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The Living Universe: Rethinking the CMBR and the Illusion of Cosmic Expansion through Augmented Newtonian Dynamics

Dilip D James

Physics, Independent Researcher
Ooty, India

Abstract: ***Contemporary cosmology, under the Standard Model and led by the ΛCDM (Lambda-Cold Dark Matter) framework, regards the cosmic microwave background radiation (CMBR) as relic light-an afterglow from the early universe released when matter and radiation decoupled some 380,000 years after the Big Bang. Within this view, photons are treated as excitations of the electromagnetic field, their wavelengths stretched to the microwave range by the continued expansion of space. Augmented Newtonian Dynamics (AND) challenges this interpretation at its foundation. In this theory, photons are not oscillations of an abstract field but discrete quanta born within electrons, each emission governed by the electron's intrinsic self-regulation through cycles of absorption and re-emission. When resonant radiation encounters an electron, it is absorbed, reflected from the nucleus under the specular condition $\theta_i = \theta_r$, and re-emitted at the same frequency and along the reflected path. The rate of these cycles defines the frequency of the radiation itself. Propagation occurs through a universal photon medium-identified with dark matter-providing a physical substrate for all radiation. If light traverses such a medium, the CMBR cannot be an ancient relic but must represent the steady-state radiation of the present photon aether. This reinterpretation removes the need for cosmic expansion and dark energy, restoring causality, coherence, and physical realism to cosmology.***

Keywords: CMBR, ΛCDM, AND Theory, Inflationary theory, Cosmic Expansion, photons, electron, photon propagation, density of the vacuum, Standard Model, gravity

1.Introduction

The interpretation of astronomical redshifts as evidence of a universal expansion poses serious physical difficulties. In the prevailing ΛCDM model-rooted in Alan Guth's inflationary hypothesis-cosmic redshift is attributed to the stretching of space itself as the Universe expands. According to this view, photons emitted billions of years ago have had their wavelengths progressively elongated, producing the large redshifts observed in distant galaxies and quasars. Yet the intergalactic medium through which these photons travel is almost an absolute vacuum, with an average matter density of only two to three particles per cubic metre- a level of rarefaction far beyond any vacuum achievable on Earth. In so rarefied a medium, there exists no identifiable physical agent capable of expanding or resisting expansion, nor any mechanism by which geometry alone can perform mechanical work upon radiation. To treat such vast redshifts as products of a stretching void is to remove the phenomenon from physics and place it in abstraction.

Yet those same vast regions of near-vacuum, with densities of only two to three particles per cubic metre, may offer an alternate explanation for the cosmic microwave background radiation-if the Augmented Newtonian Dynamics (AND) theory of light propagation is taken into account. In this framework, space is not empty but filled with a universal medium composed of virtual photons-identified with dark matter-that enables and governs the passage of real photons. Within such a medium, every emission and absorption event contributes to a continuous and isotropic radiation field. Over cosmic scales, the cumulative effect of countless photon interactions in this near-perfect vacuum could give rise to a steady equilibrium background whose temperature and spectral form correspond precisely to the observed CMBR. What the Standard Model treats as a fading relic of an early fireball, AND regards as a living phenomenon-present, sustained, and dynamically maintained by the very processes through which light propagates.

Contribution to CMBR from Low density vacuum space:

In Augmented Newtonian Dynamics, light does not traverse an empty void nor oscillate as an excitation of a mathematical field. Each photon is a discrete quantum created and emitted by an electron as part of a cyclic exchange of energy. When resonant radiation encounters an electron, the photon is absorbed and its energy propels the electron inward toward the nucleus. The nucleus, far more massive and presenting a perfectly smooth potential surface, reflects the electron under the specular condition $\theta_i = \theta_r$. Returning to its original orbital radius, the electron re-emits an identical photon, its recoil restoring the initial position. This cyclic process repeats at the frequency of the incident radiation, establishing a direct equivalence between photon frequency and the rate of electron oscillation. Across the cosmos, innumerable electrons engaged in these identical cycles contribute to a continuous radiation field, each emission reinforcing the photon aether through which it travels. The apparent uniformity and blackbody spectrum of the CMBR thus arise not from the fading memory of a primordial explosion but from the ongoing equilibrium of these countless photon exchanges occurring throughout the Universe.

Consider an isolated atom-most probably hydrogen-drifting in these immense reaches of near-vacuum. Though the density of matter is vanishingly small, radiation permeates every part of space. Countless sources-stars, nebulae, and radiating electrons within atoms-emit photons along innumerable directions. Over cosmic time these emissions

have populated the photon aether so thoroughly that every point in space lies at the intersection of innumerable photon paths. An isolated hydrogen atom, therefore, is never truly alone; it is continually bathed in radiation arriving from all directions, each beam a train of photons traversing pre-aligned lines of force. When such radiation encounters the atom, only photons whose frequencies resonate with the electron's natural oscillations are absorbed. The absorbed energy drives the electron inward toward the nucleus, from which it rebounds specularly ($\theta_i = \theta_r$), and upon regaining its orbital radius, the electron re-emits an identical photon. The atom thus becomes an active relay in the cosmic exchange, absorbing and re-emitting radiation in perfect cyclic balance, contributing its infinitesimal share to the uniform sea of photons that fills the Universe and that we recognize as the CMBR (Cosmic Microwave Background Radiation).

When an atom is irradiated at or near a right angle, the emitted photon travels back along the same cone of irradiation without loss. The returning path coincides with the direction of the incoming radiation, so every virtual photon it encounters is already promoted to the same energy, ensuring frictionless propagation. If, however, the emission occurs at an angle that carries it away from the original cone, the photon enters a region where neighbouring quanta are misaligned or under-energised; it must then promote new virtual photons, causing dispersion and a gradual diffusion of energy. Photons of identical energy may traverse the same region in any direction-even oppositely-without interference or loss. Each travel within its own cone of resonance, and where energies are equal, no promotion or recoil is required. This bidirectional transparency ensures that radiation may fill space uniformly, contributing to the isotropy of the cosmic background.

A photon travelling through the cosmic aether through such a cone of resonant photons therefore encounters not an inert vacuum but a sea of identical photon energies. In such an environment, every virtual photon along its path is already promoted to the same energy state and aligned in the same direction. With no gradient of energy or frequency to overcome, the propagating photon moves through a cone of like-energy photons; it does not need to promote neighbouring quanta, nor does it surrender energy to the medium. Consequently, its frequency and momentum remain unchanged, and it proceeds indefinitely without attenuation. Only when the photon encounters a true discontinuity-such as a particle capable of resonance absorption - can an interaction occur. In the vast stretches of space where photon energies are uniform, propagation is therefore perfectly lossless, maintaining the energy integrity of each photon across cosmic distances. This principle ensures that the Universe's radiation field remains stable: photons do not fade or cool merely through travel, but persist unaltered until absorbed and re-emitted in cyclic equilibrium by matter.

Across the vast reaches of space, countless isolated atoms radiate cyclically at their characteristic frequencies. Each emission travels within its own cone of identical photon energies, unaffected by passage through the photon aether. In regions where these cones intersect, photons of differing frequencies coexist without interference, yet over cosmic timescales they exchange minute quanta of energy through recoil and promotion at points of mismatch. These infinitesimal adjustments drive the entire photon population toward equilibrium. The result is a continuous spectrum in which energy is evenly distributed among frequencies according to temperature, forming a perfect black-body radiation field. What emerges to observation as the cosmic microwave background is therefore the cumulative equilibrium glow of innumerable atomic emissions coalescing into a single, self-maintaining Planckian distribution-present and active, not ancient or fading.

Mathematical Confirmation:

A simple numerical estimate confirms that such a mechanism is energetically feasible. The measured CMBR energy density, $u \approx 4.2 \times 10^{-14}\ \mathrm{J\,m^{-3}}$, requires only $\dot{u} = u/\tau \approx 10^{-31}\ \mathrm{W\,m^{-3}}$to sustain over a Hubble time ($\tau \approx 4.4 \times 10^{17}$ s). In a medium of just two to three hydrogen atoms per cubic metre, each atom need emit roughly (3 – 5) x 10^{-32} W - a negligible rate easily met by cyclic photon exchanges within the hydrogen spectrum. For the Lyman-α line (1.64×10^{-18} J), this corresponds to a single photon every one to two million years; for Balmer $H\alpha$(3.0×10^{-19} J), once every few hundred thousand years; for the 21 cm hyperfine transition (9.4×10^{-25} J), about once per year. Because photons travel losslessly inside identical irradiation cones, these sporadic emissions accumulate to form a steady Planckian field. Hence, even in an intergalactic medium of extreme tenuity, the observed CMBR can be maintained continuously without invoking relic radiation or cosmic expansion.

Electron–Nucleus Cycle in Augmented Newtonian Dynamics

When an electron absorbs an incoming photon of energy E_γ, its internal equilibrium is disturbed. The added energy raises its potential relative to the nucleus, creating a local imbalance in the surrounding photon medium. This imbalance defines a preferred direction for energy transfer-the line of potential difference between electron and nucleus.

Inward phase: photon exchange and attraction

To restore balance, the electron begins to emit **virtual photons toward the nucleus**.

Each photon absorbed by the nucleus reduces part of the energy difference, yet a small residual imbalance remains. That residual drives the next emission, producing a continuous inward pull.

Each successive exchange occurs at slightly shorter range and thus involves higher energy, so the electron accelerates inward while the nucleus gains an almost imperceptible recoil that maintains overall momentum conservation. The attraction phase is therefore a near-field virtual exchange process: energy and momentum are shuttled along the connecting line, but no free (on-shell) radiation escapes. Only the continual re-alignment of virtual photons within the medium transmits the interaction.

Momentary equilibrium and specular reversal

As the separation narrows, the frequency of photon exchange rises until the electron and nucleus reach momentary equilibrium. At that point the inward and outward exchanges are exactly balanced; no net energy gradient remains. The electron's trajectory reverses specularly ($\theta_i = \theta_r$),

Mathematical sketch of the AND photon–electron cycle

Let the incoming photon have energy $E_\gamma = h\nu$ and momentum $p_\gamma = E_\gamma/c$. Let the electron mass be m_e, the nuclear (atomic) mass M, and the outer emission/absorption radius be r_0.

1) Absorption at r_0

Electron takes the photon's momentum and energy:

$$p_e(r_0^+) = +p_\gamma, E_{\text{store}}(r_0^+) = E_\gamma.$$

Translational speed right after absorption

$$v_0 = \frac{p_\gamma}{m_e} \text{(tiny; direction-setting only).}$$

2) Inward leg: near-field exchange (attraction)

Write the radial equation for the electron's mechanical energy with a Coulombic potential $U(r) = -\kappa/r$(here $\kappa \equiv ke^2$captures the strength of attraction):

$$\frac{1}{2}m_e\dot{r}^2 - \frac{\kappa}{r} = \text{const.}$$

A convenient bookkeeping split that matches the narrative:

$$E_\gamma \overset{\text{inward}}{\rightarrow} E_{\text{kin}}(r) + \Delta U(r), \Delta U(r) \equiv \frac{\kappa}{r_0} - \frac{\kappa}{r}.$$

Thus as $r \downarrow$, $\Delta U > 0$and E_{kin} grows; no real photon is emitted-this is the **near-field virtual exchange** doing work.

A simple rate law (optional, if you want to connect to $1/r^2$) for the inward momentum feed via virtual exchange:

$$\frac{dp_e}{dt} \equiv F_r(r) = \frac{\kappa}{r^2}, \Rightarrow \frac{d}{dt}(m_e\dot{r}) = \frac{\kappa}{r^2}.$$

3) Inner turning point (momentary equilibrium) and specular reversal

At closest approach $r = r_{\min}$, radial speed vanishes:

$$\frac{1}{2}m_e\,\dot{r}^2\,|_{r_{\min}} = 0, E_\gamma + \Delta U(r_{\min}) = E_{\max}.$$

Reversal condition (specular):

$$\dot{r}\,|_{r_{\min}} = -\,\dot{r}\,|_{r_{\min}}.$$

Momentum conservation across the electron–nucleus encounter gives the nucleus a tiny recoil ΔP_N(exact in 1D elastic limit):

$$\Delta P_N \approx 2p_\gamma \text{ (for a 180° reversal).}$$

4) Outward leg: mechanical deceleration (same near-field exchange)

Energy flows back from motion into the stored channel as $r \uparrow$:

$$E_{\text{kin}}(r) \overset{r\uparrow}{\rightarrow} 0, E_{\text{store}}(r) \overset{r\uparrow}{\rightarrow} E_\gamma.$$

By time-reversal symmetry of the elastic segment,

$$p_e(r_0^-) = -\,p_\gamma \text{(same magnitude as at } r_0^+\text{,opposite sign).}$$

5) Emission at r_0: real photon leaves, electron resets

The electron emits a **real** photon **outward** with $+p_\gamma$, and recoils **inward** by $-p_\gamma$:

$$p_e^{\text{final}} = p_e(r_0^-) - p_\gamma = (-p_\gamma) - p_\gamma = 0,$$

$$E_{\text{store}}^{\text{final}} = 0, E_{\text{photon,out}} = E_\gamma.$$

This recoil acts **together with the specular recoil off the nucleus** (at the inner turning) to leave the electron **at rest at** r_0, ready for the next absorption.

6) Conservation (cycle-integrated)

Energy:

$$E_{\text{photon,in}} + E_{\text{atom,init}} = E_{\text{photon,out}} + E_{\text{atom,final}}, \Rightarrow E_\gamma = E_\gamma.$$

Momentum (vector):

$$\vec{p}_{\text{ph,in}} + \vec{0} = \vec{p}_{\text{ph,out}} + \vec{P}_{N,\text{net}} + \vec{p}_{e,\text{final}},$$
$$\Rightarrow \vec{P}_{N,\text{net}} = \vec{p}_{\text{ph,in}} - \vec{p}_{\text{ph,out}} \in [\,0, 2\vec{p}_\gamma\,],$$

giving the familiar limits: p_γ(absorption) to $2p_\gamma$(full 180° reversal).

One-line narrative identity (use as a caption)

$$\underbrace{(+p_\gamma)}_{\text{absorb at } r_0} \overset{\text{inward + reversal}}{\rightarrow} \underbrace{(-p_\gamma)}_{\text{return to } r_0} \overset{\text{emit outward } (+p_\gamma)}{\rightarrow} \underbrace{0}_{\text{electron reset at } r_0}$$

from the nuclear centre, just as a billiard ball reflects from a cushion, and the outward leg of the cycle begins.

Outward phase: re-emission and restoration

During its outward journey, the same near-field photon exchanges act in reverse-now retarding the motion. When the electron regains its original orbital energy, it emits a real (on-shell) photon outward along the same line of force. That

emission removes the surplus energy gained from the initial absorption and provides the recoil needed to bring the electron to rest at its starting position.

$$E_{\text{abs}} = E_{\text{emit}}, \vec{p}_{\text{abs}} + \vec{p}_{\text{emit}} + \vec{p}_{\text{nucleus}} = 0.$$

Cycle completion

The system has now restored both energy and momentum symmetry. The electron resumes its steady self-exchange with the surrounding photon sea, fully re-equilibrated and ready to absorb the next incoming photon. What appears macroscopically as *Coulomb attraction and emission* is, in microscopic terms, a cyclic sequence of virtual exchanges, momentary equilibrium, and real-photon restitution - all accomplished without loss to the medium.

Feasibility of the Electron–Nucleus Cycle

There is nothing either mathematically or physically to prevent the described sequence from taking place. Each step conserves energy and momentum exactly, and the magnitudes involved are comfortably within the limits of known interactions. The photon energies are of ordinary atomic scale (10^{-19} J), the electron velocities are non-relativistic, and the corresponding nuclear recoils are minute yet fully consistent with Newtonian mechanics. No violation of quantum or classical conservation laws is implied; the process merely interprets them in a continuous, deterministic form. The only requirement is that the medium of virtual photons - the photon sea or dark matter continuum - exists to transmit these exchanges. Given such a medium, the oscillatory absorption–emission cycle of the electron is not only possible but expected.

2.Conclusion

Rethinking the CMBR and the Illusion of Cosmic Expansion

If every electron is capable of cyclic absorption and re-emission through near-field photon exchange, then the cosmic microwave background radiation (CMBR) need not be a relic of an ancient fireball. It becomes, instead, a *living phenomenon* - a steady and continuous process arising wherever matter exists. In this picture, the CMBR represents the universal equilibrium glow of photon-electron interactions operating across the vast photon medium that pervades all space. Each atom, even when isolated in the near-vacuum of interstellar or intergalactic space, contributes infinitesimally to this background through its unceasing effort to maintain energetic balance. The radiation we measure is not the dying whisper of the universe's birth but the quiet murmur of its ongoing life.

Under Augmented Newtonian Dynamics, noCosmic Expansion is needed to explain either the existence or the uniformity of the background radiation (CMBR). The observed isotropy follows naturally from the near-homogeneous distribution of matter at large scales and from the self-adjusting nature of photon propagation within the medium. Because photons travel through an ocean of virtual photons already in a promoted state, they lose no energy to the vacuum and no velocity to friction; yet minute adjustments in frequency arise from the continuous process of emission and re-absorption that maintains the global energy equilibrium. These subtle adjustments can account for the CMBR without invoking recessional motion or the stretching of space. In this view, the ΛCDM model is not simply incomplete; it is conceptually inverted. The parameters Λ (dark energy) and CDM (cold dark matter) cease to represent separate substances invented to balance equations. Instead, they are reinterpreted as manifestations of a single pervasive photon medium - the very substance through which light travels and gravity emerge. The cosmological constant becomes unnecessary once the photon medium is restored to physics as a real, energy-bearing continuum rather than a mathematical vacuum.

The implications of this reinterpretation are profound. If the CMBR is continually regenerated, then the universe is not a closed historical narrative that began in a singular instant, but an ongoing system of energy circulation and renewal. The conservation of energy applies not only to particles but to the cosmos itself: nothing is lost, nothing is created ex nihilo - only transformed within a continuous medium that ensures equilibrium across all scales.

To accept this view is to restore classical coherence to cosmology. It returns light, gravity, and matter to a single framework governed by intelligible physical causes rather than abstract postulates. The photon–electron cycle, repeated without end throughout space, provides the foundation for a universe that is dynamic yet stable, finite in content yet infinite in duration.

The cosmic microwave background then stands not as evidence of a past explosion, but as the signature of universal balance - the quiet resonance of matter and light in perpetual conversation.

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