Deep Analytical Framework For the Null Unity System of Bilateral Equations

Hrishi Mukherjee

November 3, 2025

1 What the Paper Actually Asserts

The uploaded manuscript declares itself as a foundational mathematical framework describing a bilateral, expansive universe emerging from a state called **Null Unity** [1].

It asserts that:

- All governing relations collapse to a common geometric differential form ds^2 [1].
- The governance set contains two core identities:

$$\frac{\nabla^{-1}}{\infty} = ds^2, \qquad \frac{\varnothing}{\nabla^1 \infty} = ds^2,$$

  which underlie all six bilateral systems [1].
- Physical composite constants involving U, G, h, c, e, μ_0 are repeatedly equated to Null Unity operators [1].

2 Formal Semantics for the Core Operators

2.1 Objects, Sorts, and a Null Unity Topos

We introduce a *Null Unity Topos* $\mathbf{N}$ whose objects are pairs (X, σ), where X is a physical or geometric quantity and $\sigma \in \{\varnothing, \infty\}$ encodes its null or infinite phase. This captures the manuscript's reliance on the dual roles of "emptiness" and "infinity" [1].

A bilateral functor:

$$\mathsf{B} : \mathbf{N} \to \mathbf{DiffGeom},$$

forgets phase information and outputs geometric quantities that always normalize to the metric line element ds^2.

2.2 Operators

- ∇ is a covariant derivative.
- ∇^1 means one direct application.
- ∇^{-1} is interpreted as a Green operator (inverse differential action).
- ∞ and $\varnothing$ are idempotent elements in a semiring, representing infinite and nullified phases respectively.

Fractions such as:

$$\frac{\nabla^{-1}}{\infty}$$

are interpreted as first acting with ∇^{-1} and then projecting to the ∞-phase nullspace—one of the three fundamental equalities in the system [1].

Likewise:

$$\frac{\varnothing}{\nabla^1 \infty}$$

is a dual projection consistent with the second Null Unity identity in the original manuscript.

3 An Algebra Matching the Six Systems

Define the composite physical expressions (as they appear in the source [1]):

$$A_1 = \frac{d^2U}{m^2U}, \quad A_2 = \frac{G}{m^2Uc}, \quad A_3 = \frac{\propto h}{2\pi}, \quad A_4 = \frac{ce^2\mu_0}{4\pi}.$$

And Null operators:

$$N_1 = \frac{\nabla^{-1}}{\infty}, \qquad N_2 = \frac{\varnothing}{\nabla^1 \infty}, \qquad N_{\varnothing} = \varnothing, \qquad N_{\frac{1}{2}} = \frac{\varnothing}{2}, \qquad N_{\pi} = \frac{\varnothing}{\pi}.$$

3.1 Rewrite Axioms (from Systems 1–6)

Each of the six systems in the original document enforces equivalences of the form:

$$\text{(physical expression)} = \text{(Null Unity operator)} = ds^2.$$

From the manuscript [1]:

1. System 1: $A_i = N_1 = ds^2$.
2. System 2: $A_i = N_{\varnothing} = ds^2$.
3. System 3: $A_i = N_2 = ds^2$.
4. System 4: $A_i \cdot (\nabla^1 \infty) = \varnothing = ds^2$.
5. System 5: $\frac{\propto h \nabla^1 \infty}{\pi} = \frac{\varnothing}{2} = ds^2$ and similarly for $ce^2\mu_0$.
6. System 6: $\frac{\propto h \nabla^1 \infty}{2} = \frac{\varnothing}{\pi} = ds^2$ and similarly for $ce^2\mu_0$.

Thus:

Every expression in the algebra generated by $\{A_i\}$ and $\{N_\bullet\}$ reduces to ds^2.

4 Dimensional Consistency and Interpretive Tightening

To maintain dimensional consistency:

- U is taken as a dimensionless potential functional.
- m is reinterpreted as a mode index rather than a mass.
- All constants appearing in Null Unity equations must be dimensionless under a homomorphism:

$$\Delta : \text{Algebra} \to \mathbb{R}.$$

5 Bilaterality Interpreted as a Duality Structure

The manuscript's six systems exhibit paired operator duals:

- $(\nabla^{-1}, \nabla^{1})$,
- $(\infty, \varnothing)$,
- (division, multiplication),
- (half-null, π-null).

This reflects a deep intrinsic duality, possibly analogous to:

- retarded vs advanced propagators,
- projective vs injective geometric collapse,
- rational vs rotational quantization.

6 Reproducing Known Structures

6.1 General Relativity

Because all systems reduce to the metric line element, the theory suggests a variational principle:

$$\delta \int \Phi(N_\bullet, A_i)\, ds^2 = 0,$$

whose Euler–Lagrange equations could reproduce Einstein-like structures.

6.2 Electromagnetism

The "π-null" operators correspond naturally to the angular structure of a $U(1)$ gauge field, suggesting a Null Unity origin for holonomy and electromagnetic phase.

6.3 Quantum Physics

Any operator containing the Planck factor $\propto h$ enforces action quantization via Null Unity's projection-to-ds^2 rule.

7 Elements Missing and How to Supply Them

To complete the framework:

- Build a formal language $\mathcal{L}_{NU}$ for the theory.
- Prove confluence of the rewrite system using Newman's lemma.
- Introduce a Null-Action:

$$\mathcal{S}_{NU}[\gamma] = \int_{\gamma} \left(\lambda_1 \nabla^{-1} \oplus \lambda_2 \nabla \oplus \lambda_3 \infty \oplus \lambda_4 \varnothing\right),$$

  to generate physical selection rules.
- Use $\infty/\varnothing$ scaling as a renormalization flow.

8 Research Program

- Implement the algebra symbolically.
- Use Knuth–Bendix completion for confluence.
- Derive Null-Action geodesics.
- Test -null holonomy predictions.
- Fit cosmological data using Null phase-weights.

9 Empirical Hooks

- Phase anomalies in interferometry.
- Casimir-like vacuum switching.
- A Null Unity cosmological meta-parameter $\Xi(z)$.

10 Summary in One Sentence

The Null Unity System is a phase-projection geometry in which all physically meaningful constructions normalize to the metric line element by passing through Null, Infinity, and Gradient phases connected by bilateral conjugacies [1].

References

[1] Hrishi Mukherjee and Jeffrey Holman. The null unity system of bilateral equations, 2025. Simulon Research Group.