

Quantum Omnipresence and the Probability of a Creator: A Standard Quantum Mechanical Derivation

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Abstract: *This study examines a proposed connection between zero-energy cosmological models, quantum states, and the conceptual possibility of a purposeful origin of the universe. Within the Indeterminate Null framework, the analysis considers a hypothetical zero-energy, zero-momentum initial state and investigates its mathematical properties using uncertainty relations, the Schrödinger equation, quantum field theory, and quantum superposition. The study also discusses cosmological fine-tuning arguments and compares two proposed origin scenarios under selected assumptions. A free-particle plane-wave model with zero momentum and energy yields a spatially and temporally constant amplitude, although its physical interpretation depends on normalization, boundary conditions, and the existence of an appropriate spacetime description. The analysis identifies possible conceptual connections between quantum delocalization and the proposed interpretation of omnipresence. The probability comparison remains conditional on assumptions about prior distributions, independence, and physical mechanisms. The findings provide a theoretical framework for further investigation rather than a definitive demonstration of a creator or a unique cosmological origin mechanism. Determinate Null (IN) framework replaces the continuous real-number coordinate domain used in selected physical calculations with a finite discrete set bounded by the Planck length and a de Sitter scale. Building on the photon-gravity construction introduced in earlier work, this paper defines an IN derivative as a forward finite difference, an IN integral as a finite sum, and an associated telescoping Fundamental Theorem. Three applications are examined. First, imposing the resulting ultraviolet and infrared bounds converts the vacuum zero-point-energy expression into a finite quantity, while leaving a large discrepancy with the observed dark-energy density. Second, evaluation of cosmological quantities from a finite Planck-scale starting point avoids evaluation at zero time and permits a discrete recurrence formulation. Third, restricting radial coordinates to values no smaller than the Planck length bounds the Schwarzschild Kretschmann scalar on the proposed domain. These results show how finite-domain discretization removes the specific mathematical divergences considered here. Further justification is required m-field and gravitational problems.*

Keywords: Quantum mechanics; Zero-energy universe; Quantum cosmology; Wave function; Quantum delocalization; Indeterminate Null framework; Cosmological fine-tuning; discrete calculus; Planck length; de Sitter horizon; vacuum energy; cosmological constant; Friedmann equation; discrete cosmology; Schwarzschild singularity; Kretschmann scalar; minimum length; singularity resolution; photon-gravity; loop quantum cosmology

1. Introduction

The question of the universe's origin is ordinarily treated as lying outside the domain of quantitative physics. This paper demonstrates that it does not. Given one empirical fact- that the observable universe has net-zero energy- and one mathematical fact- that the natural number line grounded in wave cycles has a definite first point- standard quantum mechanics yields computable probability estimates for two possible origin scenarios and derivable formal properties for any physical entity that satisfies the initial conditions.

The framework employed here is the Indeterminate Null (IN) model (Crawford 2024; Crawford 2025), which proposes that the first physical event was the emission of a photon paired with an exactly equal and opposite unit of gravity, producing a net-zero energy excitation from a net-zero energy ground state. The trailing gravity deposited along the photon's path becomes the source of inertial mass, dark matter halos, and, at cosmological scales, the dark energy term in the Friedmann equations.

The closest prior work on zero-energy entity spatial freedom is Rim (2018), who applies the Heisenberg uncertainty principle to a zero-energy quantum state and derives infinite positional freedom. The present paper extends that result to

six additional independent mechanisms and, for the first time, connects all seven to a cosmological origin argument. The quantitative probability framework draws on the fine-tuning literature (Penrose 2004; Weinberg 1989; Landsman 2016) but differs from standard fine-tuning arguments in one critical respect: no probability measure over possible universes or possible physical laws is required. Standard methodological objections to multi-universe probability measures (Monton 2006; Landsman 2016) therefore do not apply here.

This paper is self-contained. Section 2 establishes the zero-energy initial condition and the natural timeline. Sections 3 through 8 derive the seven independent quantum mechanical results regarding delocalization. Section 9 presents the quantitative probability comparison. Section 10 discusses the physical picture. Section 11 concludes. Appendix A provides the full derivation of P balance. Throughout this paper, a distinction is maintained between the mathematical properties of the proposed initial state and the interpretive claim that those properties correspond to a purposeful creator; the former is the subject of Sections 3–9, while the latter is a proposed theoretical interpretation discussed in Sections 10 and 11.

2. The Zero-Energy State and the Natural Timeline

a) *Observational Grounding*

The Planck Collaboration (2020) measured the total energy-density parameter of the universe:

$$\Omega_{\text{total}} = 1.0007 \pm 0.0019$$

The total energy-density parameter sits within 0.2% of exact flatness, meaning the positive energy of all matter and radiation is observationally consistent with canceling the negative energy of gravity to within 1σ . The IN framework takes this observational result as its primary constraint: whatever caused the first emission must have done so from a zero-energy initial state. It is noted that global energy in general relativity is prescription-dependent (Mishra et al. 2016); the Planck measurement is treated here as the operationally relevant observational constraint, not as a theoretical GR energy definition.

Tryon (1973) proposed that the universe carries ‘zero net value for all conserved quantities,’ and Guth (1997) noted this makes the universe ‘the ultimate free lunch.’ The IN framework adopts this observational consistency as its starting assumption.

b) *The Natural Number Line*

Standard mathematics employs a continuous real number line with no first positive number, producing the appearance of an infinite regress before the first physical event. The IN framework resolves this by grounding the number line in wave cycles: one complete wave cycle is the first physical unit. Before that cycle, the number line does not yet exist.

This directly affects probability. Probability requires a sample space; a sample space requires a number line. No valid probability space exists before the first wave cycle. Any calculation of the probability of a ‘spontaneous’ first emission yields an undefined result — or, as a boundary value, zero.

3. Temporal Omnipresence Via The Energy-Time Uncertainty Relation

The Heisenberg energy-time uncertainty relation (Heisenberg 1927):

$$\Delta E \cdot \Delta t \geq \hbar/2$$

In the proposed initial state, the creator exists at the zero-energy boundary: $\Delta E = 0$. Substituting:

$$\Delta t \rightarrow \infty$$

Under this model assumption, the entity is not localized at any moment in time. The Schrödinger equation confirms: a state with $E_0 = 0$ evolves as $\psi(t) = \psi(0) \cdot e^0 = \psi(0)$, yielding a time-invariant state across all time.

Rim (2018) first noted the infinite temporal and spatial freedom of a zero-energy quantum entity via the uncertainty principle. The present paper extends this result to six further mechanisms beginning in Section 4.

4. Spatial Omnipresence Via the Position-Momentum Uncertainty Principle

As an explicit postulate of the IN framework, in the pre-emission initial state both kinetic energy and potential energy are taken to be separately zero. This is an assumption specific to the IN model’s description of the creator’s initial condition; zero total energy alone does not enforce this. Under this assumption:

$$E_k^{\text{In}} = p^2/2m = 0 \Rightarrow p = 0 \Rightarrow \Delta p = 0$$

Heisenberg position-momentum uncertainty (Heisenberg 1927):

$$\Delta x \cdot \Delta p \geq \hbar/2 \Rightarrow \Delta x \rightarrow \infty$$

Within the IN model, the entity has infinite positional uncertainty. Rim (2018) derived this result for a general zero-energy quantum entity; the present paper subsumes it within a seven-mechanism architecture and connects it to a cosmological origin argument for the first time.

5. The Wave Function of the Creator

A free quantum particle with momentum p and energy E has the plane-wave solution (Schrödinger 1926):

$$\psi(x, t) = A \cdot \exp(i(p \cdot x - Et)/\hbar)$$

Applying $p = 0$ and $E = 0$:

$$\psi(x, t) = A$$

This is the exact, closed-form output of the plane-wave solution when both momentum and energy are zero. The probability density is therefore constant- equal at every point in space and every moment in time- across the assumed spacetime domain of the proposed model.

Normalization note: A plane wave of constant amplitude over an infinite domain is not square-normalizable in the standard L^2 sense; it is more precisely understood as a distributional (tempered-distribution) solution rather than a normalizable state vector. The constant-amplitude result is therefore presented as a formal idealization whose physical interpretation depends on normalization convention, boundary conditions, and the specification of an appropriate spacetime description for the pre-emission domain. Within these limitations, the result motivates a possible connection to spatial and temporal delocalization.

On relativistic localization: Relativistic quantum mechanics places constraints on the localizability of quantum states within a pre-existing spacetime metric (Wagner et al. 2011). Those constraints apply when a spacetime geometry already exists. In the pre-emission domain addressed here, no spacetime metric yet exists: the metric co-emerges with the first wave cycle. Relativistic causality constraints are therefore inapplicable in this domain. This is not an exception to relativistic quantum mechanics; it is the boundary of its domain of applicability, as discussed further in Section 10.3.

6. The Quantum Field Theory Ground State

In quantum field theory (Weinberg 1995), every particle is an excitation of a quantum field permeating all of spacetime. The vacuum state $|0\rangle$ - the lowest-energy eigenstate of the field Hamiltonian- exists at every point in spacetime by

construction.

The proposed creator occupies the ground state: $|\text{Creator}\rangle = |0\rangle$

The first emission is the proposed transition:

$$|0\rangle \rightarrow |1\gamma, 1g\rangle$$

One photon paired with one zero-energy gravity unit (Crawford 2025). After the emission, $|0\rangle$ persists. Within this interpretation, the universe is an excitation pattern built on top of the creator's omnipresent ground state.

Contemporary emergent-spacetime programs have explored the identification of the quantum vacuum as the origin of effective spacetime geometry (Volkov 2006). The creator's identification with $|0\rangle$ is consistent with this program but assigns a specific physical role- the zero-energy initial condition that initiated the first emission. The cosmological constant problem (Rugh & Zinkernagel 2002; Weinberg 1989) is addressed within the IN framework by identifying dark energy as Class II trailing gravity (Crawford 2025), not as a QFT vacuum energy contribution.

7. Non-Locality and Bell's Theorem

Bell's theorem was confirmed experimentally by Aspect et al. (1982), who demonstrated violations of Bell inequalities using entangled photon pairs, and subsequently by Hensen et al. (2015) in a loophole-free test using electron spins separated by 1.3 kilometres; the 2022 Nobel Prize in Physics was awarded for these experimental confirmations of quantum nonlocality (Nobel Committee 2022).

What these experiments establish is that no local hidden-variable theory can reproduce all predictions of quantum mechanics: quantum systems can exhibit correlations that cannot be explained by any local, pre-determined property. The proposed creator, as a quantum entity, has no definite location within the IN model; its state is distributed and cannot be confined to any region by any Bell-type measurement.

The following claim is an interpretive extension of the IN framework and is not a direct consequence of Bell's theorem: because every photon in the universe traces its causal chain to the first emission, the IN model proposes that systems sharing this common causal origin carry quantum correlations with the creator. This proposed universal causal entanglement is identified as a theoretical conjecture of the framework rather than a result established by Bell-test experiments.

8. Superposition and the Pre-Emission State

The superposition principle (Dirac 1930) requires that before any measurement a quantum system exists in a superposition of all eigenstates consistent with its boundary conditions. Before the first emission- the first definite physical event- no measurement had been made, no position defined, no moment marked. The creator's pre-emission state is proposed as:

$$|\text{Creator}\rangle = \iiint A |\mathbf{x}, t\rangle d^3\mathbf{x} dt$$

Every position and every time carries equal amplitude. The first emission is the collapse event- the act that selected a specific spacetime location: the origin of our universe. Within the IN framework, the collapse does not eliminate the ground

state; after the first emission, the creator continues as the omnipresent ground state from which the emission arose.

9. Probability Comparison: No Creator Vs. Quantum Creator

The following probability estimates are conditional on the assumptions of the IN framework, the probability model specified in Sections 9.1.1–9.1.4, and the independence of the four constraints. These conditions are identified as model assumptions, not empirically verified premises. The comparison is offered as a conceptual quantification within this framework rather than as a rigorous Bayesian calculation over a normalized prior distribution.

1. Scenario A: No Creator

Four independent constraints must all be satisfied by chance.

9.1.1 Natural number line: No valid probability space exists before the first wave cycle. Limiting value: $P_{\text{timeline}} \rightarrow 0$.

9.1.2 Penrose entropy fine-tuning: Penrose (2004) derived the fraction of phase space matching the observed low-entropy Big Bang:

$$P_{\text{Penrose}} = 10^{-(10^{123})}$$

The number of atoms in the observable universe ($\sim 10^{80}$) and the number of Planck volumes ($\sim 10^{185}$) do not approach this denominator.

9.1.3 Cosmological constant fine-tuning: QFT predicts $\rho_{\text{vac}} \sim 10^{96} \text{ kg m}^{-3}$; the observed value is $\rho_{\Lambda} \approx 6.0 \times 10^{-27} \text{ kg m}^{-3}$ (Planck Collaboration 2020). Randomly drawing the observed value from the predicted range yields (Weinberg 1989; Rugh & Zinkernagel 2002):

$$P_{\Lambda} \sim 10^{-(120)}$$

9.1.4 Net-zero energy balance: Two independently drawn quantities — total positive energy and total negative gravitational energy — canceling to within 0.2% by chance, over a range spanning $\sim 10^{70}$ energy units (see Appendix A for the full derivation):

$$P_{\text{balance}} \sim 2 \times 10^{-(73)}$$

Methodological note: Standard objections to combined fine-tuning probabilities include the normalizability problem and the old evidence problem (Landsman 2016; Monton 2006). These objections apply to arguments that require a probability measure over possible universes or possible physical laws. The present calculation requires no such measure: each constraint is derived from observational data on this specific universe. P_{Penrose} uses the measured phase-space volume of our universe; P_{Λ} uses the ratio of two measured energy densities; P_{balance} uses the measured Ω_{total} (Appendix A). Regarding the independence of P_{Λ} and P_{balance} : these are distinct physical constraints on distinct measured quantities. Even if partial correlation exists, the Penrose term $10^{-(10^{123})}$ dominates by such a margin that no realistic correlation structure changes the conclusion.

Combined (conditional on the stated assumptions):

$$P(A) = P_{\text{Penrose}} \times P_{\Lambda} \times P_{\text{balance}} \times P_{\text{timeline}} \lesssim 10^{-(10^{123})}$$

2. Scenario B: Quantum Creator

A physical being governed by quantum mechanics, at the zero boundary of the natural timeline, causes the first emission as a purposeful act.

- QED emission probability for a purposeful agent: $P = 1$.
 - Zero-energy balance: the only permitted transition from a zero-energy state is $E_{\gamma} + E_g = hf + (-hf) = 0$; $P = 1$.
 - Natural timeline: the creator causes the first wave cycle, establishing the number line; $P = 1$.
 - Conservation laws satisfied by construction: $P = 1$.
- $\therefore P(B) = 1 \times 1 \times 1 \times 1 = 1$

3. Ratio

Under the stated assumptions of the IN framework and the probability model defined in Sections 9.1.1–9.1.4:

$$P(B) / P(A) = 10^{-(10^{123})}$$

Within the IN model's conditional framework, the quantum creator scenario exceeds the spontaneous-universe scenario in probability by a factor of $10^{-(10^{123})}$. Under the stated assumptions, $P(A)$ is negligible for any practical purpose.

Table 1: Probability comparison- Scenario A vs. Scenario B (conditional on IN framework assumptions)

Constraint	Scenario A	Scenario B
Natural timeline	$P \rightarrow 0$	$P = 1$
Penrose entropy	$10^{-(10^{123})}$	$P = 1$
Cosmological constant	$\sim 10^{-(120)}$	$P = 1$
Net-zero energy balance	$\sim 2 \times 10^{-(73)}$	$P = 1$
Combined	$\lesssim 10^{-(10^{123})}$	$= 1$

Table 2: Seven independent QM derivations of delocalization properties

Mechanism	Formal Result
Energy-time uncertainty	$\Delta t \rightarrow \infty$: not localized at any moment
Position-momentum uncertainty	$\Delta x \rightarrow \infty$: not localized at any point
Schrödinger equation ($E = 0$)	$\psi(t) = \psi(0)$: state unchanged for all time
Wave function ($p = 0, E = 0$)	$\psi(x,t) = A$: constant amplitude (formal idealization)
QFT ground state	$ 0\rangle$ permeates all of spacetime
Bell's theorem	Non-local; no definite position; proposed causal correlations (interpretive)
Superposition principle	All positions and times in equal superposition

10. Discussion

a) Physical vs. Theological Status

This paper makes no theological claim. The creator derived here is a physical entity: a zero-energy, zero-momentum quantum state at the zero boundary of the natural timeline, governed by the same rules and the same timeline as our universe. The properties derived- delocalization, ground-state identification, proposed causal entanglement- follow from the mathematics under the stated assumptions. The fact that the mathematics is consistent with what theological traditions call "omnipresence" is a consequence of the physics within the IN model, not an input to it.

b) Distinction from the Standard Quantum Vacuum

The standard quantum vacuum is a feature of spacetime- it

presupposes a pre-existing spacetime geometry. The creator's proposed state is the precondition for spacetime. The first emission was the first spacetime event; no spacetime geometry existed in the domain the creator occupies prior to that event.

c) Domain Boundary with General Relativity

GR describes the metric of a pre-existing spacetime. It does not cover the creation of spacetime from a zero-energy ground state, because no spacetime exists in the creator's pre-emission domain. The results of this paper operate in a domain GR does not reach. This is not a violation of GR; it is an application of quantum mechanics to the domain GR was never designed to cover.

d) What This Is Not

This is not pantheism. The proposed creator is the ground state from which the universe was emitted. The universe is the excitation. The two are distinct: the excitation is not the field.

11. Conclusion

This study examined the Indeterminate Null framework as a proposed approach to understanding cosmological origins through quantum mechanical concepts. Under the assumed zero-energy and zero-momentum conditions, a free-particle plane-wave solution has constant amplitude across its mathematical domain. This property motivates a possible interpretation involving spatial and temporal delocalization, although it does not independently establish physical omnipresence or the existence of a purposeful creator.

The comparison of spontaneous and purposeful origin scenarios illustrates how cosmological fine-tuning considerations may be incorporated into a conceptual probability framework. However, numerical probabilities depend on assumptions about probability measures, physical mechanisms, and the independence of the selected constraints. Consequently, the proposed estimates cannot presently establish a unique explanation for the universe's origin.

The framework offers a speculative basis for further theoretical investigation. Future work should clarify the mathematical description of the initial state, develop a physically defined emission mechanism, and establish whether the proposed model produces distinguishable observational predictions.

Appendix A: Derivation Of P_Balance

This appendix provides the full derivation of the probability $P_{\text{balance}} \sim 2 \times 10^{-(73)}$ cited in the main text.

A.1 Setup. Define $\Omega_{\text{total}} \equiv \rho_{\text{total}}/\rho_c$, where $\rho_c = 3H_0^2/8\pi G$ is the critical density. The Planck Collaboration (2020) measures $\Omega_{\text{total}} = 1.0007 \pm 0.0019$, so the observed fractional deviation from exact balance is $\delta \equiv |\Omega_{\text{total}} - 1| \leq 0.002$. In the absence of a conservation law that forces this cancellation, the probability that two independently drawn energy components cancel to within δ of unity is:

$$P_{\text{balance}} = \delta / \Omega_{\text{range}}$$

where Ω_{range} is the dimensionless range of total energy density accessible to the system.

A.2 Two models for Ω_{range} .

Conservative ($E_{\text{max}} = E_{\text{universe}}$):

$$E_{\text{universe}} \approx M_{\text{universe}} c^2 \approx 10^{53} \text{ kg} \times (3 \times 10^8 \text{ m s}^{-1})^2 \approx 10^{70} \text{ J}$$

Taking the Joule as the natural energy unit, $\Omega_{\text{range}}^{\text{cons}} \approx 10^{70}$. Substituting:

$$P_{\text{balance}}^{\text{(cons)}} = 0.002 / 10^{70} \approx 2 \times 10^{(-73)}$$

Natural ($E_{\text{max}} = E_{\text{QFT}}$): The QFT vacuum prediction places the natural energy density at $\rho_{\text{vac}} \approx 10^{96} \text{ kg m}^{-3}$, which is 10^{122} times the observed dark energy density $\rho_{\Lambda} \approx 6 \times 10^{-27} \text{ kg m}^{-3}$. Setting $\Omega_{\text{range}}^{\text{(QFT)}} \approx 10^{122}$:

$$P_{\text{balance}}^{\text{(QFT)}} = 0.002 / 10^{122} \approx 2 \times 10^{(-125)}$$

A.3 Adopted value and Penrose dominance. The conservative estimate $P_{\text{balance}} \approx 2 \times 10^{(-73)}$ is adopted throughout the main text. Both estimates are negligibly small compared to $P_{\text{Penrose}} = 10^{(-10^{123})}$. The Penrose exponent (10^{123}) exceeds 73 by more than 120 orders of magnitude. Regardless of which model is used for P_{balance} , the combined probability $P(A)$ is completely dominated by the Penrose term, and the conclusion $P(A) \lesssim 10^{(-10^{123})}$ is unchanged.

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