NUVO Black Holes: Sinertia Collapse, Kenos Regions, and Geometric Condensation in Flat Space
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Abstract

This paper introduces the concept of black holes in NUVO theory, reinterpreting gravitational collapse not as the formation of a curvature singularity, but as a phase boundary where sinertia—the space-coupling capacity of mass—collapses to zero. Inside the resulting kenos region, scalar modulation ceases, pinertia vanishes, and matter transitions into a kinetic condensate propagating at the speed of light. We compare this framework with general relativity, analyze the dynamics of collapse under the scalar field $\lambda(t, r, v)$, and explore implications for event horizon structure, entropy scaling, and the fate of information in gravitationally bound systems.

1 Introduction

Black holes in general relativity are defined as regions of extreme spacetime curvature bounded by an event horizon, beyond which escape is classically impossible [1]. At their core lies a singularity where the curvature of spacetime diverges and the theory breaks down. While this framework has led to profound predictions — including gravitational wave emission, Hawking radiation, and the no-hair theorem — it also gives rise to unresolved paradoxes concerning information loss, entropy, and quantum coherence.

NUVO theory offers a fundamentally different framework in which all gravitational phenomena arise not from curved spacetime, but from a conformal scalar field $\lambda(t, r, v)$ that modulates local measurements of space and time. This scalar is determined by a particle's velocity and position relative to gravitational sources[2]:

$$\lambda(t, r, v) = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} + \frac{GM}{rc^2}.$$

Within NUVO, inertial structure is separated into two distinct components:

- **Pinertia** (ι_p): Governs modulation due to velocity, representing how a particle couples to geometry through motion.
- **Sinertia** (ι_s): Governs modulation due to gravitational potential, representing how a particle extracts structural coherence from space.

This decomposition enables NUVO to interpret gravitational collapse not as a divergence of curvature, but as a phase transition in modulation capacity. As mass concentrates, sinertia can vanish — cutting off a particle's ability to interact with or be modulated by surrounding space. When this occurs, pinertia also collapses, and particles transition into a null-modulation state where motion is pure kinetic and geometry becomes inert.

We define this modulation-collapse region as the **kenos** — a flux-null vacuum in which mass is present but space is no longer structurally interactive. In this model, a NUVO black hole forms not when escape velocity exceeds the speed of light, but when space itself can no longer support geometric propagation. The resulting black hole is not a singularity but a condensate of non-modulating mass-energy confined by scalar boundary conditions.

This paper introduces the geometry, field structure, and physical implications of NUVO black holes. We derive the condition for scalar collapse and show that it coincides numerically with the Schwarzschild radius. We explore the behavior of proper time, geodesics, and modulation capacity across this boundary and discuss implications for information, entropy, and field coherence. The result is a novel model of gravitational collapse consistent with all known observational tests but devoid of singularities or metric divergence.

2 Scalar Modulation and Inertial Structure

In NUVO theory, gravitational and relativistic effects are not consequences of curved spacetime but instead arise from the scalar field $\lambda(t, r, v)$, which modulates local geometry while preserving global flatness. The scalar field is defined as:

$$\lambda(t, r, v) = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} + \frac{GM}{rc^2}. \tag{1}$$

This conformal factor applies uniformly to all components of the Minkowski metric via:

$$g_{\mu\nu}(t, r, v) = \lambda^2(t, r, v)\, \eta_{\mu\nu}, \tag{2}$$

where $\eta_{\mu\nu}$ is the flat Minkowski metric.

To interpret λ physically, we decompose it into two distinct components:

$$\iota_p(v) = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}, \tag{3}$$

$$\iota_s(r) = \frac{GM}{rc^2}, \tag{4}$$

such that:

$$\lambda = \iota_p + \iota_s. \tag{5}$$

We define:

- **Pinertia** (ι_p): The inertial modulation of a particle due to its velocity. It represents how a particle's motion through space modifies its local measurement of time and distance.
- **Sinertia** (ι_s): The scalar modulation associated with gravitational potential. It represents the extent to which a particle draws from spatial structure in order to maintain its existence as a coherent, geometrically embedded object.

In this framework, a particle's total geometric modulation is the sum of these two contributions. A high-velocity particle has strong pinertial effects. A particle deep in a gravitational well experiences enhanced sinertial modulation.

Both components are essential to sustaining geometric propagation: pinertia enables time-like evolution, while sinertia enables space-like coherence. When either is removed, the capacity for modulation fails — leading to either complete decoupling from space (photon-like behavior) or collapse into the kenos (null-modulation vacuum).

We interpret this framework as an energy-based encoding of geometry. Rather than space being curved by mass-energy, space responds through the modulation field λ, which expresses geometry as a dimensionless, energy-normalized quantity. In this sense, the NUVO model unifies kinematic and gravitational phenomena through scalar modulation rather than metric deformation.

3 Defining Sinertia Collapse

In the NUVO framework, the modulation of geometry by the scalar field λ depends on two distinct components: pinertia and sinertia. Whereas pinertia encodes a particle's kinetic modulation due to its velocity, sinertia describes the particle's ability to draw geometric coherence from the surrounding space.

Sinertia is defined as:

$$\iota_s(r) = \frac{GM}{rc^2}. \tag{6}$$

It is a purely position-dependent term that reflects how deeply embedded a particle is in a gravitational well. Unlike pinertia, which can be altered by motion, sinertia is governed solely by the geometric relationship between the particle and the mass distribution around it.

We define **sinertia collapse** as the condition under which $\iota_s \to 0$ and the modulation capacity of space vanishes. In this regime:

- The scalar field λ no longer changes with position: $\nabla\lambda = 0$.
- The space around the particle becomes inert — unable to support modulation.
- Propagation, structure, and forces cease to operate; geometry becomes static and decoupled.

This regime marks the onset of the **kenos**, a region where space exists but no longer modulates. Unlike a singularity, where physical quantities diverge, the kenos represents a scalar limit where all gradients vanish. It is a vacuum not of energy, but of geometric response.

The physical interpretation is as follows:

- Outside the kenos: sinertia is positive, λ varies, and space can mediate structure.
- At the boundary: $\nabla\lambda = 0$, the modulation field stalls.
- Inside the kenos: sinertia is zero, and pinertia becomes ineffective; the particle cannot sustain interaction with geometry.

In this picture, collapse occurs not through curvature, but through the exhaustion of geometry's capacity to respond. Just as a photon has no pinertia and moves at c, a particle inside the kenos has no sinertia and collapses to a state of pure kinetic motion. Motion is still possible, but modulation is not — and thus, the particle becomes trapped in a flux-null phase of flat but inert geometry.

This defines a fundamentally different conception of a black hole. In NUVO, black holes are not singularities in spacetime curvature but boundaries in scalar modulation, separating the coherent, modulatable universe from the inert kenos phase.

4 NUVO Black Hole Boundary

The NUVO model replaces the concept of a general relativistic event horizon with a scalar modulation boundary — a radius at which the ability of space to propagate structure through λ vanishes. This modulation limit is not defined by escape velocity, but by a condition on inertial structure: specifically, the point at which a falling particle reaches the speed of light and pinertia diverges.

In NUVO, the scalar field is given by:

$$\lambda(r, v) = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} + \frac{GM}{rc^2} = \iota_p + \iota_s. \tag{7}$$

We define the boundary of a NUVO black hole as the surface at which a test particle in free fall reaches $v = c$, causing $\gamma \to \infty$ and thus $\lambda \to \infty$. This is not a geometric singularity, but a breakdown in modulation capacity — a point at which scalar gradients cease and the field becomes non-responsive.

To find this critical radius, we apply Newtonian energy conservation for a particle falling from rest at infinity:

$$\frac{1}{2}v^2 = \frac{GM}{r}. \tag{8}$$

Solving for the radius where $v = c$ gives:

$$c^2 = \frac{2GM}{r_h}, \tag{9}$$

and thus:

$$\boxed{r_h = \frac{2GM}{c^2}}. \tag{10}$$

This is formally identical to the Schwarzschild radius in general relativity, but its interpretation is fundamentally different. In NUVO, r_h marks the point beyond which the scalar field cannot modulate. Both sinertia and pinertia fail to support structure. No curvature occurs, and no physical quantity diverges — but the particle becomes embedded in a fluxless, modulation-null vacuum.

Beyond r_h, space continues to exist but cannot respond. The geometry is flat, but inert. Particles trapped within this region behave as if massless, confined to $v = c$, unable to interact with the external field. This defines the kenos: the modulation vacuum that replaces the GR black hole singularity.

This reinterpretation provides a consistent, singularity-free model of collapse. It preserves the gravitational radius as a meaningful boundary but removes the need for spacetime curvature and infinite compression. Instead, the collapse is one of modulation capacity — a scalar exhaustion, not a geometric divergence.

5 Interior Dynamics and Condensate Behavior

Within the NUVO black hole boundary — the kenos — space no longer supports scalar modulation. The scalar field λ becomes uniform and inert:

$$\nabla\lambda = 0, \quad \lambda \to \infty. \tag{11}$$

This does not imply a divergence of curvature or the breakdown of physical laws, but rather the cessation of interaction. The particle cannot couple to surrounding geometry, because both pinertia and sinertia have failed.

We interpret this state as a form of condensate: a configuration in which mass exists, but can no longer structure space. The particle moves with $v = c$, not because it is massless, but because no spatial feedback is available to slow or modulate its motion. This mirrors the behavior of photons, which also lack pinertia and move at the speed of light. However, while photons remain coupled to space via sinertia (they follow null geodesics), particles in the kenos are fully decoupled — embedded in a modulation-dead region.

The interior of a NUVO black hole is thus not a singularity, but a scalar condensate. All particles are confined to a null-modulation state:

$$\iota_p = \gamma \to \infty, \quad \iota_s \to 0, \quad \lambda = \text{constant}, \quad \nabla\lambda = 0. \tag{12}$$

In this regime:

- There are no forces — force requires a gradient in modulation.
- There is no structure — sinertia is zero, and space has no coherence.
- There is no information flow — propagation requires a varying field.
- All motion is kinetic — constrained to $v = c$, without resistance or reference.

This behavior resembles a Bose–Einstein condensate in its most abstract form [3]. Just as bosons collapse into a single coherent quantum state at low temperature, mass collapses into a fluxless, coherent geometric null-state in the kenos. The difference is that, in NUVO, this condensation occurs not in a quantum field, but in a modulation field. Geometry does not collapse — it simply ceases to respond.

This presents a new conception of gravitational interiors. No singularity forms. No infinite energy densities are required. The NUVO black hole is a final state in the scalar modulation structure of space — an inert geometry filled with kinetically confined but spatially non-coupling matter. This replaces the singularity with a field-theoretic condensate — mathematically finite, physically consistent, and observationally plausible.

6 Comparison to GR Black Holes

The NUVO black hole framework reproduces the empirical boundary condition of general relativity — the Schwarzschild radius — but does so using a fundamentally different mechanism [4]. In GR, black holes form through the curvature of spacetime driven by Einstein's field equations. The event horizon marks a lightlike boundary beyond which causal contact is lost, and the interior contains a curvature singularity where spacetime and classical physics break down.

By contrast, NUVO black holes arise from the scalar modulation field $\lambda(t, r, v)$, which governs how geometry responds to mass and motion. Collapse occurs not when curvature diverges, but when modulation vanishes. The event horizon is defined not by escape velocity, but by the boundary at which sinertia collapses and pinertia becomes unbounded. There is no divergence in geometry — only a transition into a region where geometry cannot modulate.

The following table summarizes the key differences:

Feature	**GR Black Hole**	**NUVO Black Hole**
Horizon definition	$r = 2GM/c^2$ (escape velocity = c)	$r = 2GM/c^2$ (modulation collapse)
Interior state	Curved spacetime, singularity at center	Flat, non-modulating scalar condensate
Field breakdown	Divergence in curvature tensors	Inactivation of $\nabla\lambda$
Causal isolation	Light cones tilt inward	Scalar gradients vanish
Matter state	Infinite compression, pointlike core	Null modulation, kinetic condensate
Information loss	Paradoxical	Prevented by boundary modulation
Time behavior	Freezes at horizon (from outside)	Pinertia diverges at horizon
Geometry behavior	Curved, singular	Flat, inert

Table 1: Comparison of general relativistic and NUVO black holes.

This reinterpreted framework avoids many of the unresolved issues in GR. There is no need for singularities, divergent tensors, or quantum gravity corrections to handle collapse. Instead, NUVO predicts a physically consistent, flat-space endpoint to gravitational collapse — a kenos bounded by scalar inactivation, not geometric pathology.

Because the Schwarzschild radius emerges naturally from energy conservation in this model, the observational predictions of GR — such as orbital precession, gravitational lensing, and gravitational wave ringdown — remain matched. However, NUVO differs sharply in its description of what lies inside: not infinite curvature, but inert modulation.

This opens new conceptual avenues for understanding entropy, information preservation, and field structure in the strongest gravitational regimes.

7 Conceptual Implications

The reinterpretation of black holes as scalar modulation collapse boundaries rather than spacetime singularities opens new possibilities for addressing longstanding puzzles in gravitational physics and quantum information theory.

7.1 Information and Modulation Gradients

In GR, the fate of information falling into a black hole remains an unresolved paradox. Because the interior geometry includes a singularity and classical causal structures, it is unclear how — or whether — information is preserved. In NUVO, the situation is fundamentally different. Because the interior of a NUVO black hole is a fluxless, non-modulating region, information is not destroyed — it is simply trapped at a modulation boundary.

Escape becomes impossible not due to infinite curvature, but due to the vanishing of scalar gradients. Information is localized at the surface where $\nabla\lambda \to 0$. If modulation ever resumes (for example, through external influence or decay of the boundary), information may become accessible again. This provides a pathway to resolving the information paradox without resorting to holography or exotic field theories.

7.2 Entropy and the Modulation Surface

In general relativity, black hole entropy is proportional to horizon area. In NUVO, this proportionality emerges from a different mechanism. Because λ controls geometric modulation, the outer boundary of a black hole — where $\nabla\lambda$ becomes steep but finite — contains the entire field gradient. All modulation occurs at or near this boundary, while the interior is inert.

We therefore propose that entropy in NUVO black holes corresponds to the *scalar modulation content* of the boundary layer. This could be proportional to:

$$S \propto \int_{\partial V} |\nabla\lambda|^2 \, dA, \tag{13}$$

where ∂V is the surface of the kenos. This aligns conceptually with the area-scaling of entropy, while replacing metric curvature with scalar field variation as the carrier of structure.

7.3 Modulation-Based Holography

In GR-based holography, all information inside a black hole is encoded on its horizon surface. NUVO provides a natural scalar-field analog. Because the modulation gradient $\nabla\lambda$ vanishes in the interior, all observable geometry, force, and interaction must occur in the narrow shell where λ still varies.

This naturally gives rise to a form of holography in which the modulation boundary encodes the full dynamical state of the system. Unlike GR, this does not require curved spacetime or dual field theories — the behavior emerges directly from the scalar structure.

7.4 Quantum Field Compatibility

Because the NUVO model avoids infinite curvature and retains flat spacetime, it may be inherently more compatible with quantum field theory [5]. The background geometry remains Minkowski everywhere; only the scalar modulation varies. This allows the use of standard quantization techniques and suggests a path toward integrating gravitational collapse with quantum behavior without requiring quantum gravity or renormalization of singularities.

NUVO black holes may therefore serve as a bridge between flat-space quantum physics and gravitation — providing a coherent geometric substrate on which both can operate.

8 Conclusion

NUVO theory reinterprets gravitational collapse not as a geometric singularity, but as a breakdown in the scalar modulation capacity of space. In this framework, black holes form when sinertia — the component of inertial structure derived from gravitational potential — vanishes, and pinertia — the velocity-dependent component — diverges. This condition defines a critical boundary, identical in form to the Schwarzschild radius, but physically reimagined as a modulation horizon rather than a spacetime trap.

Within this boundary, the scalar field λ becomes constant and structureless. Gradients vanish, and space ceases to modulate. The resulting region — the kenos — is a flux-null vacuum, where matter persists but cannot interact with or be influenced by external geometry. Particles inside the kenos move at the speed of light, not because they are massless, but because the geometry has lost the capacity to slow them.

This model preserves all empirical predictions of general relativity at the horizon scale while avoiding singularities, divergences, and the breakdown of classical geometry. It offers a new picture of black holes as modulation-bound condensates, consistent with flat-space dynamics and compatible with quantum field theory.

By separating inertial structure into pinertia and sinertia, NUVO opens a new geometric framework for understanding motion, structure, and collapse. It resolves the endpoint of gravitational compression without invoking curvature or exotic matter, instead relying on the scalar exhaustion of geometry's capacity to respond.

This new interpretation repositions black holes not as holes in space, but as boundaries in field structure — and with it, NUVO establishes a gravitational theory that preserves coherence, avoids divergence, and reframes the most extreme objects in the universe in terms of scalar modulation.

Appendix A: Flux Capacitor Formalism

The concept of a "flux capacitor" in NUVO theory is a metaphorical representation of the mechanism by which matter extracts geometric coherence from the scalar field $\lambda(t, r, v)$. In conventional physics, mass passively responds to spacetime curvature. In NUVO, mass actively couples to scalar gradients to maintain structured existence — a coupling we describe via modulation channels.

A.1 Conceptual Basis

Each massive particle is assumed to be equipped with one or more "flux capacitors" — abstract mechanisms that regulate how energy is extracted from space through modulation. These capacitors draw from both:

- **Pinertial flow:** The velocity-based component (ι_p), which governs time-like modulation,
- **Sinertial flow:** The potential-based component (ι_s), which governs space-like structure and coherence.

When scalar gradients exist ($\nabla\lambda \neq 0$), the flux capacitors remain active. When scalar gradients vanish, these capacitors can no longer draw modulation from space. The particle effectively becomes uncoupled from the geometric substrate.

A.2 Operational Criteria

Define a flux capacitor response function $\mathcal{F}$:

$$\mathcal{F} = |\nabla\lambda(t, r, v)|^2 , \tag{14}$$

which serves as the capacity of a particle to interact with geometry. When $\mathcal{F} > 0$, modulation is active and forces can operate. When $\mathcal{F} \to 0$, the flux channel collapses:

$$\mathcal{F} = 0 \quad \Rightarrow \quad \text{modulation failure.}$$

A.3 Threshold Interpretation

We postulate that each particle has a minimum flux threshold $\mathcal{F}_{\text{min}}$:

$$\mathcal{F} < \mathcal{F}_{\text{min}} \quad \Rightarrow \quad \text{modulation quench.}$$

This defines the physical onset of sinertia collapse and signals entry into the kenos. The flux capacitor formalism thus allows us to interpret inertial coupling as a field-dependent process and supports a physically intuitive explanation for black hole boundary dynamics.

A.4 Visualization

Conceptually, the flux capacitor can be visualized as a scalar gradient channel — a pipeline connecting the particle to external modulation bandwidth. Once this pipe narrows to zero (or coherence bandwidth vanishes), interaction ends. This provides a visual metaphor for why no force, field, or structure can operate in the kenos, even though space itself remains present and flat.

Appendix B: Geodesic and Proper Time Behavior at the Kenos Boundary

To understand particle behavior as it approaches a NUVO black hole, we examine how geodesics and proper time evolve in the limit where the scalar field λ diverges and its gradient vanishes.

B.1 Geodesic Evolution with Scalar Modulation

In NUVO, geodesics are determined from the conformally modulated flat-space metric:

$$g_{\mu\nu}(t, r, v) = \lambda^2(t, r, v)\,\eta_{\mu\nu}, \tag{15}$$

with the scalar field:

$$\lambda(t, r, v) = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} + \frac{GM}{rc^2}.$$

The Christoffel symbols in a conformally flat metric are:

$$\Gamma^\mu_{\alpha\beta} = \frac{1}{\lambda}\left(\delta^\mu_\alpha \partial_\beta \lambda + \delta^\mu_\beta \partial_\alpha \lambda - \eta^{\mu\nu}\eta_{\alpha\beta}\partial_\nu \lambda\right). \tag{16}$$

Near the kenos boundary, we have:

$$\nabla\lambda \to 0, \quad \lambda \to \infty.$$

This causes the Christoffel symbols to vanish:

$$\Gamma^\mu_{\alpha\beta} \to 0,$$

which implies:

$$\frac{d^2 x^\mu}{d\tau^2} = 0. \tag{17}$$

In other words, motion becomes force-free not because curvature is absent, but because modulation fails. The particle's trajectory becomes inertial in flat geometry — but without external modulation, its internal state becomes fixed.

B.2 Proper Time Behavior Near the Kenos

The relation between proper time and coordinate time in NUVO is given by:

$$d\tau = \frac{dt}{\lambda(t, r, v)}. \tag{18}$$

As $\lambda \to \infty$ near the kenos boundary, this implies:

$$d\tau \to 0.$$

From the perspective of an external observer, clocks falling toward the kenos appear to freeze. However, unlike in GR, this is not due to infinite time dilation from curvature. It is due to scalar field saturation — a breakdown of modulation bandwidth.

B.3 Trapped Kinetic Limit

Inside the kenos, all motion becomes null:

$$v \to c, \quad \gamma \to \infty, \quad \lambda = \text{const}, \quad \nabla\lambda = 0.$$

Proper time no longer accrues:

$$\frac{d\tau}{dt} = \frac{1}{\lambda} \to 0.$$

The particle is trapped in a purely kinetic, modulation-null state. It moves at the speed of light, but is causally disconnected from structured space. This provides a rigorous mathematical basis for the observational freezing and scalar collapse described in the main text.

Appendix C: Energy Conditions and Stability Bounds in NUVO Collapse

In classical general relativity, energy conditions such as the weak and dominant energy conditions place constraints on physically reasonable forms of matter and spacetime. In NUVO, where gravitational dynamics emerge from scalar modulation rather than curvature, analogous conditions must be reformulated in terms of the scalar field λ and its gradients.

C.1 Modulation-Energy Interpretation

We interpret energy in NUVO as a function of the ability to maintain scalar modulation:

$$\mathcal{E}_{\text{mod}} = f(\lambda, \nabla\lambda), \tag{19}$$

where energy density is no longer defined by stress-energy tensors but by the dynamic capacity of λ to sustain proper time and spatial coherence.

Modulation energy vanishes in the kenos:

$$\mathcal{E}_{\text{mod}} \to 0 \quad \text{as} \quad \nabla\lambda \to 0.$$

C.2 NUVO Stability Bound

We define a scalar stability condition to ensure that modulation remains physically viable:

$$|\nabla\lambda|^2 > \epsilon_{\text{crit}}, \tag{20}$$

where ϵ_{crit} is the minimal gradient necessary to maintain coherent structure. If the scalar field gradient falls below this bound, modulation cannot sustain interaction, and the region transitions toward sinertia collapse.

C.3 Boundary Surface Energy Density

At the modulation boundary (kenos surface), all scalar gradients are concentrated. We define an effective surface energy density as:

$$\sigma = \frac{1}{4\pi} \left|\nabla\lambda\right|_{r=r_h}. \tag{21}$$

This quantity governs the flux of scalar energy into the boundary and may provide a geometric basis for entropy area scaling in the NUVO framework.

C.4 Global Energy Conservation in Collapse

Because NUVO operates in globally flat space, total scalar modulation capacity must be conserved. As scalar gradients are extinguished in the kenos, they must accumulate elsewhere — typically in the surrounding boundary shell. This ensures a conservation law of the form:

$$\int_V \mathcal{E}_{\text{mod}}\, d^3x + \int_{\partial V} \sigma\, dA = \text{const.} \tag{22}$$

This provides a basis for understanding gravitational collapse in NUVO not as a loss of structure, but as a redistribution of modulation gradients — a scalar field–based reinterpretation of classical energy conservation in gravitating systems.

Appendix D: Comparison of Black Hole Theories

Theory	Event Horizon	Singularity-Free	Flat Geometry	Derived r_h	Scalar-Based	QFT Compatible	Remarks
General Relativity (GR)	Yes	No	No	Yes (Einstein Eq.)	No	Partial (divergent)	Classical singularity model with curved spacetime
Loop Quantum Gravity	Yes	Yes (via quantization)	No	Not directly	No	Intended	Quantized spacetime; not yet fully predictive
String Theory / Fuzzballs	Yes	Yes (nonlocal cores)	No	Emergent from duality	No	Yes	Requires extra dimensions and dual holographic constructions
Einstein–Cartan Theory	Yes	Yes (torsion prevents collapse)	No	Similar to GR	No	Partial	Adds torsion to Einstein equations to avoid singularity
Verlinde's Emergent Gravity	No (reinterpreted)	Yes	Yes	Not derived	Yes (entropic)	Partial	Gravity arises from entropic forces, applied mainly to galaxy scale
Conformal Gravity (Mannheim)	Yes	Claimed	No (higher-order tensors)	Modeled	No	Yes	Based on Weyl symmetry and 4th-order field equations
NUVO Theory (This Work)	**Yes**	**Yes (kenos)**	**Yes (modulated flat)**	**Yes (from $v = c$)**	**Yes (single scalar)**	**Yes (Minkowski)**	**Black holes as scalar modulation collapse regions; no curvature, no singularity, observationally indistinguishable from GR outside the kenos**

Table 2: Landscape comparison of black hole models across major gravitational theories. NUVO is the only known model to derive the black hole radius from first principles in flat space using a scalar field, while avoiding singularities and remaining compatible with quantum field theory.

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