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Exotic Nonthermal Radiation, Etheric Tension and Reciprocal Galactic Regeneration: A Theory-Building Cosmological Framework for Dark Matter Halo Formation Through Black Hole Metaparticle Emissions

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Abstract

Modern cosmology possesses extraordinary predictive power while simultaneously lacking explanatory closure concerning the deeper ontological origins of dark matter, dark energy, and the informational properties of black holes. Einstein's general theory of relativity successfully describes gravitational curvature, Hubble's observations established the expanding Universe, and Hawking demonstrated that black holes radiate thermally through quantum processes near event horizons. Nevertheless, the prevailing ΛCDM paradigm remains primarily descriptive regarding the physical nature of its dominant constituents, while thermal black hole models provide limited explanatory capacity concerning coherent, information-rich nonthermal emissions. Significant conceptual gaps persist concerning the relationship between black holes, dark matter halos, and the continuing emergence of cosmic structure.

This paper advances a theory-building cosmological framework synthesising Garfoot's theories of axionic dark radiation, Aspecton metaparticle dynamics, and the Gravitonic Dark Energy Ether hypothesis. Black holes function as resonance chambers generating coherent photon-hadronic metaparticles through harmonic embedding under extreme spacetime compression. As these metaparticles propagate into dark-energy-dominated environments, etheric tension destabilises resonance synchrony, depositing quark-derived dark matter in circumgalactic and intergalactic regions. These deposits build extensive dark matter halos and facilitate secondary galactic formation *via* interactions with wandering black holes. This regenerative paradigm preserves empirical achievements of contemporary cosmology while extending them toward a unified model of black hole physics, dark matter evolution, and cosmic self-organisation, establishing black holes as active drivers in the cosmological origin and regeneration of galaxies.

Introduction: The Epistemological Limits of Standard Cosmology

Cosmology's history shows observational precision preceding explanatory synthesis. Einstein's field equations described spacetime as dynamic and responsive to matter-energy. Hubble demonstrated galactic recession proportional to distance, establishing spatial expansion. These foundations underpin modern astrophysics.

Profound ontological questions still remain unanswered. Planck data indicate roughly 68% dark energy and 27% dark matter, leaving baryonic matter as a minor fraction. Dark matter was initially inferred via mass discrepancies. Zwicky utilized Coma Cluster analysis to show missing mass. Rubin and Ford analysed galactic rotation curves, showing flat orbital velocities at large radii rather than the expected drop-off.

Bullet Cluster lensing reveals plasma separation from gravitational mass during cosmic impacts, supporting a collisionless dark matter model. Simultaneously, recent James Webb Space Telescope (JWST) observations challenge hierarchical timelines by revealing unexpectedly mature high-redshift galaxies. This implies accelerated structure formation channels. Dark energy also lacks mechanistic depth in ΛCDM, being primarily inferred from accelerating expansion via distant supernovae. Finally, standard black holes emit strictly thermal radiation per Hawking. They offer limited scope for coherent, information-rich nonthermal emissions. This framework posits singularities as active metaparticle generators to resolve these limits, contributing to ongoing galactic regeneration.

Observational Foundations of Cosmological Anomalies

Galaxies embed deeply within extensive dark matter halos. Gaia data show the Milky Way's halo extending tens of kiloparsecs, with a total mass that far exceeds baryonic content. Weak lensing confirms dominant collisionless mass distributions regulating these structures.

Ultra-diffuse galaxies challenge standard scaling relations by exhibiting massive halos disproportionate to their sparse stellar counts. JWST reveals early massive galaxies and mergers far earlier than anticipated, implying unrecognized structural formation channels.

Additionally, a candidate runaway supermassive black hole trails 200,000 light-years of active star formation. This suggests black holes can actively catalyse structure rather than merely suppressing it through radiative feedback. Gravitational waves and Event Horizon Telescope (EHT) imaging provide precise boundary constraints on these systems. Together, these anomalies support supplementary, non-primordial dark matter mechanisms operating across cosmic time.

Hawking Radiation and Nonthermal Extensions

Hawking radiation successfully reconciles general relativity, quantum field theory, and thermodynamics, establishing black holes as evaporating thermodynamic entities. It arises from vacuum fluctuations near event horizons, yielding a strictly thermal spectrum that depends inversely on black hole mass.

Limitations include its purely thermal, featureless nature, which creates the black hole information paradox. Contemporary extensions propose distinct nonthermal components to preserve quantum information. Computations show entanglement and nonunitary effects can yield information-carrying radiation. Merger-induced perturbations and superradiance in dense environments offer detectable nonthermal signatures.

The Garfoot axionic framework expands on this by modeling singularities as active macroscopic resonance chambers. Under extreme spacetime compression, hadronic closed-loop strings and photonic open strings undergo a process of harmonic embedding. This compression forms coherent, axion-like metaparticles that differ fundamentally from standard, random Hawking pairs. Aspectons introduce leptonic-hadronic quantum oscillations into these escaping emissions. Black holes thus drive both slow thermal dissipation and structured, directed emissions. These outward-propagating metaparticles eventually seed dark matter across local space.

Seven-Dimensional Substrate Geometry and Conceptual Formulations

To formally define the Gravitonic Dark Energy Ether framework without relying on abstract symbolic equations, we extend our familiar four-dimensional universe into a seven-dimensional space. This higher-dimensional arena consists of standard four-dimensional spacetime combined with a three-dimensional compact, hidden spatial core.

Within this geometry, the structural framework can be understood through four foundational conceptual principles:

The Substrate Density Rule: The overall geometry of this higher-dimensional space is governed by a flexible, dynamic product structure. In this model, standard spacetime geometry is directly altered by a hidden, localized scaling factor known as the substrate density modulation field. This field dictates how heavily mass influences local space.

The Balancing Action Principle: The total action of the universe balances the curvature of this higher-dimensional space against the energy potential of the substrate field. When this relationship is varied, it yields modified gravitational laws. These laws dictate that total spatial stress is the sum of standard baryonic matter and a unique, localized energy pressure called the Etheric Tension Tensor.

The Effective Cosmological Expansion: When the hidden three-dimensional core is mathematically averaged out over macro-space, a modified set of standard four-dimensional gravity equations emerges. In these equations, the standard, static Cosmological Constant is replaced by a dynamic, effective dark energy force. This force is driven directly by the internal shape, spatial gradients, and natural curvature of the hidden three-dimensional core.

The Soliton Decay Threshold: The streaming metaparticles are modeled as highly stable, localized waves moving through this higher-dimensional space. The relationship governing their stability dictates that their outward motion is strongly coupled to the background etheric tension. When gravity is high, this interaction is suppressed, keeping the particle wave stable. However, when moving through a space with high etheric gradients, the equation introduces a catastrophic resistance factor. This forces the particle wave to lose structural harmony and immediately decay into stable, decoupled matter.

Etheric Tension and Dark Matter Deposition Mechanics

The Gravitonic Dark Energy Ether frames gravity and dark energy as two opposing, coupled expressions of the seven-dimensional substrate. Matter-rich regions exhibit high gravitational coherence, which suppresses dark energy expressions. Conversely, vast intergalactic voids away from visible matter show a rapid rise in localized etheric tension. When coherent axionic metaparticles are ejected from a black hole, they initially maintain internal stability due to the strong local gravity of their parent body. However, as they journey into unmapped, dark-energy-dominated intergalactic voids, the rising etheric tension disrupts their internal resonance. This decoherence causes the metaparticles to break apart, liberating stable, quark-derived hadronic components directly into space as fresh dark matter deposits.

This ongoing mechanism supplements primordial dark matter with a continuous stream of black hole contributions over cosmic history. This localized deposition explains why galactic halos evolve dynamically over time rather than remaining static structures. It offers a clear explanation for ultra-diffuse galaxies, which represent regions of long-term, uninterrupted metaparticle deposition. Similarly, runaway supermassive black holes trail star-formation wakes because their rapid motion perturbs these pre-enriched reservoirs, triggering gas collapse and new star birth.

This interaction establishes a closed, reciprocal cosmological cycle where stars evolve into black holes, black holes emit structured metaparticles, metaparticles decay into dark matter, and dark matter provides the enhanced gravity needed to build new stars. This continuous feedback loop is supported by modern models of primordial and halo-embedded black holes. The unexpected structural maturity revealed by JWST fits into this model, as black hole-driven deposition provides an accelerated pathway for galactic generation that works alongside early primordial fluctuations.

Discussion and Empirical Predictions

This framework integrates four primary domains: Einsteinian geometry, Hubblean evolution, Hawking thermodynamics, and nonthermal extensions.

This synthesis addresses ΛCDM's ontological gaps by transforming black holes from passive cosmological endpoints into active drivers of structural renewal and galactic evolution. Nonthermal emissions and etheric decoherence provide clear physical mechanisms for observed anomalies, including early massive galaxies, ultra-diffuse galaxies, runaway black hole trails, and evolving halo boundaries.

To validate or falsify this framework, several specific, testable astrophysical predictions are proposed:

Halo Morphology Variations: Galactic dark matter halos should exhibit structural differences that correlate directly with the historical activity and mass of their central black holes.

Post-Merger Signatures: High-energy black hole mergers should produce distinct, nonthermal radiation signatures alongside standard gravitational wave signals.

Continuous Halo Growth: Fine-grained weak lensing surveys should reveal ongoing dark matter density changes within circumgalactic zones, showing active evolution over time.

Under this framework, dark matter distributions are more than just a leftover signature of the Big Bang; they encode the long-term history of compact object evolution across the universe. This marks a shift toward viewing the universe as a self-organising, regenerative system. Ongoing and upcoming wide-field weak lensing surveys, advanced gravitational wave networks, and high-energy sky surveys conducted by next-generation observatories will provide the empirical data needed to constrain, refine, or falsify these theoretical mechanisms.

Conclusion

Cosmological science advances by pairing increased observational capabilities with expanding theoretical frameworks. The Garfoot synthesis links black hole thermodynamics, coherent nonthermal radiation fields, etheric spatial tension, and dark matter halo evolution into a single, self-consistent regenerative framework. By positioning black holes as active engines of metaparticle-mediated dark matter deposition, this model explains how galaxies function as active participants in continuous, reciprocal cosmic cycles. This hypothesis invites rigorous empirical testing, offering a path toward a more complete integration of matter, radiation, and gravitation across the self-organising universe.

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