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Is Time Continuous or Discrete?

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Abstract: Most people believe that time is continuous, but we assume the opposite is true; moreover, by modelling time as discrete, the rules and laws of nature can be efficiently described in a unitary 4D xyzt space [1,2].

In a previous article entitled 101 Authors Against Einstein [2], we presented scathing critiques of Albert Einstein's theories of relativity, explaining and proving how Einstein's SR and GR theories are fundamentally incomplete and misleading due to a poor understanding of the underlying universal laws of physics.

We also assume that the main reason for Einstein's errors in general relativity is that he started from the mathematical Riemann space where time is a continuous scalar and inadequate to demonstrate the physical laws in the unitary 4D xyzt space [3,4].

In this article, we examine the link between the discretization of time, the universal laws of physics, and Einstein's theories of special and general relativity, demonstrating that [3,4,5]:

- ***Special Relativity is a Special Case of General Relativity.***
  Special relativity and general relativity form a single theory.

- ***Einstein's Theory of Gravitation in 1915 Led to the Erroneous Conclusion that Gravity is Not a Force, but a Consequence of the Curvature of Space Time.***

We show that gravity is a real force that curves space-time, and not the other way around.

We also present and define the rules and foundations of discrete time theory.

Finally, it should be clarified that this article is not intended to diminish the achievements of the great Einstein, such as the discovery of the laser theory 50 years before its practical application, but rather to dispel any misconceptions about his theories if any.

- ***Note: If you are Not Familiar with the Universal Laws of Physics, Please Stop Reading.***

This article is not intended for you.

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I. INTRODUCTION

Einstein's theories of relativity are still regarded as cornerstones of modern experimental and theoretical physics and have been consistently confirmed by experiments and observations for over a century.

When we discover the true discrete universal laws of physics that underlie Einstein's demonstration of relativity, it will change many things.

- *That is the Subject of this Article.*

In his theory of special relativity (SR), he attempted to demonstrate and prove the one-dimensional Lorentz transformation through a thought experiment involving two observers in two different frames of reference: one on a moving train, the other stationary in the same train station.

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Strangely, he supposed that these two spheres of light propagated separately and continuously, but that, when observed by two different observers, they had the same center (Fig.1)

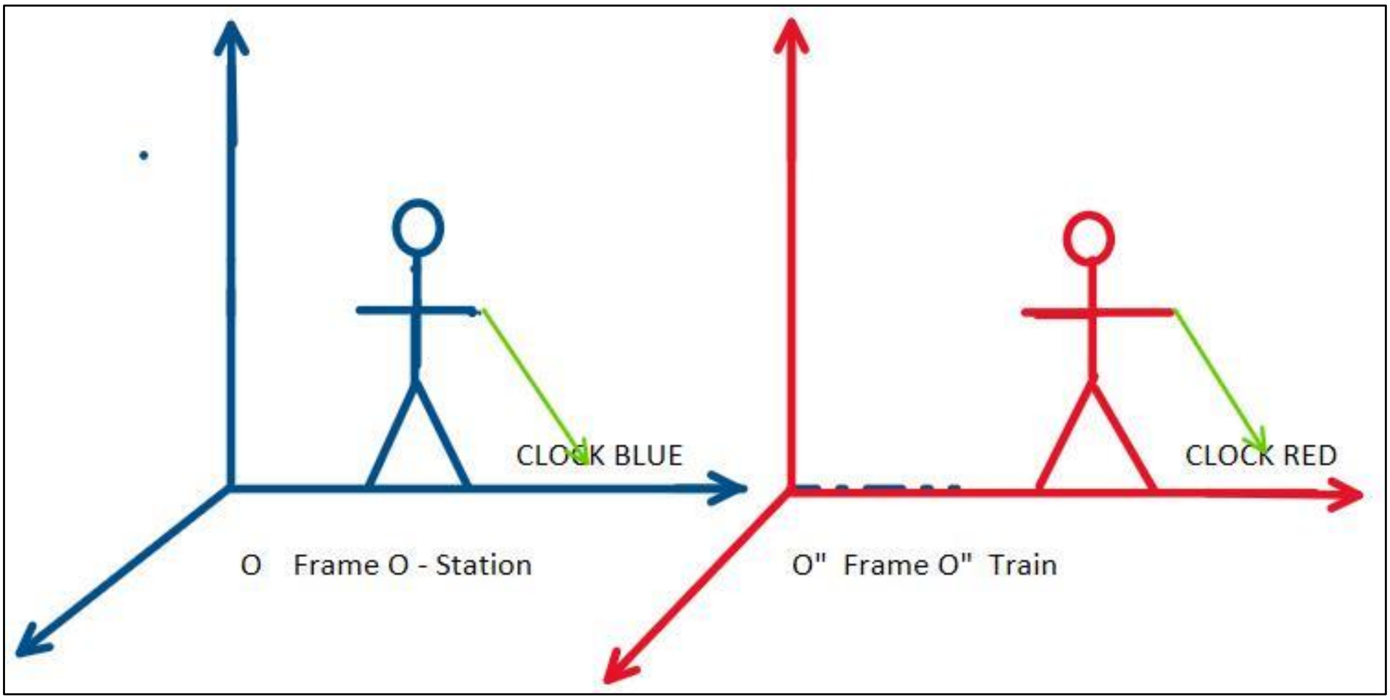

Fig 1 Einstein's Thought Experiment on Special Relativity in 1905.

In reality, unitary discrete special relativity in x-t space is nothing more than the one-dimensional Lorentz transformation, which is in fact a universal law of physics and, therefore, cannot be proven.

In other words, this dubious thought experiment illustrated in Figure 1 is merely a decoy that masks the simple demonstration made possible by the interpretation of the Lorentz transformation law.

Given the previous observation, the proof of SR can be summarized in a single sentence.

Note also that the discrete-time state-space model is perfect for studying both classical and quantum physics in addition to pure mathematics, as shown in Table I.

Similarly, he attempted to prove his theory of general relativity (GR) with another dubious thought experiment: two observers moving relative to each other in a continuous Riemann space with arbitrary acceleration and they try to measure the gravitational field of massive planets like the Sun.

➢ *The Two Observers should Obtain Exactly the Same Results.*

This thought experiment led Einstein to a catastrophic conclusion:

- *The Force of Gravity does Not Exist and is Only a Result of the Curvature of Spacetime.*

However, the truth is that the theory of general relativity (GR) is nothing more than the Lorentz transformation in a discrete 4-dimensional unitary space, which is a universal law of physics and therefore cannot be proven.

Once again, this observation reduces the proof of general relativity to a single sentence and refutes Einstein's catastrophic conclusion as follows:

- *Gravity is a Real Force that Curves Spacetime, Not the Other way Around*.

Furthermore, using Lorentz's law on universal physics and/or matrix mechanics resulting from the statistical theory of Cairo techniques, it can be demonstrated that:

➢ ***Special Relativity is Simply a Special Case of General Relativity.***

*****Special relativity and general relativity form a single theory not two. [3,4,5].

- *Einstein Failed to Demonstrate this Simple Fact, and Special Relativity and General Relativity Remain Two Distinct Theories.*

The iron guards of A. Einstein argues that Einstein's conclusions have been tested experimentally and theoretically for a century and have proven accurate, but they forget that this accuracy and precision are not due to Einstein theory; they derive from the universal laws of physics, such as the Lorentz transformation, which must be experimentally accurate.

But who are these inflexible or unyielding guardians of Einstein's relativity in 1915?

They adopt the same attitude as the inflexible guardians of the classical Schrödinger equation and the Bohr/Copenhagen interpretation of 1927:

They defend the flaws in these two theories to their last breath, because they know that the disappearance of these erroneous theories would inevitably lead them into the unknown.

They even claim that the combination of the two previous theories, Einstein's general relativity and Schrödinger's partial differential equation, would allow them to develop a theory of everything.

- *They're Dreaming*

In other words, their strange assertion amounts to believing that two incomplete and misleading theories can constitute an ideal perfection [6,7,8,9].

The third topic addressed and analyzed in this article concerns, for the first time, the foundations of the discrete theory of spacetime.

We hypothesize that the prolonged neglect of the discrete theory of spacetime for over a century,is at the root of current errors in the understanding and development of new physical and mathematical laws, as well as in their underlying conceptual philosophy.

It should be noted that in discrete Markov chains (DMCs), efficiency is higher than in continuous Markov chains (CMCs), and that in Cairo techniques, the chains of matrix B possess a similar discrete set of states. The difference lies in the presence or addition of the boundary condition vector and the source/sink term vector in Cairo techniques, unlike Markov chains.

Another important difference is that, in the Cairo techniques, it is impossible to pre-select (by observation or experimentally) the time step dt, inherent in the nature of the problem in the given control volume, whereas in DMC, the time step is pre-selected according to a certain social performance.

However, the theory of Cairo techniques lives and operates within a suitable control volume defined by the shape and size, volume, surface area, and diffusion or absorption of its internal walls.

Whereas in DMC Markov techniques, where there is no control volume, this time step dt must necessarily be predefined by a temporal observation parameter.

It is crucial to remember that the goal of all these physical and mathematical models is to describe, with varying degrees of accuracy, the nature of our world.

The main difficulty lies in the fact that we only observe and measure the initial and final macroscopic states over a given period. We know practically nothing about the intermediate states, which can number in the thousands.

- *This is Precisely the Object and Role of the Cairo Technique in Statistical Theory.*

Finally, the fourth topic addressed and analyzed in this article concerns the need to create a Nobel Prize in mathematics, which has been sorely lacking for over a century.

To avoid dwelling on the details of the introduction, let us move directly to Section II, which is devoted to theory.

II. THEORY

The theory of discrete-time Cairo techniques is not merely a theoretical argument, but a claim supported by experimental results and precise measurements.

Applications of the theory of discrete-time Cairo techniques extend to almost all scientific fields, and also allow testing and confirmation or refutation of the validity of other theories.

It is worth mentioning that the discrete theory of Cairo techniques is not entirely new, as it has produced over 100 original scientific articles in less than 5 years.

We can highlight the contributions and innovations of the statistical theory of Cairo techniques in the following areas:

- Does the Schrödinger equation describe the wave function or its square? [1, 3, 16, 24]
- Einstein's relativity: special relativity and general relativity are incomplete and misleading [1, 2, 17]
- How to generate new mathematics [3]?
- Theory and Practice of Artificial Intelligence [8, 19, 25]
- Theory and Practice of Audio Rooms [10, 14, 15]
- Theory of Everything [10]
- Information theory, which underlies the six preceding themes, is still in its infancy [18, 19].

We believe that the main reason for the defects and incompleteness of Einstein's relativity, the Schrödinger equation, classical and quantum physics, pure mathematics and statistics, etc., is that they live and operate in a three-dimensional geometric space plus real time t as an external controller (R^4 space), which is an incomplete and inadequate space.

The author introduces and defines the concept of control volume (in a unitary x-t space in 4D), rarely mentioned in classical or quantum physics, or even in pure mathematics.

This concept of a closed control volume space, delimited by a closed surface A subject to Dirichlet boundary conditions, replaces the classical concept of an infinite space of limited utility.

The story of the recent volume of control began as an indispensable element only recently, in 2020, with the emergence of the revolutionary new statistical theory and

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matrix mechanics in the x-t 4D unit space based on chains of transition matrices B, called Cairo Techniques Theory [1,20].

This This theory, which models the behavior of nature, has proven capable of solving transient and stationary situations in classical and quantum physics in the most general cases, as well as pure mathematical problems (Table I).

Table 1 A Brief Comparison of Seven Solved Topics Using Cairo Theory Techniques, with a Red Arrow Indicating the Last Resistant Topic [10].

Table – Summary Analysis of the Seven Topics

Topic	Audience	Potential	Pros	Cons
1. Schrödinger Equation: wave function vs. squared	Intermediate/advanced	Medium	Classic topic that always sparks debate	Niche; does not give broad identity to the project
2. Einstein's relativity and possible incompleteness	Broad and curious	High	Highly engaging; opens space for rich discussions	Requires extreme rigor to avoid sounding like pseudoscience
3. How to generate new mathematics	Academic and creative	Medium	Original; strong niche	Difficult to maintain continuous and collaborative production
4. Theory and practice of AI	Very broad	Very high	Hot and current topic with growing interest	High competition; requires constant updates
5. Theory and practice of audio rooms	Specialized	Low/medium	Very useful for a professional niche	Lacks scientific universality
6. The theory of everything	Broad	Very high	Great appeal; unifies several fields	Highly speculative; difficult to maintain rigor
7. Information theory (foundation for all the others)	Medium/broad	Very high	Unifying, foundational, with applications everywhere	Still poorly understood by the general public

Finally, we present and explain the preliminary rules and foundations of the theory of temporal discretization that governs all the scientific laws we know.

The discrete-time theory of Cairo techniques can be defined and described in 1D, 2D and 3D geometric spaces.

The simplest 3D configuration is that of 8 equidistant free nodes subjected to Dirichlet boundary conditions and that of 27 equidistant free nodes also subjected to Dirichlet boundary conditions illustrated in Figure 2.

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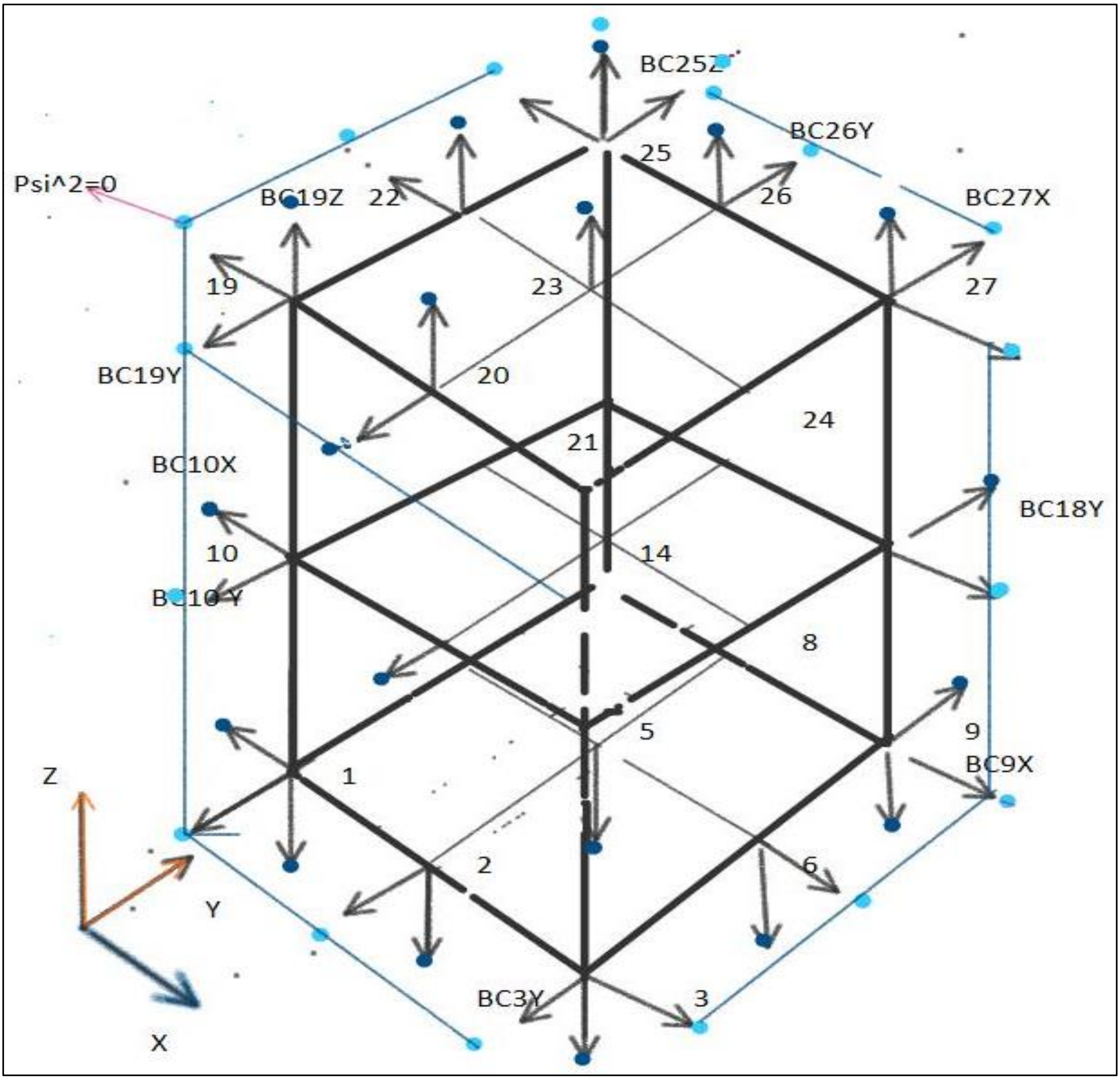

Fig 1 Illustrates a Cube of 27 Equidistant Free Nodes Subjected to 52 Dirichlet Boundary Conditions.

We explain in detail below the Cairo theory and procedure, including the discretization of time in 3 consecutive steps [20]:

- *First Step*

Discretize the 1D, 2D or 3D domain of the problem into n equidistant free nodes and find the appropriate stochastic transition matrix B satisfying conditions i-iv explained in reference 20.

For a correct choice of the transition matrix B, the following equation or hypothesis 3 concerning the spatio-temporal evolution of the energy density matrix U is verified:

U (x,y,z,t,t+dt) = B.U(x,y,z,t). (b + S) + B^N.IC (1)

Again,

B is the stochastic transition matrix of the model that generates or governs the evolution.

b is the vector of values for the 1D, 2D, or 3D boundary conditions, ordered appropriately.

S is the source vector included in the PDE or the problem itself.

IC is the vector of initial conditions, that is U(x,y,z,0).

Note that S = 0 in a Laplace PDE and is greater than zero in a Poisson PDE.

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Note also that U(x, y, z, N) is the spatio-temporal solution of the PDE corresponding to time t = Ndt, where the PDE itself is neglected or eliminated here.

Therefore, no FDM technique or any other iterative method will be required for the solution using matrix mechanics.

N represents the number of steps dt or iterations N (not to be confused with n the number of free nodes).

Once again, the statistical transition matrix B = (Bi,j) itself is well defined by 4 statistical assumptions explained in [20].

For example, in 2D Cartesian coordinates, the elements Bi,j satisfy the following four conditions:

- Bi,j = 1/4 for i adjacent to j, and Bi,j = 0 otherwise.

- The elements of B-transition probability B real and non-negative.

Which implies that the main diagonal is composed of constant elements RO.

For example, in the heat diffusion equation, RO can theoretically take any value in the semi-closed interval [0, 1[.Note that for Laplace and Poisson PDEs, RO = 0.

Bi,i equals zero, means that the transition matrix has a principal diagonal matrix with zero input elements.

Note again that RO=0 in the case of the electromagnetic wave energy density.

In other words, the transition matrix whose main diagonal has zero input elements corresponds to the assumption of zero residual energy density after each time step for all free nodes.

- The transition B-Matrix is symmetric, in accordance with the detailed physical principle of equilibrium.

Bi,j=Bj,i.

- The transition matrix B is doubly statistical in the sense that:

The sum of Bi,j is equal to 1 for all rows and/or columns far from the edges and less than 1 for all rows and/or columns adjacent to the edges, which means that the probability of the entire space is equal to 1.

Clearly, the statistical matrix B is very different from the Laplacian mathematical matrix A and the Markovian transition matrix M.

The physical nature of B is clear and briefly defined above by conditions i to iv, which confirm Hypothesis 3.

Once again, it is worth noting that Hypothesis iv makes the transition matrix B a doubly symmetric transition matrix [20,22,23,24].

➢ *Second Step*

Define the vector b, representing the boundary conditions, by correctly ordering these conditions.

And calculate the vector S, representing the source/sink terms, as a function of energy density (J/m³) rather than as a function of potential, voltage, or temperature (Kelvin) (as in the case of the heat diffusion equation).

➢ *Third Step*

Calculate the transfer matrices D and E, which are the solutions to the neglected or eliminated PDE which are expressed as,

E(N)=B^0+B+B^2+B^3+. . . +B^N . . . …………………..(1)

And,

D(N)=B+B^2+B^3+. . . +B^N . . ….. …………………...(2)

Equations 4 and 5 imply that:

D(N) = E(N) - I . . . ………………………………………..(3)

Since B^0 = I

Where I is the identity or unitary matrix nxn.

The time dependent solution U(x,t) is obtained straightforward by application of the following formula:

U(N+1) = B.(U(N). (b + s) +B^N.IC..................................(4)

Where N = 0, 1, 2, ..., N.

What is the solution U(x,t) at time t = Ndt, where N is the number of iterations in equation.

Note that D(N) is a tensor,

$D_{x,y,z}^{t} = D_{i,j,k}^{N}$

Where x=idx, y=jdy, z=kdz and t=Ndt.

It should also be noted that for sufficiently large N, corresponding to a sufficiently large time t = Ndt, the transfer function E(N tends to infinity) is given by:

E = 1/(I - B) ....(5)

And:

D = 1/(I - B) - I ....(6)

Here, the time-independent stationary solution is given by:

U(t tends to infinity) = D(N tends to infinity) * (b + s) + 0 .(7)

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- Note that E(N tends to infinity) =E is a matrix.

- Similarly D(N tends to infinity) =D is a matrix.

In equation 9, we substituted B^N.IC = 0 since the norm B is less than one.

Note again that the infinite series (5,6) can be evaluated in two equivalent ways:

- By summing the elements of the power series using matrix multiplication and addition rules [22,23] for a large number N, or
- By evaluating the infinite power series using the formula:

E = 1/(I - B) ....(8)

The simplicity and accuracy of the numerical statistical method are surprising, and the terms of the series expansion of the matrix converge stably and rapidly.

It suffices to first calculate the matrix B and the boundary condition vector b as functions of the field geometry and the boundary condition configuration of the problem, and then calculate the matrix E by summing the elements of the series expansion of B (equation (5)) or by using equation (7).

To avoid dwelling too much on the theoretical details, let's move directly to the 3D illustrations.

III. APPLICATIONS AND NUMERICAL RESULTS

In this section III of Applications and Numerical Results we will use the method of questions and answers for clarity.

We focus here on the following three topics: special relativity, general relativity, and the theory of time discretization.

A. Q1 What are the Main Mistakes of Einstein in his Theory of Special Relativity?

➢ *A1*

- *Attempt to Prove Universal Laws of Physics:*

The author claims that Einstein attempted to demonstrate the Lorentz transformation law through a thought experiment within the framework of his original theory of special relativity.

However, the Lorentz transformation law is a universal law of physics and, therefore, cannot be proved or demonstrated.

The Lorentz transformation law in one dimension can be interpreted as the conservation of four-dimensional unit space x-t during motion, that is:

x t = x*t* . . . …. ………………………………………….(9)

✓ *Equation 8, by itself, Constitutes the Theory of Special Relativity in a Single Sentence!*

Einstein once said that imagination is more important than knowledge, but we think that applies more to mathematics than to physics, as Hilbert claimed.

- *Redundant Assumptions:*

Einstein used five assumptions in his 1905 paper on special relativity, describing them as irreducible. However, we have shown that they can be reduced to only three in a rigorous algebraic derivation of Einstein's special relativity [21].

The constancy of the speed of light C is not a universal physical law, but the constancy of its square C^2 is.

C^2 represents the universal mass-energy constant:

$E = mc^2$. . . ……………………………………………….(10)

The constancy of the square of the speed of light, C^2, implies the constancy of the speed of light, C, and not the other way around.

The fundamental ideas of the theory could be deduced more simply here, without resorting to superfluous assumptions.

- *Inadequate Mathematical Space:*

We assume that the standard classical mathematical space used in general relativity (Riemannian space) is inadequate and misleading, calling it a “satanic trap” into which Einstein fell.

We propose an alternative discrete numerical statistical theory in a real unitary x-t space, called the Cairo technique, and use its B-matrix statistical chains as a superior method to justify aspects not only of relativity, but also of virtually all the laws of physics and mathematics.

- *Separation of the Two Theories of Relativity*

In 1905, Einstein proposed his theory of special relativity for two frames of reference moving in a straight line at constant velocity relative to each other.

In other words, the acceleration is zero.

In 1915, he proposed his theory of general relativity for two frames of reference moving with any acceleration relative to each other.

It goes without saying that this proposition is illogical, since special relativity is simply a special case of general relativity obtained by setting the acceleration to zero.

- ✓ *Einstein was Unable to Prove this Simple Fact, and these Two Theories Remain Distinct.*

It is interesting to note that this was the first time that the theory of special relativity could be deduced from general relativity, as illustrated by the following question (Q2).

- ✓ *This Demonstrates that the Discrete Statistical Theory of Cairo Techniques is Indeed the Theory of Everything.*

It is worth mentioning that this same theory proposes replacing the standard Schrödinger partial differential equation for ψ with its square describing ψ².

It is amazing to note that all textbooks state that ψ must be continuous and that its first derivative must also be continuous, whereas solving the simple problem of a quantum particle in an infinite potential well using a one-dimensional Schrödinger PDE reveals the opposite:

Its first derivative of ψ is not continuous at the boundaries, but only the first derivative of ψ² is continuous there.

We can apply the statistics of the Cairo technique theory to a well-defined quantum physical situation in terms of ψ², then apply the original Schrödinger partial differential equation to the same defined situation and find the affinity zones and/or decoherence zones of the two solutions.

B. Q2 What are the Main Mistakes of Einstein in his Theory of General Relativity?

- ➢ *A2*

- *Like special relativity, Einstein attempted to prove his theory of general relativity (GR) through another dubious thought experiment, leading to a catastrophic conclusion:*

- *The Force of Gravity is Nothing More than a Consequence of the Curvature of Space.*

However, the truth is that general relativity (GR) is nothing more than the Lorentz transformation in four-dimensional unit space xyzt, interpreted as follows:

[Force matrix/tensor F] . [Curvature matrix/tensor C] = I .(11)

Where I is the identity matrix.

Equation 10 can be interpreted as the Lorentz transformation law which is the conservation of unit space 4D xyzt in motion.

Equation 10 represents a universal physical law and, therefore, cannot be proven.

This observation reduces the proof of general relativity to a single sentence:

F.C = I . . . . …(12)

But both the force and curvature matrices F,C of equation 10 must be correctly redefined.

The conclusion is that gravity is a real force that causes the curvature of space, and not the other way around.

- *Wrong and Ambiguous Derivation*

We propose a more correct and accurate spatiotemporal energy density matrix/tensor that conforms to equation 10 given by:

∇^2xx ∇^2xy ∇^2xz ∇^2xt]U(x,y,z,t)

∇^2yx ∇^2yy ∇^2yz ∇^2yt]U(x,y,z,t)

∇^2zx ∇^2zy ∇^2zz ∇^ zt]U(x,y,z,t)

∇^2tx ∇^2ty ∇^ 2tz ∇^2tt]U(x,y,z,t)

Where

∇^2xy = d^2/dx dy)partial, ∇^2tz=d^2/dtdz)partial, ∇^2tt=d^2/dt^2)partial . . etc.

We call the previous matrix M1.

- *We Again Propose Another More Accurate Spatio-Temporal Curvature Matrix/Tensor given by*

Cxx Cxy Cxz Cxt

Cyx Cyy Cyz Cyt

Czx Czy Czz Czt

Ctx Cty Ctz Ctt

We call this matrix M2

Where Cxy=dxdy/xy, Cyy=dy^2/y^2, Ctz=dtdz/tz . . etc.

- *We Apply the Universal Physical Lorentz Transformation Law in a 4-Dimensional Unitary xyzt Space,*

M1 * M2 = I . . . .(12)

Where I is the unit matrix.

Equation 11 is itself the law of general relativity or the conservation of the space-time element xyzt implied by the Lorentz universal transformation law.

The law of special relativity is a special case of the law of general relativity, and it can be derived by setting the shear elements in the stress and strain tensors equal to zero, i.e:

∇^2xx 0 0 ∇^2xt]U(x,y,z,t)

0 0 0 0]U(x,y,z,t)

0 0 0 0]U(x,y,z,t)

∇^2tx 0 0 ∇^2tt]U(x,y,z,t)

So we now have two distinct theories of general relativity mec: one based on the original 1915 theory of A. Einstein stress strain tensor equation, and the other based on the author stresses strain tensor equation.

C. Q3 What are the Foundations of Discrete Time Theory?

➢ *A3*

Most of physicists and mathematicians believe that time is continuous and not discrete, but we believe the opposite.

Einstein once said that geometry is physics which is true and exact saying.

Therefore we refer to the cornerstone of geometry, the well-known pythagoras theorem to give preliminary idea about spaces.

- *The Pythagorean Theorem in Mathematics:*

$a^2 + b^2 + c^2 = d^2$

a = side of the right triangle along the x-axis.

b = side of the right triangle along the y-axis.

c = side of the right triangle along the z-axis.

d = hypotenuse.

- *The Pythagorean Theorem in Physics:*

$a^2 + b^2 + c^2 + d^2 = e^2$… …………………………………...(13)

a = side of the right triangle along the x-axis.

b = side of the right triangle along the y-axis.

c = side of the right triangle along the z-axis.

d = side of the right triangle along the time axis.

e = hypotenuse.

Further analysis shows that time in equation (12) is discrete and not continuous.

- *Further Analysis Shows that Time in Equation (12) is Discrete and Not Continuous.*

However, most mathematicians and physicists do not accept the above fact.

They argue that physics and mathematics would become extremely difficult if expressed in terms of discrete time, because the discrete case would be fundamentally unsolvable, and the analyses of Newton and Leibniz would no longer be applicable.

- *The Answer is Simple:*

✓ Physics and mathematics would certainly be very different, but not insurmountable.
✓ Newton and Leibniz were not gods, and we can perform all differentiations and integrations without resorting to the finite difference method, and even solve partial differential equations, whether they depend on time or not, in the general case by neglecting them completely.

We simply need to use Cairo's statistical theory, or any other suitable discrete statistical theory.

It is absolutely necessary to adopt a new approach, because we are mistakenly using current mathematics to model reality in an approximate way. Cairo's discrete statistical theory has proven to be the theory of everything.

We assume that Einstein's relativity and Schrödinger's partial differential equation are both incomplete and misleading because they apply to continuous time, not discrete time.

Author's discrete-time stress-strain tensor allows us to derive Einstein's general relativity in a single sentence.

- *We Reiterate that Equation 10 Explains the Following:*

- Gravity is a real force that curves space-time, and not the other way around.
- Author's stress-strain tensor can demonstrate that special relativity is a special case of general relativity simply by setting acceleration to zero, unlike Einstein's stress-strain tensor.
- We assume that the Planck length can be better defined and explained using Author's stress-strain tensor. Finally, we thank our Italian colleague, Professor Filippo Maria Denaro, for his relevant and helpful response. Techniques in a suitable volume of control.

D. Q4 Should we Create a Nobel Prize in Mathematics?

➢ *A4*

Most people think that mathematics is a closed field where original mathematical research has been abandoned for decades, which is completely false. The author is convinced that there are thousands of new, unexplored mathematical rules and formulas just waiting to be discovered or generated.

- *The Question then Arises: how do we Generate such New Mathematics?*

We assume that there are three main methods for generating new mathematics. The choice between them depends on the user's preferences, knowledge, and experience: i- Use existing mathematics, composed of a virtually infinite number of axioms and theories, to generate new mathematics. Mathematics can generate new mathematics. ii- Use four-dimensional topology to describe and analyze quantum mechanical systems, based on the 1927

Schrödinger equation, to generate new expressions and formulas describing vacuum dynamics.

Fundamental questions about the nature of cosmic space, linked to the universal laws of thermodynamics, such as the entropy of a vacuum, the density and temperature of dark matter, etc., remain unanswered.

Today, six Nobel Prizes are awarded each year, one in each of the following categories: literature, physics, chemistry, peace, economics, and physiology and medicine.

Yet mathematics, a discipline essential to humanity, is strangely absent and has remained…

Isn't it time to reconsider this situation?

IV. CONCLUSION

There are two distinct theories of general relativity: Einstein's classical general relativity (1915) and modern general relativity, derived from the Cairo technique and introduced by the author in 2020.

We demonstrate that the general relativity proposed by the author, which exists and operates in a four-dimensional unit space xyzt where time is discrete and not continuous, is more complete than Einstein's classical theory.

In his 1905 paper on special relativity, Einstein used five redundant assumptions, describing them as irreducible, when in reality they can be reduced to three.

In his 1915 theory of general relativity, he used flawed reasoning, based on a dubious thought experiment in continuous space-time, and arrived at a false conclusion:

Gravity would be a consequence of the curvature of space-time, whereas in reality the opposite is true.

Finally, we briefly explain the foundations of the theory of time discretization

NB. The author uses his own double precision algorithm, such as that of references 23,24 and 25.

No ready-to-use Python or MATLAB algorithms are needed.

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