda \qquad (1)$$

which means that either logic Λ is valid or logic Λ is not valid. So, our consideration takes the widest credibility. Therefore, we can look into the following cases:

1) *Logic Λ is not valid.* It is obvious that if a system includes Λ this system is contradictory since it must be valid Λ and ($\sim \Lambda$) at the same time.

2) *Logic Λ is valid.* If $R_{\Lambda 1}, R_{\Lambda 2}, ..., R_{\Lambda N}$ are the statements-reasons for Λ validation, then, since any proof requires Λ, we will have that $R_{\Lambda 1}, R_{\Lambda 2}, ..., R_{\Lambda N} \cdot \Lambda \supset \Lambda$. Since $\Lambda \supset \Lambda$, we conclude that Λ is valid due to Λ itself, and does not require any further reason. This is not in contrast with principle II, since in this case, Λ is regarded as valid, due to a hypothesis (case 2 instead of case 1).

Based on all these, and using the symbolic logic - *not through the frame of the propositional logic, but rather through the frame of logic* Λ - we will prove the following Statement IV:

Statement IV: *" If logic Λ is by hypothesis valid, then any system that includes this logic Λ and a statement A that is not a theorem of logic Λ leads to contradiction."*

Proof: We consider the system $\Pi = \Lambda \cdot A$. Because of Λ we have

$$\Lambda \Rightarrow A \vee \sim A \quad (2)$$

and

$$(\Lambda \Rightarrow A) \vee (\Lambda \Rightarrow \sim A) \quad (3)$$

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More on Min. Contradictions (cont. from p…)

If Π is complete, all statements deriving from Π are valid due to Π itself. If:

$$(\Lambda \Rightarrow A) \quad (4)$$

Because of the completeness of Π the only possibility for statement (4) to be valid is for A to be theorem of Λ; *i.e.*: $\Lambda \supset A$, since, by hypothesis, logic Λ is valid, A cannot prove itself (Principle II) and A cannot be proved by means of statements out of Π (completeness). It is noted that the statement $\Lambda \supset A$ expresses an inference, while the statement ($\Lambda \Rightarrow \mathrm{A}$) expresses an implication. Of course, an implication is not an inference. However, *in the case under study* (Π completeness), we have, as was mentioned, that the implication (4) has meaning only as an inference *i.e;*

$$(\Lambda \Rightarrow A) \equiv (\Lambda \supset A) \quad (5)$$

By definition, A is not a theorem of Λ; therefore we have:

$$\sim (\Lambda \supset A) \quad (6)$$

Because of (6),(5),(3) we obtain:

$$\Lambda \Rightarrow \sim A \quad (7)$$

According to logic Λ we have:

$$A \Rightarrow A \quad (8)$$

Because of (7),(8), for a complete system we obtain:

$$\Lambda \cdot A \Rightarrow (\sim A) \cdot (A) \quad (9)$$

Statement (9) is valid for any set of statements $B \equiv A \cdot A'$, since, having a component A that is not a theorem of Λ, B cannot be theorem of Λ as well.

Taking into account the above mentioned, we conclude the following statement:

Statement V: *" If logic Λ is by hypothesis valid, then any system that includes this logic Λ and a statement A that is not a theorem of logic Λ cannot be complete and consistent at the same time."*

This statement can be regarded as a generalized case of Gödel's theorem [12]; in order for this theorem to be derived, Aristotlean logic (Mathematica Principia) and axioms that are not theorems of this logic (Peanno's axioms) are required.

We consider that Π is not complete. According to principle II, both Λ and A must be provable through some valid statements different from them. These statements- reasons must be concrete final valid statements; if there are not concrete final valid statements, A should prove itself a fact which is in contrast with principle II. As was mentioned, Λ is by hypothesis valid.

If $R_{A1}, R_{A2}, ..., R_{AN}$ (where N is any number) are the *final statements-reasons for validity of* A, we consider the statement $AR \equiv A \cdot R_{A1}, R_{A2}, ..., R_{AN}$. According to principle II, the system $\Lambda \cdot AR \equiv \Lambda \cdot \mathrm{A} \cdot R_{A1}, R_{A2}, ..., R_{AN}$ should be complete (final valid reasons) and consistent so that A can be logically provable through valid statements different from A; $R_{A1}, R_{A2}, ..., R_{AN}$ can be regarded as valid-provable and final at the same time when they are provable within the system $\Lambda \cdot AR$. However, according to Statement V, it is impossible for system $\Lambda \cdot AR$ to be complete and consistent at the same time, since it includes A which is not theorem of Λ. Therefore, in general, the system $\Lambda \cdot A$ leads to contradiction regardless of whether it is complete or not; *i.e.* Statement IV is valid.

Thus taking into account what was mentioned in case 1 and Statement IV we can state Theorem I, since it is valid without any restriction for Λ; *i.e.*:

Theorem I: "Any system that includes the logic Λ and at least one statement A that is not a theorem of logic Λ leads to contradiction."

The anterior-posterior axiom in arithmetic can be stated as following [12]:

1. Zero (0) is a number;
2. There is the next of any number x

(10)

For $x = 0$, the next is 1. If this axiom were a theorem of logic Λ, then '1' should derive from '0'. However, the notion '1' is not included in the notion '0'. In fact, according to the common way in which we learn and use numbers, we can correspond 0 to non-existence of something and 1 to its existence somewhere. Of course, the non-existence of something cannot imply logically its existence. Thus, the anterior-posterior axiom is not a theorem of logic; therefore, Theorem I can apply to systems that include this axiom *i.e.* the following can be stated:

Statement I: " Any system that includes logic Λ and the anterior-posterior axiom leads to contradiction."

Gödel's Work

In [1], it was mentioned that theorem I could be proved through Gödel's work, but some weaknesses were pointed out. Besides these weaknesses, some other weak points of using Gödel's work in this subject are stressed, and these weak points come from Putnam's and Penrose's points of view [10,11]. This reveals in a clearer way the necessity of a proof different from the one deriving from Gödel's work. In fact, what Gödel proved is: [12,14]

Statement VI: "An ω-consistent system including Peano's arithmetic cannot be complete".

where as ω-*consistent* property of a system is defined a property which is valid only for some numerical value; not valid in general; of course it needs more analysis but it is beyond the limits of this paper. It is noted that this statement was proved on the basis of the *arbitrary hypothesis* that there is an algorithm that permits the derivation of only true statements.

According to Hillary Putnam, Gödel's second incompleteness theorem states that if a system 'S' of formalized mathematics – that is, a set of axioms and rules so precisely described that a computer could be programmed to check proofs in the system for correctness – is strong enough for us to do number theory in it, then a certain well-formed statement of the system, one which implies that the system is consistent, cannot be proved within the system. [13]

As Putnam noticed, this Gödel's theorem had been misinterpreted; *e.g.* Lucas based his investigation on the statement [13]:

Statement VII: "Any consistent system which includes Peano's arithmetic cannot be complete".

Statement VII has not been proved in spite of efforts made by Church, Schröter and others [15].

Roger Penrose investigated the 2^{nd} Gödel's theorem and, taking into account the fact that it is not completely valid in the form of statement VII, concluded that: [14]

Conclusion I: There is a part of our thinking which cannot be computational; this part could be investigated by laws of physics.

There are doubts that there is a possibility for non-computational thinking able to be investigated by the laws of physics to exist [13]; however, Penrose's conclusion completely takes into account what exactly has until now been proved [14]. Thus, if we were to prove statement VII and more generally theorem I, we should find another way beyond Gödel's work; this is the subject of this paper.

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