



A Reality-Oriented Philosophical Framework for Modern Physics

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Abstract

This article examines the hidden physical reality underlying modern mathematical physics and argues that excessive dependence on abstract mathematical formalism has gradually separated micro-domain physics from reality-based conceptual understanding. Mathematics, being fundamentally a relational and quantitative tool, can successfully correlate physical parameters but cannot independently establish the ontological reality of physical entities and mechanisms. The article emphasizes that philosophy, logic, conceptual physics, and mathematics must function together for a comprehensive understanding of nature. The work proposes that the universe is fundamentally constituted of two formless physical realities: mass and space, while all observable entities are mass-space integral systems possessing form and form-based properties. The paper further argues that the universal norms of nature- consistency, continuity, causality and similarity of structure across different domains should remain valid from micro-micro domain to macro-macro domain. Based on this principle, the article critically re-examines prevailing concepts such as wave-particle duality, identical nature of fundamental particles, abstract field theory, matter-free vacuum, quantum indeterminacy and the interpretation of the Michelson–Morley experiment. A reality-based interpretation of field, space, time, space-time, gravity, atomic structure and light propagation is proposed by considering physical space with space matter particle of finer domain as a dynamic fluid medium. The article further attempts to establish conceptual continuity between atomic systems and celestial systems through the uniformity of nature. It is argued that many quantum phenomena presently treated as acausal or abstract may originate from hidden causal processes operating in deeper micro-micro domains beyond current observational limits. The study finally suggests that incorporation of reality-based universal norms into mathematical formalism may help reduce the growing separation between conceptual physics and mathematical physics, thereby contributing toward a more unified understanding of science and nature.

Keywords: *Conceptual Physics, Mathematical Physics, Physical Reality, Mass-Space Interaction, Philosophy of Science, Space-Time, Quantum Causality, Field Theory, Physical Vacuum, Unification of Sciences*



Introduction

Modern physics has achieved extraordinary success in quantitatively describing natural phenomena through mathematical formalism. However, the increasing dependence on abstract mathematical structures has also raised philosophical questions regarding the underlying physical reality represented by such formulations. Mathematical physics is highly effective in correlating measurable parameters and predicting experimental outcomes, yet mathematical consistency alone may not always guarantee conceptual clarity regarding the physical nature of the entities and mechanisms involved. Conceptual physics attempts to understand nature through causality, physical feasibility, continuity and reality-based interpretation. Mathematics, philosophy, logic and physics therefore perform complementary rather than competing roles in scientific understanding. Mathematics provides quantitative relationships, while philosophy and conceptual physics help examine the ontological and causal significance of physical theories.

The present work argues that excessive dependence on domain-specific assumptions in micro-domain physics has gradually separated microphysics from the continuity observed in macro-domain nature. As a result, the structures, properties and interactions of micro particles are often considered fundamentally different from those of larger systems. The article proposes that the observable universe may instead obey common universal norms across all domains of nature. In the present framework, the fundamental formless constituents of the physical universe are considered to be mass and space [1]. All observable entities are treated as mass-space integral systems possessing form and form-based properties [2]. Properties such as charge, energy, temperature and field are interpreted as state properties emerging from the configuration and interaction of mass-space systems [3] [4]. The article further explores the possibility that the continuity and uniformity observed in macro-domain systems may also extend into micro and micro-micro domains [5]. Based on this philosophical standpoint, several prevailing concepts of modern physics including abstract vacuum, wave-particle duality, independent field ontology and quantum acausality are critically re-examined. The objective of the study is not to reject mathematical physics, but to emphasize that mathematical formalism and physical realism should evolve together. The work therefore attempts to develop a conceptual framework in which philosophy, causality and physical feasibility remain integrated with scientific formalism.

Universal Norms of Nature

The present work proposes that nature follows certain universal norms that remain valid across different domains of existence. These norms are not considered merely mathematical assumptions but philosophical principles inferred from continuity and uniformity observed in the natural world.



The first proposed norm is the consistency of nature. Natural laws do not arbitrarily change with time or domain. A principle operating in one domain may appear in modified form in another domain, yet the underlying causality remains continuous [6] [7].

The second proposed norm is the uniformity of structure and feature across domains. The observable universe reveals organized systems at multiple scales, including atomic systems [6], planetary systems, stellar systems and galactic systems. Although dimensions and physical conditions differ significantly, structural similarities may indicate deeper continuity in nature.

The third proposed norm is the universal presence of mass and space in all physical existence. According to the present framework, all observable forms are mass-space integral systems possessing definite geometrical configuration and state properties [8].

The fourth proposed norm is causality. Every physical event is assumed to possess a cause, even if that cause remains hidden due to observational limitations. From this standpoint, quantum events presently treated as probabilistic or acausal may originate from hidden processes operating in deeper domains beyond current experimental reach [5].

The article argues that if such universal norms are maintained consistently while formulating physical theories, the separation between macro-domain and micro-domain understanding may gradually reduce.

Reality in Atomic Structure

The early planetary models of the atom were inspired by the observed similarity between atomic systems and celestial systems. Although those early models could not fully explain atomic spectra, the present work argues that their philosophical basis the uniformity of nature should not necessarily be abandoned. The failure of the planetary model may have resulted not from the absence of structural similarity, but from incompleteness in the modelling process. Instead of extending the model by incorporating additional structural features, modern physics gradually adopted increasingly domain-specific assumptions that departed from macro-domain intuition.

The present work proposes that centrally organized systems throughout nature may possess common structural characteristics [2]. Examples include solar systems, galactic systems, and atomic systems, each consisting of a central region and surrounding organized structure. In this interpretation, the atomic system is viewed as a mass-space organized structure rather than an abstract probabilistic entity. The article



further proposes that atomic phenomena may arise from interactions involving finer micro-micro domain constituents associated with structured physical space.

The proposed framework also attempts to reinterpret charge as a state property related to mass-space configuration [3]. In this view, different forms of charge observed in different domains may represent domain-specific manifestations of more fundamental mass-space interactions [9]. Although speculative, the approach attempts to restore conceptual continuity between atomic and celestial systems while maintaining philosophical consistency across scales of nature.

Concept of Field and Physical Vacuum

In modern physics, a field is generally represented as a physical quantity assigned to every point of space-time. Gravitational, electric, magnetic, scalar and quantum fields are therefore treated mathematically as distributed properties of space. Although this framework has achieved considerable predictive success, questions remain regarding the deeper physical nature of the medium through which such fields exist and interact [10] [11] [12] [13] [14].

The present work proposes a reality-based interpretation in which the so-called vacuum is not absolute emptiness but a physical medium populated by ultra-fine space-matter particles belonging to a deeper micro-micro domain. In this approach, fields are not treated as independent abstract entities; rather, they are considered spatially differential states arising from the organization, disturbance or polarization of this underlying medium. According to this interpretation, a physically meaningful field should correspond to a non-uniform condition capable of producing measurable interaction with particles or bodies. A perfectly uniform condition, though mathematically definable, may not possess direct physical distinguishability from the absence of a field. The proposed framework attempts to provide conceptual continuity between different known classes of fields. Just as pressure and density variations exist in ordinary gas media, electromagnetic and gravitational field effects may similarly emerge from organized states of finer particulate media. This interpretation does not deny the mathematical utility of existing field theory. Rather, it attempts to supplement the formal description with a physically intuitive ontology.

Uniformity and the Nature of Fundamental Particles

Modern physics generally treats fundamental particles of a given class as identical in mass and charge. This assumption has proven highly successful mathematically and experimentally for describing collective particle behaviour. The present work, however, raises the philosophical question of whether strict identity represents physical reality



or a useful approximation. In macroscopic systems, apparent uniformity often emerges statistically despite underlying variation among constituents.

The article proposes that if particles possess internal structure associated with deeper micro-micro domains, then small variations in state properties may exist without immediately contradicting observable average behaviour [15]. Similarly, the work questions whether presently observed particle properties might depend partly upon the surrounding state of structured space [3]. If so, particle behaviour may not arise solely from isolated intrinsic properties but also from interaction with the surrounding medium. The purpose of this discussion is not to reject established particle theory, but to explore whether deeper causal interpretations may exist beneath current formal descriptions.

Physical Significance of Space

Space is generally represented in modern physics through geometrical description such as distance, direction, curvature and coordinates. Geometry, however, is fundamentally relational. It describes the configuration and positional relationship between entities but does not directly explain the intrinsic physical nature of space itself. The present framework proposes that space should not be regarded as mere emptiness or passive background. Instead, space is treated as a physical medium possessing structure, density and dynamical significance [2] [16]. According to this view, physical space contains ultra-fine space-matter particles existing in domains beyond present observational capability [8]. Consequently, space may possess physical properties capable of influencing the behaviour of matter and radiation. This interpretation attempts to provide a physical basis for field interaction, propagation phenomena, and the dynamical behaviour associated with space-time.

Significance of Time

Time has no independent meaning in a completely static universe where no motion or transformation exists. The concept of time arises only in a dynamic universe containing changing physical systems. In this interpretation, time is not treated as an independent flowing substance but as a comparative measure associated with dynamical processes [17]. Periodic motions such as planetary rotation and revolution provide natural standards through which duration may be measured. Every physical system therefore possesses its own characteristic temporal significance depending upon its dynamical condition. Time becomes meaningful through motion, change, and interaction.



Significance of Space-Time

If space possesses physical structure and dynamical properties, then space-time may acquire physical significance beyond purely mathematical geometry. In the present framework, local space regions may contain different space densities and different dynamical states associated with surrounding matter distributions. Since time is related to dynamical condition, each spatial region may also possess characteristic temporal significance [17].

Thus, space-time is interpreted not merely as an abstract geometrical manifold but as a physically dynamic medium characterized by:

- spatial density,
- embedded space-matter content,
- and local dynamical state.
- Gradients of space density, number density of different space matter particles.

This interpretation attempts to provide a physically intuitive understanding of relativistic effects while preserving the mathematical usefulness of space-time formalism.

Gravity as Dynamic Space-Time Interaction

Newtonian gravitation describes gravitational interaction through force relations between masses, while Einstein's relativity interprets gravity through curvature of space-time. The present framework attempts to reinterpret gravity by treating space itself as a physical medium whose local structure may be modified by the presence of mass and its dynamic state. According to this interpretation, mass interacts with surrounding space and changes the local density and organization of the space medium. The resulting variation in space structure contributes to the gravitational condition associated with that region.

The article further proposes that gravity may depend not only upon spatial density distribution but also upon the dynamical condition of local space. In this sense, gravity becomes associated with space-time interaction rather than merely static force attraction. Although conceptual in nature, this interpretation attempts to provide a physical ontology underlying geometrical descriptions of gravitation.

Decay and Impermanence in Different Domains

Many philosophical traditions emphasize impermanence as a universal characteristic of existence. The present work explores whether gradual decay may also represent a universal physical process extending across different domains of nature [18]. All structured forms are composed of finer constituents held together through interaction



and organization. Over sufficiently long-time scales, gradual structural changes may accumulate until the original form transforms into another stable configuration. The article proposes that events appearing sudden or quantum-like may actually arise from long-term gradual processes operating beneath observational resolution. By analogy, if atomic nuclei also undergo extremely slow structural evolution comparable to stellar evolution, their apparent stability during human observational timescales may not necessarily imply absolute invariance. The purpose of this argument is to emphasize continuity and causality rather than abrupt acausal transition.

Reconsideration of the Michelson–Morley Experiment

The Michelson–Morley experiment historically played a major role in the rejection of classical ether theories and contributed significantly to the development of relativity. The present work does not dispute the experimental result itself but proposes that alternative philosophical interpretations may still be explored. In conventional wave theory, propagation generally requires a medium possessing suitable restoring properties. The difficulty of defining a mechanically consistent ether contributed to the abandonment of classical medium theories.

The present framework instead proposes a particulate interpretation in which light propagates through a structured space medium composed of ultra-fine space-matter particles. In this interpretation, the medium behaves more like a highly subtle particulate environment rather than a rigid elastic substance. Light propagation through motion of light particle is not assisted by the functional property of the medium whereas light as a wave is functionally linked with the property of space. Thus, the results of Michelson–Morley experiment precisely concludes that light is not a wave motion in a medium since the speed of light is not affected by the motion of the medium. The result of the experiment is not conclusive for existence of ether. The article suggests that the observed constancy of light velocity may arise from the intrinsic interaction between light particles and the surrounding structured space medium [10]. This interpretation remains speculative and requires further mathematical and experimental development. However, it attempts to restore physical mechanism and causal continuity to light propagation and other phenomena of light.

Physical Understanding and Mathematical Formalism

Scientific progress generally requires both qualitative understanding and quantitative analysis. Before mathematical relationships can be formulated, there must first exist some conceptual understanding regarding the entities, interactions and mechanisms involved. Mathematics provides a powerful tool for correlation, prediction, and quantitative representation. However, physical parameters themselves arise from



conceptually identified aspects of reality. Historically, many scientific advances began through qualitative insight before later receiving precise mathematical formulation. Conceptual understanding and mathematical formalism therefore develop together rather than independently. The present work argues that excessive dependence on abstract formalism without sufficient physical interpretation may sometimes produce conceptual difficulties in understanding the deeper reality represented by scientific theories. Accordingly, the article advocates a balanced approach in which mathematics and physical realism remain closely integrated.

Reality-Based Geometry

All physical objects possess fundamentally three-dimensional existence. Lower-dimensional representations are mathematical approximations arising when one or more dimensions become negligibly small relative to others. Geometry describes relational aspects such as shape, size, orientation, and location. However, physical systems also possess non-geometrical properties including mass, charge, temperature, and dynamical state. Time, associated with dynamical change, may be mathematically incorporated into higher-dimensional formulations. Nevertheless, the present work argues that space and time retain distinct physical significance despite their mathematical unification within space-time geometry. From this philosophical standpoint, space-time geometry is treated as an effective mathematical framework rather than direct perceptual reality.

Limitations and Scope of the Present Framework

The present work is primarily philosophical and conceptual in nature. Several proposed interpretations—including the existence of ultra-fine space-matter particles, reinterpretation of vacuum, alternative explanation of quantum phenomena, and continuity between atomic and celestial structures—require further mathematical development and experimental investigation. The objective of the article is therefore not to present a finalized physical theory, but to propose a reality-oriented conceptual framework that may motivate further exploration regarding the ontological foundations of modern physics. The article attempts to restore conceptual continuity between philosophy and physics while encouraging future development of models capable of connecting physical intuition with mathematical formalism.

Conclusion

The present study attempts to re-examine modern physical concepts from a realism-oriented philosophical perspective and argues that mathematical formalism alone cannot fully reveal the physical reality of nature unless supported by conceptual feasibility, causality, and universal consistency. Mathematics remains an indispensable quantitative



tool for science; however, physical science ultimately depends upon reality-based understanding of entities, interactions, and mechanisms. The article proposes that the fundamental constituents of the universe are mass and physical space, and that all observable entities are mass-space integral systems possessing form and form-based properties. The continuity and uniformity of nature across different domains imply that the structural and functional similarities observed in macro systems may also extend into micro and micro-micro domains. From this standpoint, the prevailing separation between macro-domain and micro-domain physics may arise largely from domain-specific assumptions introduced to satisfy mathematical requirements without sufficient philosophical examination of reality.

Several prevailing concepts of modern physics—including abstract vacuum, independent field ontology, wave-particle duality, quantum acausality, and identical nature of fundamental particles—have been critically re-examined in the light of universal causality and continuity of nature. The study proposes that many presently unexplained quantum phenomena may originate from hidden processes operating in deeper micro-micro domains beyond current observational capability. The work further presents a reality-based interpretation of field, light propagation, space, time, space-time, gravity, and atomic structure by treating physical space as a dynamic particulate medium. The proposed approach attempts to restore conceptual continuity between physical phenomena observed in different domains of nature and thereby contribute toward the broader objective of unification of sciences. Although the present work is primarily philosophical and conceptual in nature, it attempts to provide a framework for future reality-based theoretical development. Further mathematical formulation, experimental examination, and detailed physical modelling are required to evaluate the scientific validity and applicability of the proposed concepts.

Reference

1. <https://philosophyofnature.org.in/basic-constituents-of-universe-and-their-interactions>.
2. <https://philosophyofnature.org.in/mass-space-structure-of-centrally-organized-systems>.
3. <https://philosophyofnature.org.in/new-concept-of-electric-charge-in-matter>.
4. <https://philosophyofnature.org.in/unified-concept-of-energy-for-all-domains>.
5. <https://philosophyofnature.org.in/different-domains-of-nature>.
6. <https://philosophyofnature.org.in/modelling-atomic-system>.
7. <https://philosophyofnature.org.in/critical-analysis-on-physical-reality-of-light>.



8. <https://philosophyofnature.org.in/towards-a-new-comprehensive-universal-science>.
9. <https://philosophyofnature.org.in/electric-and-non-electric-charges-and-their-inter-conversion>.
10. <https://philosophyofnature.org.in/a-new-vision-of-light-and-space-the-cause-behind-constant-velocity>.
11. <https://philosophyofnature.org.in/micro-micro-structure-of-interfaces-and-photonic-charge-field-a-reality-based-classical-explanation-of-reflection-and-refraction-of-light>.
12. <https://philosophyofnature.org.in/grazing-of-light>.
13. <https://philosophyofnature.org.in/interference-and-diffraction-of-light>.
14. <https://philosophyofnature.org.in/analysis-of-polarization-and-scattering-of-light-through-the-new-particle-concept>.
15. <https://philosophyofnature.org.in/electrons-vary-in-mass-and-charge-similar-to-planets>.
16. <https://philosophyofnature.org.in/new-interactions-of-mass-and-space-is-the-cause-of-gravity>.
17. <https://philosophyofnature.org.in/revised-concept-of-time>.
18. <https://philosophyofnature.org.in/complete-harmony-between-brahman-and-the-doctrine-of-buddhism>.