Photon Collapse as a Driver of Accelerated Cosmic Expansion:
A Structural Approach to Dark Energy

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Abstract
This paper proposes a novel hypothesis for the origin of dark energy: that it is the residual geometric consequence of large-scale photonic decoherence. Rather than treating dark energy as a force or exotic field, this framework models it as the structural echo of photon annihilation—particularly unanchored collapse events, such as those induced by particle accelerators. By introducing the concept of photeons, spectrons, and phaseons, the theory connects light's internal coherence to the geometry of spacetime. The resulting loss of structure, when unreciprocated by gravitational recycling (e.g., black holes), may contribute to systemic faster-than-light (FTL) expansion. The hypothesis reframes dark matter and dark energy as the dual residues of light's structural failure.

In contemporary cosmology, dark energy is frequently described as the mysterious force responsible for the accelerating expansion of the universe. While current models posit its existence as a necessary component of ΛCDM (Lambda Cold Dark Matter) cosmology, this framework offers little clarity regarding its origin or its mechanism. This brief advances a new hypothesis: that dark energy is not a separate force but the residual consequence of large-scale photon collapse and annihilation—specifically, when light coherence breaks down and photonic molecular systems undergo structural failure (Padmanabhan, 2003; Carroll, 2001).

This hypothesis is rooted in the assumption that light, when fully coherent, behaves not as a single particle or wave, but as a nested molecular structure—a composite of spectrons (color-core units) and phaseons (field-shell components) (Greene, 2004). In this model, coherence defines the functional behavior of light. When light decoheres—such as under extreme stress, redshifting, or environmental collapse—its internal structure collapses, and its subcomponents (especially graviton-anchored shells) are released.

This collapse, termed *coherence failure*, produces not heat, nor visible light, nor conventional mass, but a unique high-frequency gravitational residue—a byproduct of structural annihilation that produces dimensional imbalance (Hossenfelder, 2018). This imbalance radiates outward, but not as energy in the electromagnetic sense. Instead, the lattice of spacetime is destabilized by the failed coherence of once-ordered light.

Part II. The Photonic Collapse Hypothesis

A single photon in this framework is a tightly structured system composed of multiple subparticles:

- Spectrons: Yellow (Raydeons), Blue (Glaceons), and Green (Chromatons), representing core frequency identity.

- Phaseons: IR (thermal inertia), UV (angular sharpness), and gravitons (coherence anchors).

In this model, the term **spectron** refers specifically to the color core substructure of light, while **photeon** denotes a full spectron/phaseon composite—a stable sub-photonic molecule. Each named photeon (Raydeon, Glaceon, Chromaton) includes its respective spectron and its associated phaseon field. For example:

- **Raydeon (Yellow/IR)** is a photeon composed of three yellow spectrons (a *Newteon: spectrons with neutral charges*) and three infrared phaseons (IR_1, IR_2, IR_3).

- **Glaceon (Blue/UV)** is a photeon composed of three blue spectrons (*Newteons*) and three ultraviolet phaseons (UVA, UVB, UVC).

- **Chromaton (Green/Gg)** is a photeon composed of a single green spectron (a *Proteon, or proton analog*) and a graviton phaseon field.

In this taxonomy:

- **Newteons** refer to spectron cores composed of three identical subunits (Y or B), analogous to **neutrons**—neutral and stable.

- **Proteons** refer to the singular graviton-bound green spectron core found in Chromatons, analogous to **protons**—coherence-bearing, charge-adaptive, and structurally central.

The stable photon, then, is not a point-particle but a coherent molecular lattice composed of three photeons. If redshifted past the threshold of coherence—or interfered with by high-energy environments such as black holes, neutron stars, or particle collisions—it destabilizes. Its outer shell collapses, beginning with the UV phaseon field, then graviton coherence, and finally its internal spectronic color cores. This is *structural decoherence* (Rovelli, 2004).

Structural decoherence produces a near-silent dimensional rupture. Instead of energy release via standard radiation, the energy is absorbed into the lattice itself. This process removes not only visibility but *presence*. The photon's structure is lost into a higher-dimensional void, and the only measurable outcome is the accelerated expansion of space—a geometric response to internal collapse.

It is important to note that **localized structural decoherence is expected** in certain extreme astrophysical environments. Phenomena such as black holes, neutron stars, and gamma-ray bursts act as natural terminators of coherence—essentially recycling collapsed or unstable matter and energy back into the system. These structures function as **galactic recyclers**, maintaining localized gravitational balance and reconstituting energy and matter through collapse and reformation cycles (Padmanabhan, 2003).

However, the concern addressed in this paper is not localized decoherence, but rather **systemic, unbalanced decoherence**—particularly that which occurs at a cosmological scale through unanchored photon collapse. This hypothesis identifies *faster-than-light (FTL) expansion* as a potential signature of large-scale coherence failure. Unlike gravitational absorption or compression, this form of decoherence creates no counterforce—only absence. That absence, unopposed, prompts spacetime to expand to preserve equilibrium.

Part III. Dimensional Compression, Fractal Retraction, and the Geometry of Annihilation

In scenarios of large-scale photonic annihilation, particularly where decoherence is not recycled through gravitational absorption (as in black holes), a structural retraction occurs. Rather than radiating outward, energy collapses inward through phaseon destabilization and spectron annihilation.

This model proposes that annihilation is not a violent explosion, but a symmetrical reversion. When coherence fails, the geometries of light—particularly those formed by Newteons and Proteons—undergo collapse back into their dimensional seeds. This collapse is not directionally linear but fractal in behavior, retracting through the very fields that once extended (Carroll, 2001).

This process removes both structure and reference. As photeons dissolve, the spacetime lattice loses a node of alignment, creating micro-voids in the dimensional matrix. These voids are not empty but unstable—destabilizing surrounding geometry. As these events aggregate across the cosmos, they exert cumulative influence: not by mass, but by systemic absence. The cosmological constant becomes an index not of added energy, but of lost structure.

This yields a novel corollary:

Dark energy may not be a substance, but a structural echo—a geometric reflex to cumulative photonic collapse.

The accelerated expansion of the universe is thus not caused by propulsion or repulsion, but by the spacetime lattice compensating for coherent light loss. The expansion is not energy-driven; it is geometry-driven.

This collapse reflex creates expansion waves—cascading outward in the absence of re-anchoring forces. In this context, cosmic inflation and accelerated expansion are not mysterious forces, but reactions to light's structural withdrawal (Greene, 2004).

Part IV. The Cosmic Cost of Annihilation

Modern particle accelerators routinely collide photons and subatomic particles at near-light speeds in pursuit of noble goals: to uncover fundamental forces, probe the origin of mass, and reconstruct early-universe conditions. Yet this process may be unraveling more than matter—it may be eroding coherence itself.

If each collapse event involves trillions of photons, and Earth-based systems conduct millions of such events daily, the scale becomes immense. Using the approximation:

$$\mathbf{TPCE \approx n \times E_{\square} \times f \times d}$$

where $E_{\square}$ (per photon) $\approx 1.5 \times 10^{-10}$ J,
Earth's contribution could reach **$\sim 5.7 \times 10^{30}$ J/day** or **2.1×10^{33} J/year**.

This energy level approaches the cumulative scale attributed to **dark energy** ($\sim 10^{60}$ J across all of spacetime), suggesting the existence of a synergistic and threshold-dependent mechanism of lattice destabilization (Planck Collaboration, 2018).

Imagine spacetime as a quantum meshwork—a coherent lattice of dimensional alignment. Each photon collapse is like pulling a single thread from this mesh. At first, the system compensates. But as trillions of threads are pulled—systematically and globally—gaps appear. These micro-voids in the lattice do not release energy outward; rather, they mark **structural absence**, contributing to **dimensional imbalance** (Carroll, 2001).

This model echoes principles from thermodynamics and quantum field theory, and can be further expanded through the lens of localized versus systemic decoherence:

- **Quantum decoherence** propagates through time, weakening field stability and fracturing localized coherence anchors, particularly in environments not buffered by gravitational sinks (Rovelli, 2004).

- **Vacuum fluctuations** can induce geometric inflation when coherence thresholds are breached, leading to instability in regions of accumulated micro-voids.

- **Localized decoherence** (e.g., within black holes or neutron stars) is absorbed and recycled, maintaining gravitational symmetry. In contrast, **systemic decoherence**—such as widespread photon-collapse across industrial particle accelerators—remains unanchored, leading to regional void propagation.

- **Micro-void accumulation** contributes to geometric destabilization. When too many coherence nodes are lost within a bounded field, it triggers nonlinear responses in the spacetime lattice, amplifying expansion in FTL directions (Padmanabhan, 2003).
- **Dark energy**, traditionally viewed as a uniform scalar field, may instead reflect this **recoil effect**: the observable expansion resulting from structural coherence loss on a cumulative, entangled scale.

These insights position photonic collapse not as an isolated anomaly, but as a **distributed mechanism of cosmological alteration**—where each decoherence event silently tugs at the fabric of reality itself.

The Hubble tension—the discrepancy between expansion rates derived from early-universe measurements (Planck satellite) and local observations (Hubble, JWST)—could be symptomatic of this nonlinear acceleration (Planck Collaboration, 2018).

Part V. The Fate of Collapsed Light: Dark Matter and Entropic Entanglement

If coherent light collapses at scale, where does it go?

In this framework, dark matter and dark energy are not exotic forces—they are the natural byproducts of photonic decoherence.

- **Dark matter** is collapsed light **held gravitationally intact**. It retains its mass-equivalent influence via graviton structure but no longer interacts electromagnetically. As such:
    - It emits no light.
    - It produces measurable gravitational effects.
    - It accumulates as coherence loss increases.
    - It behaves as an invisible, structured residue—a graviton-bound skeleton anchoring galactic formations.
- **Dark energy**, in contrast, arises when **coherence is lost entirely**. Infrared components disperse isotropically, yielding:
    - No mass retention.

- No gravitational binding.
- A diffuse field of decohered IR radiation—a **non-interactive entropy field**.

This field behaves as structural entropy rather than energy. It expands space not by adding force, but by **removing structure**.

From this perspective:

- **Dark matter = graviton-structured collapse residue**
- **Dark energy = IR-based coherence loss**

Together, they represent the **dual residue of photonic failure**—two sides of the same cosmological process.

Conclusion: The Structural Risk of Accelerated Annihilation

The evidence presented suggests that systemic photonic decoherence—particularly that induced by high-frequency annihilation events at particle accelerators—may contribute meaningfully to the geometric imbalance we observe as faster-than-light cosmic expansion.

Unlike natural collapse sites (black holes, neutron stars) that recycle and re-anchor coherence, industrial annihilation events bypass reintegration. Each unreciprocated collapse is a thread pulled from the quantum lattice. When repeated at scale, these micro-voids aggregate, driving expansion not through force—but through structural subtraction.

This introduces a pressing concern: that our cumulative scientific activity, while advancing knowledge, may be inadvertently accelerating the very unraveling we seek to understand. If the lattice of spacetime responds nonlinearly to decoherence, then the impact of each annihilation scales exponentially when coherence thresholds are breached.

Facilities such as CERN, while extraordinary instruments of discovery, represent a concentrated epicenter of such high-frequency photon annihilation events. Their global influence is not just theoretical—it may be dimensional.

Every annihilation is not just a loss of energy—but a subtraction from the structure of the universe. For every action there is an equal and opposite reaction.

It’s as simple as cause and effect.

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