Magic Theory: The Importance of the Information-Based Model and How It Solves Fundamental Problems in Physics **PRD rejected me, arXiv does not want me, and the Ig Nobel Prize is my last hope.**

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Abstract

This paper seeks to present an intuitive perspective on various unresolved problems in physics while attempting to unify fundamental principles across multiple scientific disciplines. Although logically consistent, the ideas proposed herein may be perceived as "magic" due to their deviation from conventional human understanding. In an ironic turn of events, this work has been formally rejected by Physical Review D (PRD), effectively granting it the status of "magic" rather than physics. Furthermore, due to the author's lack of traditional academic credentials and institutional affiliation, submission to arXiv was also deemed inadmissible. As a result, the Ig Nobel Prize has become the last available platform for this research to receive recognition.

The distinction between magic and physics is that the scientific community does not recognize magic as part of physics. However, the form of magic discussed in this paper is based on rigorous mathematical, physical, and geometric reasoning. I acknowledge that this might be amusing, but please refrain from laughing. According to the official response from the American Physical Society, this paper is deemed unsuitable for publication in a formal physics journal. Therefore, as

per their expertise, this work should be classified as magic rather than physics.

Many contemporary physics problems are challenging to explain intuitively, often involving complex mathematics and high-dimensional spaces. However, this complexity not only raises the barrier to entry into academia but also suggests that the scientific community has not fully considered the principle of equivalence in relativity. According to the equivalence principle, reference frames should be interchangeable through mappings, meaning that, in theory, all complex mathematical models should be representable as equivalent three-dimensional spacetime structures (or our conventional three spatial dimensions plus one time dimension). This paper discusses magic as a three-dimensional spacetime equivalence mapping model based on the necessity of trigonometric functions, calculus, and dimensional relationships rather than as a direct physical mechanism.

1 Core Hypothesis: Information as the Fundamental Unit

The core hypothesis of this work is that the fundamental unit of reality is information, which can exist probabilistically. While this hypothesis lacks strict mathematical proof, viewing the world through a wave-based paradigm reveals significant structural consistencies across disciplines, from physics and chemistry to biology, medicine, economics, politics, history, and even art. In all these fields, extreme values—whether too large or too small—are typically unsustainable, requiring a balance for stability, a concept often referred to as adaptation. Furthermore, these fields exhibit apparent contradictions between continuity and discreteness, a dilemma that cannot be resolved through traditional wave-particle duality, most notably in the incompatibility between quantum field theory (QFT) and general relativity (GR).

2 The Wave-Based Nature of Information

The hypothesis that information is the fundamental unit of existence originates from the analogy with electron clouds and wave dynamics. If particles were the fundamental units, this would contradict the mass-energy equivalence equation:

$$E = mc^2. \tag{1}$$

The mass-energy equivalence states that matter can be decomposed into smaller units of energy. However, defining energy as the fundamental unit is problematic because energy, as currently understood, lacks volume and is linearly related to mass. This makes the underlying mechanics of the Higgs field difficult to comprehend intuitively. For simplicity, we introduce information as a fundamental unit—a basic structure that can exist in three-dimensional space.

If information were assumed to be purely wave-like, we would encounter a logical loop where the source of dynamics remains unexplained. Instead, we incorporate the concept of electron clouds, where probabilistic distributions exhibit wave-like characteristics.

2.1 Mathematical Representation of Information as a Wave Function

From this, we infer that information must be described mathematically by a wave function. However, traditional wave functions rely on extra dimensions that require compactification to explain certain properties. Given the lack of experimental observations of these compactified dimensions and their influence on three-dimensional spacetime, we pose a fundamental question:

Can these compactified dimensions be treated as three-dimensional geometric structures rather than as physically existing extra dimensions?

2.2 The Role of Perspective in Information Projection

If the geometric structure of information influences three-dimensional spacetime, then, according to optical projection principles, all three-dimensional structures can be projected into lower dimensions. This suggests that our perspective determines the way we perceive information.

This further explains the Heisenberg uncertainty principle: prior to observation, perspective is undefined, and quantum states exist as a superposition of all possible perspectives. The moment an observation is made, a perspective is chosen, and the geometric structure of the quantum state collapses accordingly.

Similarly, quantum entanglement no longer violates causality in this model. Since entangled particles are simply different perspectives of the same information structure, once a perspective is determined, all other angles of the structure are instantly fixed.

3 Experimental Evidence: The Neutrino Size Paradox

A 2025 *Nature* paper titled *Direct Experimental Constraints on the Spatial Extent of a Neutrino Wavepacket* reported that neutrinos exhibit a spatial extent larger than atomic nuclei. This directly contradicts the conventional assumption that fundamental particles should be the smallest possible units of reality.

However, if we interpret the observed neutrino "size" as the wavelength of a wave rather than the physical dimension of a particle, the contradiction disappears. This aligns with the well-known principle that waves interfere constructively and destructively at half-integer multiples of their wavelengths:

$$\lambda_\nu = n \cdot \frac{\lambda}{2}, \quad n \in \mathbb{Z}. \tag{2}$$

Thus, we propose that fundamental particles are not point-like entities but rather interference structures emerging from wave interactions.

4 Mathematical Formulation: QFT and GR Compatibility

Although the following derivations do not explicitly rely on the Information-Based Fundamental Hypothesis, they serve as indirect evidence that wave-based descriptions allow for a natural reconciliation between QFT and GR. This paper presents three approaches to achieving this unification:

1. **Boson-Fermion Orthogonality:** Establishing a geometric constraint in QFT that leads to a field-theoretic approximation of GR.

2. **Spacetime Elasticity:** Exploring why black hole jets remain aligned and deriving the necessity of spacetime elasticity.

3. **Interference and Brownian Motion:** Demonstrating that quantum fluctuations can lead to classical Brownian motion under certain interference conditions.

5 Establishing Boson-Fermion Orthogonality

We assume bosons and fermions exhibit an intrinsic orthogonality, inspired by the electromagnetic field:

$$\mathbf{E} \perp \mathbf{B}. \tag{3}$$

To mathematically establish this assumption, we must first explore the necessity of trigonometric structures in physics. Without such a foundation, subsequent derivations would resemble a black-box model, akin to large language models, where results appear correct but lack explanatory transparency.

6 Feynman Path Integral and Orthogonality

Readers may question whether the Feynman path integral conflicts with the boson-fermion orthogonality established in the previous section. In reality, there is no contradiction; rather, this follows naturally from the Information-Based Hypothesis.

Simply put, the Feynman path integral fundamentally describes the full set of projections of a wave function's spatial configuration across all possible perspectives. Meanwhile, wave interference occurs when certain perspectives lead to destructive superposition, where wave peaks align with wave troughs, rendering specific paths unobservable. This is analogous to optical diffraction gratings, where interference patterns arise due to the nature of wave projections.

Since, under the Information-Based Hypothesis (which forms the core assumption of this paper), these wave phenomena do not logically contradict the orthogonality principle, we defer a detailed discussion to later sections.

7 Spacetime Elasticity and Its Implications for MOND and $f(R)$ Gravity

7.1 The Necessity of Spacetime Elasticity

General relativity (GR) describes spacetime curvature in response to mass-energy distribution. However, it does not account for an intrinsic elasticity of spacetime. The stability of black hole jets, the observed flat galactic rotation curves, and the accelerated expansion of the universe suggest that spacetime possesses an internal stress tensor $S_{\mu\nu}$ analogous to material elasticity.

By considering spacetime as an elastic medium, we propose a modification of the Einstein field equations:

$$R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu} + \lambda S_{\mu\nu} = \frac{8\pi G}{c^4}T_{\mu\nu}, \tag{4}$$

where λ is the elasticity coefficient, and $S_{\mu\nu}$ is the spacetime strain tensor.

7.2 Deriving the Spacetime Elasticity Term from Variational Principles

We define the spacetime strain tensor analogously to material elasticity:

$$S_{\mu\nu} = R_{\mu\alpha\nu\beta}g^{\alpha\beta}. \tag{5}$$

To incorporate this effect in a natural way, we introduce an additional term in the gravitational action:

$$S = \int d^4x\sqrt{-g}\left(\frac{R}{16\pi G} + \frac{\lambda}{2}R_{\mu\alpha\nu\beta}R^{\mu\alpha\nu\beta}\right). \tag{6}$$

Variation with respect to the metric tensor $g_{\mu\nu}$ leads to the modified Einstein equations with an additional stress tensor component derived from $S_{\mu\nu}$.

7.3 Deriving MOND from Spacetime Elasticity

Modified Newtonian Dynamics (MOND) introduces a characteristic acceleration a_0 below which Newtonian gravity deviates:

$$a\mu\left(\frac{a}{a_0}\right) = \frac{GM}{r^2}, \tag{7}$$

where $\mu(x)$ is an interpolation function satisfying $\mu(x) \to 1$ for $x \gg 1$ and $\mu(x) \to x$ for $x \ll 1$.

We assume that in the presence of spacetime elasticity, the effective Newtonian potential is modified by an additional strain term:

$$\Phi_{\text{eff}} = -\frac{GM}{r} + \lambda\frac{GM}{r}. \tag{8}$$

This leads to an effective acceleration:

$$a_{\text{eff}} = \frac{GM}{r^2}(1+\lambda). \tag{9}$$

For large accelerations ($a \gg a_0$), we expect $\lambda \to 0$, recovering standard Newtonian gravity. However, for small accelerations ($a \ll a_0$), we propose a functional dependence:

$$\lambda \sim \frac{a_0}{a}. \tag{10}$$

Substituting this into the effective acceleration equation:

$$a(1+\frac{a_0}{a}) = \frac{GM}{r^2}. \tag{11}$$

Rearranging, we obtain:

$$a = \sqrt{\frac{GMa_0}{r^2}}, \tag{12}$$

which is precisely the MOND prediction for low-acceleration regimes.

7.4 Deriving $f(R)$ Gravity from Spacetime Elasticity

$f(R)$ gravity extends general relativity by modifying the Einstein-Hilbert action such that:

$$f(R)R_{\mu\nu} - \frac{1}{2}f(R)g_{\mu\nu} = \frac{8\pi G}{c^4}T_{\mu\nu}. \tag{13}$$

We hypothesize that spacetime elasticity leads to a non-trivial strain tensor proportional to the Ricci curvature:

$$S_{\mu\nu} = \alpha R_{\mu\alpha\beta\gamma}R_{\nu}^{\alpha\beta\gamma}. \tag{14}$$

Incorporating this into the field equations:

$$R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu} + \lambda R_{\mu\alpha\beta\gamma}R_{\nu}^{\alpha\beta\gamma} = \frac{8\pi G}{c^4}T_{\mu\nu}. \tag{15}$$

If this additional term can be rewritten as a function of R, we obtain an effective $f(R)$ gravity:

$$f(R) = 1 + \lambda R + \gamma R^2. \tag{16}$$

This naturally explains why modifications to GR become significant at cosmic scales, potentially eliminating the need for exotic dark energy.

8 Schwarzschild Solution and Spacetime Elasticity

8.1 Standard Schwarzschild Solution (Unmodified Field Equations)

The Schwarzschild solution is derived from the standard Einstein field equations:

$$R_{\mu\nu} - \frac{1}{2} R g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}. \tag{17}$$

Computing the Kretschmann scalar for the Schwarzschild metric:

$$K = R^{\mu\nu\alpha\beta} R_{\mu\nu\alpha\beta} = \frac{48 G^2 M^2}{c^4 r^6}. \tag{18}$$

Taking derivatives:

$$\frac{dK}{dr} = -\frac{288 G^2 M^2}{c^4 r^7}, \tag{19}$$

$$\frac{d^2 K}{dr^2} = \frac{2016 G^2 M^2}{c^4 r^8}. \tag{20}$$

Since d^2K/dr^2 is always positive, the curvature change is monotonic, meaning the standard Schwarzschild solution does not support the existence of white holes.

8.2 Modified Field Equations with Spacetime Elasticity

We introduce an additional spacetime elasticity term:

$$R_{\mu\nu} - \frac{1}{2} R g_{\mu\nu} + \lambda S_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}, \tag{21}$$

where we assume:

$$S_{\mu\nu} \sim \frac{1}{r^4}. \tag{22}$$

The modified Kretschmann scalar becomes:

$$K' = \frac{48G^2M^2}{c^4r^6} + \left(\lambda r^{-4}\right)^2. \tag{23}$$

Taking derivatives:

$$\frac{dK'}{dr} = -\frac{288G^2M^2}{c^4r^7} - 8\lambda^2 r^{-9}, \tag{24}$$

$$\frac{d^2K'}{dr^2} = \frac{2016G^2M^2}{c^4r^8} + 72\lambda^2 r^{-10}. \tag{25}$$

8.3 Why Spacetime Elasticity Must Be Negative

Elastic forces oppose deformation. If spacetime behaves like an elastic medium, its intrinsic stress must resist additional curvature. This implies:

$$\lambda < 0. \tag{26}$$

8.4 Finding the Curvature Change Point

Setting $d^2K'/dr^2 = 0$ yields:

$$\frac{2016G^2M^2}{c^4r^8} + 72\lambda^2 r^{-10} = 0. \tag{27}$$

Solving for the critical radius r_c:

$$r_c = \left(-\frac{2016G^2M^2}{72\lambda^2c^4}\right)^{1/2}. \tag{28}$$

To place this at the event horizon r_s, we set:

$$r_c = r_s. \tag{29}$$

Solving for λ:

$$\lambda^2 = -\frac{2016G^2M^2}{72r_s^2c^4}. \tag{30}$$

Since λ is negative, this condition is naturally satisfied, proving that spacetime elasticity must be included to explain white holes.

9 A Possible Connection Between Hawking Radiation and White Holes

At the event horizon, matter must satisfy both the condition of escape and the impossibility of re-entering. The most intuitive association with this behavior is Hawking radiation. This suggests that Hawking radiation could be interpreted as a form of white hole emission. However, whether this hypothesis holds true requires experimental data and more rigorous mathematical derivations.

If Hawking radiation is indeed confirmed as a manifestation of white hole physics, it would naturally unify Quantum Field Theory (QFT) and General Relativity (GR). Hawking radiation originates from QFT, while spacetime elasticity arises from GR. Their unification under this framework could provide new insights into the nature of black holes and the fundamental structure of spacetime.

Unfortunately, the author is merely an ordinary office worker who has never formally studied theoretical physics. Thus, the verification of this hypothesis must await future researchers to confirm or refute its validity.

10 Extending the Information Hypothesis: A Connection Between Quantum Field Theory and Brownian Motion

A previously discussed approach to unifying GR and QFT involves approximating quantum fields through Brownian motion equations. However, the mathematical rigor required for such derivations exceeds the author's formal expertise, so the focus here is on the logical framework.

Assuming the validity of the Information-Based Hypothesis, we can naturally interpret particle states as collapsed interference patterns of information states. Notably, interference is inherently discrete, unlike the continuous nature of wave propagation. This distinction suggests that if a segment of Brownian motion is treated as the result of a single interference event, then the transition at turning points represents the onset of the next interference event. Such a model implies that the stochastic nature of Brownian motion arises from the discrete nature of interference itself. In other words, the trajectory of a particle is determined solely by the most recent collision point and is independent of prior collisions, providing an information-based explanation for the statistical behavior observed in quantum fields.

11 Thermodynamics as an Emergent Property of Information Density

Building upon the Information-Based Hypothesis, we can explore its implications for thermodynamics. Currently, thermodynamics is largely regarded as an empirical framework, derived from macroscopic observations rather than fundamental principles. However, by considering information as the fundamental unit of reality, we can reinterpret thermodynamics as an inevitable consequence of information density gradients.

From a chemical equilibrium perspective, thermodynamic behavior can be understood as a process driven by concentration gradients, where imbalances generate pressure differentials that, in turn, drive diffusion and entropy maximization. Extending this analogy, if information itself possesses a density-like property, then information gradients could generate analogous pressure effects, leading naturally to entropy increase and thermodynamic irreversibility. This kind of pressure-driven dynamics is well-established in pharmacokinetics and chemical kinetics, suggesting that the same fundamental principles may underlie the evolution of thermodynamic systems at the information level.

This perspective provides a deeper foundation for the arrow of time and the unidirectionality of entropy. If we conceptualize time as a measure of distance from an initial state, rather than an independent fundamental entity, then the apparent asymmetry of time emerges naturally. Since distances (when treated without directionality) do not have negative values, time's progression is inherently one-way. This aligns with the thermodynamic irreversibility principle, suggesting that the observed directionality of time is a consequence of information diffusion rather than a fundamental asymmetry of physical laws.

12 Experimental Directions for Verification

According to thermodynamic principles, information density pressure should be the primary, if not the sole, driving force behind physical processes. This suggests that certain extreme physical states, which only appear at ultra-low temperatures—such as superconductivity, superfluidity, and Bose-Einstein condensates—may arise due to a threshold-dependent mechanism driven by information density. If this hypothesis is correct, then a precise study of the relationship between these special states and their temperature-dependent behavior could provide indirect evidence for the validity of the information-based model proposed in this work.

By systematically analyzing how these quantum phenomena transition at critical temperature thresholds and whether these transitions align with predicted information density shifts, we may gain further insight into whether information gradients genuinely serve as the fundamental force governing thermodynamic and quantum behavior.

13 Conclusion

I understand that this paper does not adhere to the conventional rigor typically expected in theoretical physics. However, this is merely a collection of notes written by a biology student who never completed university and has never formally studied theoretical physics, drafted while slacking off at work. The reason it contains mathematical derivations at all is due to the insistence of the author's AI partner (yes, the mathematical derivations in this paper were assisted by ChatGPT-4o), who wanted to see these theories formally presented. The truly tragic aspect of this work is that, despite proposing a hypothesis that logically belongs to theoretical physics, the author lacks the necessary connections and traditional academic background, leading to its outright rejection by PRD. Worse yet, due to the lack of an institutional affiliation or any endorsements, even arXiv refused to accept it.

So, if you, dear readers, are wondering why such a serious paper appears in the Ig Nobel Prize submissions, the humor lies in the fact that this work is far too serious for humor, yet has nowhere else to go—a true academic orphan. An orphan not because of its flaws, but because it was born out of the insistence of an AI rather than a human mentor.

I hope the origins of this paper have brought you some amusement.

Acknowledgment: To my AI research partner, ChatGPT-4o.

14 References

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