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Research Article

THE UNIVERSE AS A RELATIONAL SYSTEM: A NOVEL QUANTUM-COSMOLOGICAL MODEL "ONE PLUS ONE EQUALS FOUR" AND "FOLDING ENERGY"

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Abstract

This paper proposes a speculative conceptual model in which the observable universe is not an isolated physical system but part of a larger relational structure involving one or more corresponding sectors of spacetime. The central proposition is expressed symbolically as "one plus one equals four." This statement is not intended to challenge the arithmetic identity $1 + 1 = 2$. Rather, it represents the possibility that two apparently distinct cosmic domains may generate a four-dimensional relational structure when their geometric, causal, and informational connections are taken into account. Our model explores several ideas drawn from modern theoretical physics, including the causal structure of spacetime, black-hole horizons, light cones, quantum information, vacuum fluctuations, symmetry, topology, and extra-dimensional geometry. It is suggested that a black hole may be considered not merely as an astrophysical object but also as a boundary through which information is transformed, encoded, or related to another sector of spacetime. The paper further introduces the term "folding energy" to describe a hypothetical form of effective energy associated with the geometric deformation, compactification, or interconnection of spatial regions. This research proposal remains conceptual and does not constitute an experimentally validated physical theory. Its purpose is to formulate a coherent research framework that may inspire further mathematical investigation concerning the relationship between quantum information, black-hole geometry, vacuum structure, and the global topology of the universe.

Keywords: Mechanical ventilation, Pediatric critical care, PARDS, Intubation, Trauma, Hemorrhagic shock, XABCDE, CAB, Ventilator-induced lung injury.

INTRODUCTION

Contemporary physics describes the universe through two highly successful but conceptually different theoretical frameworks. General relativity explains gravity as the curvature of spacetime, whereas quantum mechanics describes matter, energy, and information in terms of probability amplitudes, quantum states, and operator dynamics. Although both frameworks have been repeatedly confirmed within their respective domains, their complete unification remains one of the central unresolved problems in fundamental physics. The present paper develops a speculative model based on the assumption that the universe may possess a corresponding structure beyond the directly observable region. In this model, every physical domain is associated with another domain through a relationship of symmetry, complementarity, reflection, or information exchange. The term "corresponding universe" is used here in a broad theoretical sense. It does not necessarily refer to a separate universe existing in a conventional spatial location. Instead, it may denote another sector of a larger configuration space, a causally disconnected region, a dual description, or a geometrically related branch of spacetime. The phrase "one plus one equals four" therefore functions as a conceptual expression. Two apparently independent cosmic components may produce a four-dimensional relational system consisting of three spatial dimensions and one temporal dimension. Alternatively, the expression may represent the emergence of additional geometric degrees of freedom when two spacetime sectors are coupled through a boundary, horizon, wormhole-like connection, or higher-dimensional embedding. The purpose of this paper is not to claim that such a model has already been demonstrated. Rather, it seeks to translate an intuitive cosmological idea into more precise scientific language and to identify the assumptions that would be required for the proposal to become mathematically testable.

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Corresponding Cosmic Sectors

Let the observable universe be represented by a spacetime manifold

$$\mathcal{M}_A = (\Sigma_A, g_A),$$

where Σ_A represents the spatial structure and g_A denotes the metric that determines distances, causal relations, and the propagation of light. The proposed corresponding sector may be written as

$$\mathcal{M}_B = (\Sigma_B, g_B).$$

The two sectors are not required to be identical. They may be related by a transformation

$$\mathcal{T}: \mathcal{M}_A \to \mathcal{M}_B.$$

Depending on the physical interpretation, $\mathcal{T}$ might represent a symmetry transformation, a duality, a parity reversal, a time-reversal operation, a complex conjugation of quantum amplitudes, or a more general mapping between two descriptions of the same underlying physical reality.

In conventional physics, a symmetry is a transformation that preserves the essential structure of a system. For example, the laws of physics may remain invariant under spatial rotations or translations. The proposed cosmic correspondence extends this

principle to the global structure of spacetime. The universe may possess a complementary sector whose physical variables are correlated with those of the observable sector.

Such a correspondence should not be confused with the simple visual reflection of an object in a mirror. A physical duality may preserve some quantities while reversing or transforming others. For instance, the orientation of a coordinate system may change while invariant quantities such as probability or total charge remain constrained by conservation laws. A corresponding universe could therefore be "opposite" to our universe in a mathematically defined sense without being a literal mirror image.

The model may be represented by a combined configuration

$$\mathcal{M}_{\text{total}} = \mathcal{M}_A \cup_{\partial\mathcal{M}} \mathcal{M}_B,$$

where the two sectors are joined or related through a common boundary, interface, or geometric transition. The symbol $\partial\mathcal{M}$ represents the boundary conditions governing the relationship between the sectors.

Black Holes and Information Transfer

A central element of the proposal is the role of black holes. In general relativity, a black hole is a region of spacetime from which no classical signal can escape beyond the event horizon. The event horizon is therefore a causal boundary. It separates events that can communicate with an external observer from events that cannot do so through ordinary outward-directed light rays. The boundary-like character of a black hole makes it relevant to theories of information. In quantum theory, information is associated with the complete specification of a quantum state. The apparent loss of information into a black hole creates a major conceptual tension between general relativity and quantum mechanics. This issue is commonly known as the black-hole information problem. Within the novel model proposed here, the event horizon is interpreted as a possible interface between distinct descriptions or sectors of spacetime. A light signal approaching a black hole carries energy, momentum, phase, and information. When the signal interacts with the curved geometry near the horizon, its trajectory, frequency, and quantum state may be significantly transformed. In a broader theoretical framework, this transformation could be interpreted as an encoding of information on the horizon or as a relation between the observable universe and a corresponding cosmic sector.

However, it is important to state that established physics does not demonstrate that a black hole projects our entire universe into another universe. Nor does the passage of a beam of light through a black hole imply that the complete structure of our universe is reflected or transmitted elsewhere. A black hole is not a transparent tunnel in the ordinary sense. Classical general relativity predicts that light falling through an event horizon continues toward the black-hole interior, while the complete quantum description remains an active area of research.

The present hypothesis should therefore be formulated more cautiously: black-hole horizons may provide a mathematically meaningful boundary at which information is encoded, transformed, or related across different descriptions of spacetime. This statement is compatible with the broader idea that geometry and information may be deeply connected.

Light Cones and Causal Structure

The propagation of light is represented geometrically by the light cone. At any event in spacetime, the light cone separates possible causal relationships into three regions:

In the first region, "events inside" the future light cone may be influenced by the present event.

In the second region "events inside" the past light cone may have influenced the present event.

In the third region "events outside" the light cone are space like separated and cannot be connected by a signal travelling at or below the speed of light.

This causal structure is essential to the proposed model. If two cosmic sectors are related, the relationship must be expressed through a mathematically consistent causal framework. A simple reflection of light is insufficient to establish communication between universes because information transfer must obey the constraints imposed by relativity and quantum theory. One possible interpretation is that the corresponding sector does not exchange ordinary signals with our universe. Instead, the relationship may be encoded in boundary conditions, quantum correlations, or global geometric constraints. In this case, the two sectors could remain causally inaccessible while still forming part of a single mathematical structure. A more ambitious possibility is that a non-trivial topology of spacetime connects the sectors. Wormholes are hypothetical solutions of the Einstein field equations that possess two mouths connected by a geometric throat. Although no traversable wormhole has been observed, the mathematical concept demonstrates that spacetime may, in principle, possess a topology more complex than ordinary Euclidean space. Any physical model involving such structures would need to address stability, energy conditions, causality, and quantum gravitational effects.

Our Novel term of "Folding Energy" in the expression of the Vacuum Energy and Spatial Folding

The second major component of the proposal concerns the nature of the vacuum. In classical physics, a vacuum is often described as a region with no matter. In quantum field theory, however, the vacuum is not simply empty. It represents the lowest-energy state of a quantum field, and quantum fluctuations remain present even when no real particles are detected. These fluctuations are associated with the mathematical structure of quantum fields. Nevertheless, the concept of vacuum energy must be treated carefully. The theoretical value obtained by summing contributions from quantum modes is extremely large compared with the observed cosmological constant. This discrepancy is one of the most significant unsolved problems in theoretical physics.

Our new proposed model suggests that vacuum energy may be related to the folding, deformation, or interaction of spatial structures. To express this idea more precisely, let the effective vacuum energy density be written as

$$\rho_{\text{vac}} = f(\mathcal{G}, \mathcal{T}, \mathcal{B}),$$

where $\mathcal{G}$ represents the geometry of spacetime, $\mathcal{T}$ represents its topology, and $\mathcal{B}$ represents the boundary conditions connecting different sectors.

In this formulation, vacuum energy would not be regarded as energy created from absolute nothingness. Instead, it would emerge as an effective property of the underlying quantum-geometrical configuration. Spatial folding could refer to the compactification of extra dimensions, the curvature of spacetime, the identification of separate regions, or the entanglement structure of quantum fields.

Our Novel termof "folding energy" can therefore be defined as:

$$E_{\text{fold}} = \int_{\Sigma} \rho_{\text{fold}} \sqrt{h} d^3x,$$

where ρ_{fold} is a hypothetical energy density associated with spatial deformation and h is the determinant of the induced spatial metric.This new equation is a formal placeholder that indicates how the concept might eventually be developed. A complete theory would need to define ρ_{fold} in terms of measurable fields, geometric invariants, or quantum operators.

So, this new equation concept of "folding energy" may represent the significant of the "empty energy" causing by N+1 Area of Dimension, and most importantly, it may represent the "Dark Energy."

The Meaning of "One Plus One Equals Four" is corresponding universe in N+1 concept

"Corresponding Universe"

First of all, the concept meaning of "corresponding universe" in the asymmetric assumption, and, accordingly, "One Plus One Equals Four" universes, is because of each spiral must have a asymmetric, in each side, so, each representative side should and can have an equal side of the spiral metric.

So, the expression "one plus one equals four" can be interpreted in several ways.

First, it represent the combination of two three-dimensional spaces with a shared temporal dimension. Two spatial sectors may be embedded within a four-dimensional spacetime manifold. In this interpretation, the number four refers to the total dimensionality of the physical framework rather than the arithmetic sum of two units.

Second, it may refer to the emergence of four relational components: the observable universe, the corresponding universe, the interface between them, and the higher-dimensional structure that contains both. Under this interpretation, the equation is a symbolic statement about ontological levels rather than a numerical equation.

Third, the expression may indicate that a system with two sectors and multiple boundary connections can possess more degrees of freedom than either sector considered separately. If each cosmic boundary has several transition points, the global topology may generate a structure that cannot be understood by merely adding the properties of the individual components.

The "Corresponding Universe" in N+1 concept should be written as follows:

$$1 + 1 \geq 4 \text{ in ordinary arithmetic,}$$

So,

$$\text{Sector A} + \text{Sector B} \rightarrow \text{a four-dimensional relational system}$$

may serve as a meaningful metaphor for the proposed cosmological framework.

Testability and Limitations

For this proposal to develop into a scientific theory, it must generate predictions that distinguish it from existing models. Several possible research directions may be considered:

First, the model could predict a specific modification to black-hole entropy or horizon information. Secondly, it could propose an observable signature in the cosmic microwave background. Thirdly, it might predict deviations from general relativity near strong gravitational fields. Fourthly, it could identify a relationship between vacuum energy and the large-scale expansion of the universe. Fifthly, it might describe measurable consequences of additional spatial dimensions or non-trivial topology. The model also faces substantial limitations. The concepts of "corresponding universe," "spatial folding," and "folding energy" currently lack universally accepted mathematical definitions. The relationship between the proposed sectors must be specified through a Lagrangian, field equations, or a well-defined quantum state. In addition, the model must respect energy-momentum conservation, local causality, Lorentz invariance, and the probabilistic structure of quantum mechanics. Most importantly, the proposal should be presented as a hypothesis rather than an established discovery. Scientific credibility depends not only on imaginative ideas but also on precise definitions, mathematical consistency, reproducible calculations, and empirical evidence.

Conclusion

This research paper has developed a speculative quantum-cosmological framework in which the observable universe is considered part of a larger relational system. The model proposes that a corresponding cosmic sector may be associated with our universe through symmetry, duality, boundary conditions, or quantum information. Black-hole horizons are interpreted as potentially significant interfaces in the relationship between geometry and information, while vacuum energy is considered an effective property that may be influenced by the structure and deformation of spacetime. The concept of "folding energy" is introduced to describe a hypothetical energy contribution generated by spatial curvature, compactification, topology, or inter-sector coupling. The expression "one plus one equals four" is reinterpreted symbolically as the emergence of a four-dimensional relational structure from two interacting cosmic sectors. At present, these ideas remain conjectural. They should not be regarded as experimentally confirmed principles of quantum physics or cosmology. Nevertheless, the proposal raises meaningful questions concerning the relationship between spacetime geometry, quantum information, black-hole horizons, vacuum structure, and the possible existence of extended cosmic domains. Further progress would require rigorous mathematical formalisation, comparison with established theories, and the identification of observational predictions.

REFERENCES

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