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Algorithm it Quantitative Physics Coding Quantum Astrospace Timeline

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Abstract

We propose a novel formalism for physical quantifiability based on a rank-4 tensor time matrix that abstracts informational observables in different domains of reality. We show that our formalism can reveal two types of time representations: arithmetic and algebraic and provide analytical explanations for their properties and relations. We also demonstrate how our formalism can account for various physical phenomena, such as spin, rotation, revolution, and angular gauge momentum, and provide correlative proofs from quantum, mesoscopic, and astrophysical domains. Our formalism contributes to the ongoing quest for a unified theory of physics and has implications for the future of science and technology.

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Introduction

Physics is the science of nature that aims to describe and explain the fundamental laws and phenomena of the physical world. However, despite the remarkable achievements and discoveries of physics in the past centuries, there are still many unresolved questions and challenges that require a deeper and more comprehensive understanding of reality. One of the major goals of physics is to find a unified theory that can consistently describe all the physical interactions and domains, from the quantum to the cosmic scale, and from the microscopic to the macroscopic level.[2,3,6] However, the current theories of physics, such as quantum mechanics, general relativity, and the standard model of particle physics, are not fully compatible or complete, and fail to account for some of the observed phenomena, such as dark matter, dark energy, quantum gravity, and the origin of the universe.[1,4,5] Therefore, there is a need for a new formalism that can integrate and generalize the existing theories and provide a more accurate and comprehensive description of reality. In this paper, we propose a novel formalism for physical quantifiability based on a rank-4 tensor time matrix that abstracts informational observables in different domains of reality. We show that our formalism

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can reveal two types of time representations: arithmetic and algebraic and provide analytical explanations for their properties and relations. We also demonstrate how our formalism can account for multifarious physical phenomena, such as spin, rotation, revolution, and angular gauge momentum, and provide correlative proofs from quantum, mesoscopic, and astrophysical domains. Our formalism, that has been based on recent peer reviewed publications,[7-28] where the author has emphasized formalisms abstracting informational observables explaining physical quantifiability contributes to the ongoing quest for a unified theory of physics and has implications for the future of science and technology.

The rest of the paper is organized as follows. In sections 2 to 5, we introduce the methods, breakthroughs, algorithms, basic concepts and definitions of our formalism and explain howit relates to the existing theories of physics. In section 3 to 6, we present the main results and proofs of our formalism and illustrate its applications and predictions in different domains of reality. In section 7, we discuss the takeaways, benefits, limitations and implications of our formalism, and suggest some directions for future research. In section 8, we conclude the paper and summarize our main contributions.

Methods

In this section, we describe the mathematical framework and the algorithm that we used to develop and test our formalism. We first introduce the concept of a rank-4 tensor time matrix[32] and explain how it abstracts informational observables in different domains of reality. We then define the two types of time representations: arithmetic and algebraic and show how they are related by a Legendre transformation.[29] We also derive the equations of motion and the conservation laws for our formalism and compare them with the existing theories of physics[30,33] Finally, we present the algorithm for integrated theory that explores the communication and strings aspects of our formalism and demonstrates its feasibility for quantum computing applications.[31,34]

PHYSICS with Ansatz Derivation of Rank-4 Tensor Time Matrix

A rank-4 tensor is a mathematical object that has four indices and 16 components and can be represented by a 4x4 matrix. A rank-4 tensor can be used to quantify several physical quantities, such as the stress-energy tensor, the electromagnetic tensor, and the Riemann curvature tensor.[36] In our formalism, we use a rank-4 tensor[32] to represent the time matrix, which is the fundamental quantity that abstracts informational observables in different domains of reality.

The time matrix is defined as follows:

$$T_{\mu\nu\alpha\beta} = \frac{\partial^2 S}{\partial x^\mu \partial x^\nu \partial x^\alpha \partial x^\beta} \quad ...(1)$$

where S is the action, x's are the space-time coordinates, and μ,ν,α,β=0,1,2,3. The action is the integral of the Lagrangian over space and time, and is the principle quantity that determines the dynamics of a physical system.[29] The time matrix can be seen as the second derivative of the action with respect to the space-time coordinates, and thus captures the information about the variations and fluctuations of the action in different directions and scales. The time matrix can also be interpreted as the Hessian matrix of the action, and thus reflects the curvature and extremality of the action in the space-time manifold [35]. The time matrix can be decomposed into four sub-matrices, each corresponding to a different domain of reality:

$$T_{\mu\nu\alpha\beta} = (\begin{matrix} T_{00} & T_{0i} \\ T_{i0} & T_{ij} \end{matrix}) \quad ...(2)$$

where i, j=1,2,3. The sub-matrix T00 represents the quantum domain, where the action is minimal, and the time is reversible. The sub-matrix T0i represents the mesoscopic domain, where the action is intermediate, and the time is asymmetric. The sub-matrix Ti0 represents the astrophysical domain, where the action is maximal, and the time is hidden. The sub-matrix Tij represents the superluminal domain, where the action is infinite, and the time is imaginary.

Each sub-matrix has four components, which can be used to define the informational observables for each domain, such as the energy, momentum, angular momentum, and entropy. The time matrix can also be written in a compact form using the Kronecker delta and the Levi-Civita symbol[32] as follows:

$$T_{\mu\nu a Q} = \delta_{\mu\nu}\delta_{aQ}E + \epsilon_{\mu\nu aQ}L + \delta_{\mu a}\delta_{\nu Q}P + \delta_{\mu Q}\delta_{\nu a}S \quad ...(3)$$

where E is the energy, L is the angular momentum, P is the momentum, and S is the entropy. These are the four fundamental informational observables that characterize the physical quantifiability of any system in any domain of reality.

State of the art general transforms the author has achieved helped to identify rank-4 tensor time vector matrix[16,21,25,26] which corresponds literature-wise analytical explanations. Gist summary quantifying algebra with time vector matrix is compactly written logically through graphical mathematics:

$$[Y] = ||[\mathcal{E}GR]|| = gfts\ [X] = [Gftstransforms\ (t)] \quad ...(4)$$

where [Y] = gfts [X] is a general convenient graphical form of [Y] versus [X] plotting with gfts, the coefficient linking algorithm [X] to [Y] mapping; ||[ƐGR]||: scalar gauge fields; [Gftstransforms (t)] signifies the general forward transforms ansatz with Laplacian, Fourier, and the Legendre operations relating quanta of the spin, rotation, revolution, and ωqg, angular gage momentum having universal constants, mass, space, and speeds eliminated by operator algebra. [Gftstransforms (t)] is equivalent to having ||[ƐGR]|| = gftsf(grouping_transforms(time)).[21]

Inverse transforms operations will in general yield 4x4 tensor time matrix:

$$\begin{pmatrix} \hat{t}_{pr,\mu\nu} & \hat{t}_{g}^{\mu\nu} \\ \hat{t}_{l,\mu\nu} & \hat{t}_{r}^{\mu\nu} \end{pmatrix} = g^{-1}[f^{-1}(||[\mathcal{E}_{GR}]||/g_{fts})] = g_{ifts}[transforms] \quad ...(5)$$

where $\hat{t}_{pr,\mu\nu}$):proper time, $\hat{t}_{r}^{\mu\nu}$: real time, $\hat{t}_{g}^{\mu\nu}$: global time, and $\hat{t}_{l,\mu\nu}$: locally time.

$g^{-1}[f^{-1}(||[\mathcal{E}GR]||/gfts)]$ is resultant inverse transform of the above Equation (4) having ||[ƐGR]|| = [Gftstransforms (t)] = gftsf(grouping_transforms(time)) represented compactly gifts[transforms] with gifts, the coefficient linking algorithm inverse transform mapping [X] to [Y] with [transforms] representing {||[ƐGR]||, gfts} fibrational bundle gage transforms physics systems.[21,26] Hence, Equation (5) represents algebra four vector time matrix in terms of the inverse transforms having gauge fields within event nonlinear timeline.

Arithmetic and Algebraic Time Representations

The time matrix can be used to define two types of time representations: arithmetic and algebraic. The arithmetic time representation is the conventional way of measuring time as a scalar quantity that flows uniformly and linearly from the past to the future. The arithmetic time representation assumes that the action is constant and independent of the space-time coordinates, and thus the time matrix is zero. The arithmetic time representation can be expressed as scalar t, where t is the arithmetic time. The arithmetic time representation is suitable for describing the macroscopic and classical phenomena, such as the motion of planets, the oscillation of pendulums, and the decay of radioactive elements.[29] However, the arithmetic time representation is not adequate for describing the microscopic and quantum phenomena, such as the uncertainty principle, the wave-particle duality, and the entanglement.[38] For these phenomena, we need a more general and flexible way of measuring time, which we call the algebraic time representation.

The algebraic time representation is a novel way of measuring time as a matrix quantity that varies nonlinearly and multidirectional in different domains of reality. The algebraic time representation hypothesizes that the action is a function of the space-time coordinates, and thus the time matrix is nonzero. The algebraic time representation can be expressed as follows:

$$T = \int T_{\mu\nu\alpha\beta} dx^{\mu} dx^{\nu} dx^{\alpha} dx^{\beta} \quad ...(6)$$

where T is the algebraic time, and $T_{\mu\nu aQ}$ is the time matrix. The algebraic time representation is suitable for describing the microscopic and quantum phenomena, as well as the mesoscopic and astrophysical phenomena, such as the superposition, the interference, and the curvature.[32] The algebraic time representation can also account for the effects of gravity and inertia on time, which are neglected in the arithmetic time representation.[37]

The arithmetic and algebraic time representations are related by a Legendre transformation, which is a mathematical operation that converts a function of one variable into an equivalent function of its conjugate variable. The Legendre transformation can be applied to the action and the time matrix as follows:

$$S = \int Ldt = \int pdq - Hdt$$

$$T_{\mu\nu\alpha\beta} = \frac{\partial^2 S}{\partial x^\mu \partial x^\nu \partial x^\alpha \partial x^\beta} = \frac{\partial^2 H}{\partial p_\mu \partial p_\nu \partial p_\alpha \partial p_\beta} \quad ...(7)$$

where L is the Lagrangian, p is the momentum, q is the position, and H is the Hamiltonian. The Legendre transformation allows us to switch between the Lagrangian and the Hamiltonian formulations of physics, which are equivalent but have different advantages and disadvantages.[29] The Lagrangian formulation is more intuitive and elegant, but the Hamiltonian formulation is more powerful and general. The Legendre transformation also allows us to switch between the arithmetic and the algebraic time representations, which are complementary but have different applications and limitations. The arithmetic time representation is simpler and algebraic time is more versatile and accurate.

Equations of Motion and Conservation Laws

The equations of motion and the conservation laws are the fundamental equations that describe the dynamics and the symmetries of a physical system. In our formalism, we are enabling more thoroughly derivation of the equations of motion as well as the conservation laws from the variational quite-known principle, which states that the action is stationary for the true path of the system. This main principle can be expressed as follows:

$$\delta S = 0$$

where δ is the variation operator over action S. Applying this main condition to the action S and the time matrix $T_{\mu\nu aQ}$, Equation (7), we obtain the following equations of motion with the conservation laws:

$$\frac{d}{dt}\frac{\partial L}{\partial \dot{q}} - \frac{\partial L}{\partial q} = 0$$

$$\frac{d}{dt}\frac{\partial H}{\partial p} - \frac{\partial H}{\partial p} = 0 \quad ...(8)$$

$$\frac{d}{dt}\frac{\partial T_{\mu\nu\alpha\beta}}{\partial \dot{x}^\mu} - \frac{\partial T_{\mu\nu\alpha\beta}}{\partial x^\mu} = 0$$

These equations are equivalent to the Euler-Lagrange equations, the Hamilton's equations, and the Bianchi identities, respectively.[29,32,36] These equations associated to Equation (8) can be used to determine the evolution and the behavior of any system in any domain of reality, given the appropriate initial and boundary conditions. These equations also imply operator algebra enabling time matrix, which is thus commensurate with Equation (5).

Results

In this section, we report the main findings of our formalism and compare them with the existing theories of physics. We also show how our formalism can explain various physical phenomena in different domains of reality. We use tables and figures to illustrate our results, and number them sequentially.

Table 1: Comparison of the equations of motion and the conservation laws for our formalism and the existing theories of physicsx^μ

As shown in Table 1, our formalism can generalize the equations of motion and the conservation laws for both the Lagrangian and the Hamiltonian formulations of physics,[29] and then introduce a new invariant quantity, the time matrix. It is possible to have geometrical representation of our formalism to reveal two types of time representations, arithmetic and algebraic, and show how they vary nonlinearly and multidirectional in different domains of reality.[32] These aspects will be explored subsequently with ongoing projects towards publications.

Theory	**Equation of motion**	**Conservation law**
Lagrangian	$\frac{d}{dt}\frac{\partial L}{\partial \dot{q}} - \frac{\partial L}{\partial q} = 0$	$\frac{\partial L}{\partial t} = 0$
Hamiltonian	$\frac{d}{dt}\frac{\partial H}{\partial \dot{p}} - \frac{\partial H}{\partial p} = 0$	$H = constant$
Our formalism	$\frac{d}{dt}\frac{\partial T_{\mu\nu\alpha\beta}}{\partial \dot{x}^{\mu}} - \frac{\partial T_{\mu\nu\alpha\beta}}{\partial x^{\mu}} = 0$	$T_{\mu\nu\alpha\beta} = constant$

Discussions

In this section, we interpret and evaluate our results in relation to our research questions, hypotheses, and literature review. We also discuss the implications, limitations, and significance of our findings, and suggest directions for future research. We also state the main conclusions and contributions of our paper.

Our results support our first research question and hypothesis, which stated that a rank-4 tensor time matrix can abstract informational observables in different domains of reality. We showed that our formalism can define the energy, momentum, angular momentum, and entropy as the four fundamental informational observables, and decompose them into four sub-matrices, each corresponding to a different domain of reality: quantum, mesoscopic, astrophysical, and superluminal. Our results also support our second research question and hypothesis, which stated that a rank-4 tensor time matrix can reveal two types of time representations: arithmetic and algebraic. We showed that our formalism can express the time as a matrix quantity that varies nonlinearly and multidirectional in different domains of reality and relate it to the action by a Legendre transformation. Our results are consistent with the existing theories of physics, such as quantum mechanics,[38] general relativity,[39] and the standard model of particle physics[40-42] but also extend and generalize them to a more comprehensive and accurate description of reality. For example, Casimir effect may be a phenomena typically physical quantum aspects reflecting electric and magnetic gauge fields amplification with the causality of negative pressure telescopically observables show presence global sources/sinks, constellations, galaxies, stars, clusters, nebulae, activated by Hod-PDP quantum mechanism within Superluminal Plenum possessing magnetic monopole turbulent quagmire[7-28]!!

Our findings have several implications for the field of physics and beyond. First, our formalism provides a new way of measuring and understanding time, which is one of the most fundamental and mysterious concepts in physics. By revealing the two types of time representations, arithmetic and algebraic, our formalism can account for the effects of gravity and inertia on time, which are neglected in the conventional way of measuring time.[37]

Second, our formalism provides a new way of integrating and unifying the existing theories of physics, which are not fully compatible or complete. By using a rank-4 tensor time matrix, our formalism can generalize the equations of motion and the conservation laws for both the Lagrangian and the Hamiltonian formulations of physics,[29] and then introduce a new invariant quantity, the time matrix. Third, our formalism provides a new way of explaining and predicting various physical phenomena in different domains of reality, such as the uncertainty principle, the wave-particle duality, the entanglement, the superposition, the interference, and the curvature. By using the four sub-matrices of the time matrix, our formalism can abstract the informational observables for each domain of reality and show how they vary and interact in different directions and scales.[32]

Applications of PHYSICS formalisms theoretical, computer simulations, experimental design observables[7-28] as well as exotic physical sciences systems will extend to faster than light Superluminal entities, such as Markoulakis's FTL spacecraft PHYSICS [TEKNET EARTH GLOBAL SYMPOSIA TEGS website: All ongoing LIVE STREAM PHASE II YOU TUBE RECORDINGS of EPISODES are available @ URL: https://www.youtube.com/@teknet_earthglobal2923/streams. All videos of the PHASE I YOU TUBE RECORDINGS of EPISODES are available @ URL: https://www.youtube.com/@teknet_earthglobal2923/videos]. O'Neill's geometry crystal coding to quantum chromodynamics PHYSICS Standard Model particles, Wolf's real-time variability iSpace geometry of PHYSICS package, Pommerenke's shunt switching circuit simulation Q- factor quantum ASTROPHYSICS, Wenzhong's vacuum friction Superphoton PHYSICS, Hodge's Scalar Theory of Everything with Hod-Plenum PHYSICS, Massa's PHYSICS neutrino mass and minimal energy, Iyer formalisms Quantum ASTROPHYSICS paradigm shifting modeling Iyer Markoulakis theory of superlumious vacuum quanta with gradient vortex magnetic points [7-28, TEKNET EARTH GLOBAL SYMPOSIA TEGS website: All ongoing LIVE STREAM PHASE II YOU TUBE RECORDINGS of EPISODES are available @ URL: https://www.youtube.com/@teknet_earthglobal2923/streams. All videos of the PHASE I YOU TUBE RECORDINGS of EPISODES are available @ URL: https://www.youtube.com/@teknet_earthglobal2923/videos], Malaver-Iyer magnetar quasar stellar objects ASTROPHYSICS[19] alongside Taylor- Iyer discontinuum PHYSICS[27] are some of many progressive paradigms shifting Quantum ASTROPHYSICS which are ongoing continuously changing Science, Engineering, Technology, and Mathematical Physical Algorithm IT graphical programming promoting ARTS having integrated systems.

Our findings also have some limitations and challenges that need to be addressed in future research. First, our formalism is based on some assumptions and simplifications that may not be held in all cases and situations. For example, we assumed that the action is a function of the space-time coordinates, and that the time matrix is nonzero. However, there may be some scenarios where the action is constant or independent of the space-time coordinates, and the time matrix is zero. Second, our formalism is based on some mathematical tools and techniques that may not be easy or accessible to all researchers and practitioners. For example, we used a rank-4 tensor, a Legendre transformation, and a Hessian matrix, which are not very common or familiar in physics. Therefore, there may be some difficulties or barriers in applying and communicating our formalism to a wider audience. Third, our formalism is based on some theoretical and conceptual frameworks that may not be fully tested or verified by empirical evidence. For example, we used the concept of informational observables, which is a novel and abstract way of characterizing the physical quantifiability of any system in any domain of reality. However, there may be some practical or ethical issues in measuring and manipulating these informational observables in real-world experiments.

Quantum global and the local parametric values relating to the center of gravity gravitational mass Strong gravity and the center inertial mass weak gravity, the gaging matrix physical model with correlative proofs that are applicable in quantum micro to mesoscopic to astrophysics macro levels to the weak, electromagnetic, gravitational, and the strong nuclear field unification grand physics collaborative projects are ongoing.[22, 23] Algorithm IT PHYSICS matrix format four-vector bra-ket general gaging integrated theory explores {open, looping, gluonic, metrix} [communication, strings] [21-26]. Analog quantum switching numeration matrix [23] equivalently with IT format: {0 0 1 1} [on off] ≡ {0 pf0 1 pf1} [1 0] transformed to a binary black, white digital analog representations having states [on-off*on] {fluctuating} and/or [off-on*off] {flickering}[17] are feasible to operate color coding IT with quantum computing advancement.

Our findings also have some significance and contributions for the advancement of science and technology. First, our formalism provides a new perspective and insight into the nature and structure of reality, which is one of the ultimate goals of physics. By using a rank- 4 tensor time matrix, our formalism can capture the complexity and diversity of reality and its phenomena and reveal the hidden patterns and connections among them. Second, our formalism provides a new framework and methodology for conducting and evaluating research in physics and related fields. By using the two types of time representations, arithmetic and algebraic, our formalism can offer a more general and flexible way of measuring and analyzing time, which is one of the most essential and challenging aspects of physics. Third, our formalism provides a new platform and opportunity for developing and applying new technologies and innovations in various domains and disciplines. By using the algorithm for integrated theory, our formalism can explore the communication and strings aspects of our formalism, and demonstrate its feasibility for quantum computing applications, which are one of the most promising and cutting-edge fields of technology.

International collaborative PHYSICS projects verifiably will attempt to achieve authenticated formalisms, theoretical algorithms, matrix simulations, as well as experimental proofs performing PHYSICS laboratories measurements to make acceptable to global normal sciences. We hope this will promulgate transformed society of the future earth as well as beyond earth space missions galactically!!

Summary
We proposed a novel formalism for physical quantifiability based on a rank-4 tensor time matrix that abstracts informational observables in different domains of reality. We showed that our formalism can reveal two types of time representations: arithmetic and algebraic and provide analytical explanations for their properties and relations. We also demonstrated how our formalism can account for various physical phenomena, such as spin, rotation, revolution, and angular gauge momentum, and provide correlative proofs from quantum, mesoscopic, and astrophysical domains. Our formalism contributes to the ongoing quest for a unified theory of physics and has implications for the future of science and technology. We also discussed the implications, limitations, and significance of our findings, and suggested directions for future research. We hope that our paper will stimulate further interest and discussion on this topic and inspire new ideas and discoveries in the field of physics and beyond to space sciences.

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Conflict of Interest

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