A Vibrational Paradigm of the Universe II: Time and Light

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Abstract

In the first article of this series (*A Vibrational Paradigm of the Universe I: Foundations*), we proposed that space itself may be understood as a lattice of oscillatory points. From this minimal assumption, several key aspects of physics—such as synchronization, particle stability, quantization, and gravitation—were reinterpreted.

The present article extends this vibrational framework to two of the most fundamental concepts in physics: **time** and **light**. We argue that time should not be regarded as an independent dimension but rather as the cadence of oscillatory processes relative to the space lattice, with proper time emerging naturally from the geometry of confined light-like trajectories. Similarly, light can be reinterpreted as the propagation of density modulations within the oscillatory lattice, its universal velocity arising from the intrinsic properties of the medium.

While highly speculative, this perspective offers an alternative basis for reflection on long-standing problems in relativity, quantum theory, and the nature of spacetime itself.

Keywords: Vibrational paradigm, Oscillatory space, Proper time, Light propagation, Zero-point energy, Relativity, Wave-particle duality

1 Introduction

In *A Vibrational Paradigm of the Universe I: Foundations* [1], we proposed that physical space could be modeled as an ensemble of oscillatory points capable of synchronization. This simple hypothesis, though speculative, provided a unifying language to reinterpret phenomena such as quantization, particle confinement, gravitation as refraction, and electromagnetic radiation.

This second article extends the paradigm to address **time** and **light**—two cornerstones of physics that remain conceptually elusive. Time, as formalized in relativity, is relative to the observer's state of motion and gravitational environment. Yet it remains unclear what physical mechanism underlies this relativity. Within the vibrational paradigm, we suggest that time is better understood as the **internal cadence** of oscillatory structures relative to the lattice of space.

Light, on the other hand, is central both to relativity and quantum mechanics, yet still requires a dual description as both wave and particle. Here, we explore how light may instead be conceived as a **transport of vibrational density**—a synchronized impulse traveling through the oscillatory lattice of space.

2 Time as Cadence

The conventional view, inherited from Minkowski spacetime, treats time as a fourth dimension, orthogonal to the three dimensions of space. However, in the vibrational paradigm, time arises not as a dimension but as a measure of the **number of oscillatory cycles** completed by localized structures relative to the background space lattice.

At macroscopic scales, our species perceives time in units such as seconds, defined via atomic processes. Yet relative to the putative oscillatory scale of space points, such intervals are immense. In this sense, the "flow" of time is simply a reflection of our position in the hierarchy of scales.

A more detailed derivation of **proper time** as the cadence of internal oscillations for moving particles is provided in Appendix 5. There we show, through a geometric argument based on confined light-like trajectories, how the standard relativistic time-dilation relation emerges naturally.

3 Light as Propagation of Vibrational Density

Light, within this framework, corresponds to the transmission of an **impulse** through the oscillatory space lattice. Rather than particles traveling through a vacuum, photons represent localized packets of synchronized modulation in the density of space points.

This propagation occurs along **pseudo-standing waves**, formed by the superposition of IN and OUT oscillatory modes generated by matter. The familiar invariance of the speed of light (c) is then not an unexplained postulate, but a direct property of the synchronization capacity of the oscillatory lattice.

From this perspective:

- The electromagnetic wave corresponds to the periodic alternation of density in the lattice nodes.
- The photon, in its particle-like guise, is a quantized packet of such modulation.
- The universality of c emerges because all oscillations propagate through the same substrate: the vibrational medium of space.

4 Discussion

The vibrational paradigm, though speculative, offers a fresh lens for reinterpreting fundamental issues.

4.1 Relativity of Time: Proper Time and Universal Time

Within the framework of our paradigm, the relativity of time ceases to be a mysterious phenomenon, and all associated paradoxes vanish. It becomes natural that each observer

possesses a proper time whose cadence depends on their motion relative to the fabric of Space.

As a consequence, two observers moving at different velocities cannot agree on the time intervals separating two external events when these are measured according to their respective clocks. The very notion of simultaneity loses its meaning in this context. Simultaneity can only be defined with respect to a reference clock that remains at rest relative to the underlying structure of space.

4.2 The Nature of Light

Electromagnetic radiation may be interpreted as the transport of a vibrational energy density. The well-known wave–particle duality is, in this view, a macroscopic illusion emerging from the discrete structure of space and from that of matter particles, themselves composed of electromagnetic radiation [**?**]. Light appears to propagate along multiple paths simultaneously; however, this too is an emergent illusion, a phenomenon that will be explored in a forthcoming study. Here, light is invoked solely to explain the physical mechanism underlying the slowing of proper time.

Future work will extend this collection of studies to address key questions in particle physics and unresolved issues such as the expansion of space, the nature of inertia, the transactional interpretation of quantum processes, the propagation of light, and the collapse of the wave function.

5 Conclusion

From the single postulate that space consists of oscillatory points, we have extended the vibrational paradigm to account for the phenomena of time and light. Time is reinterpreted not as a dimension, but as cadence relative to the oscillatory lattice. Light is viewed as density propagation within that lattice.

This work offers a basis for reflection. It serves as the second step in a broader program—a collection of articles devoted to exploring whether the vibrational paradigm may ultimately provide a coherent alternative picture of fundamental physics.

Appendix

Derivation of Proper Time

The "time dimension" is a mathematical convenience; a more physical approach is to consider **durations**, defined by the cadence of internal oscillations relative to the space lattice.

Consider a particle as a confined light-like trajectory, looping internally at speed c. When the particle is at rest with respect to the space lattice, all of this trajectory is devoted to internal loops. When the particle moves with velocity v, part of the trajectory contributes to translation, leaving fewer loops executed per unit universal duration.

This can be represented as a helical trajectory along a cylinder: the base perimeter corresponds to internal loops, while the cylinder height corresponds to translation. Flattening this geometry yields a right triangle, whose hypotenuse is the total light-like path length. Applying Pythagoras:

$$c^2 = v^2 + \left(\frac{n \cdot 2\pi r}{s}\right)^2 \tag{1}$$

Rearranging:

$$\frac{n \cdot 2\pi r}{s} = c\sqrt{1 - \frac{v^2}{c^2}} \tag{2}$$

Defining the internal cadence (proper time) as $T_p = \frac{n \cdot 2\pi r}{c}$:

$$\frac{T_p}{s} = \sqrt{1 - \frac{v^2}{c^2}} \tag{3}$$

This is precisely the time-dilation formula of relativity. Thus, proper time emerges naturally when particles are conceived as confined light oscillations within the oscillatory lattice of space.

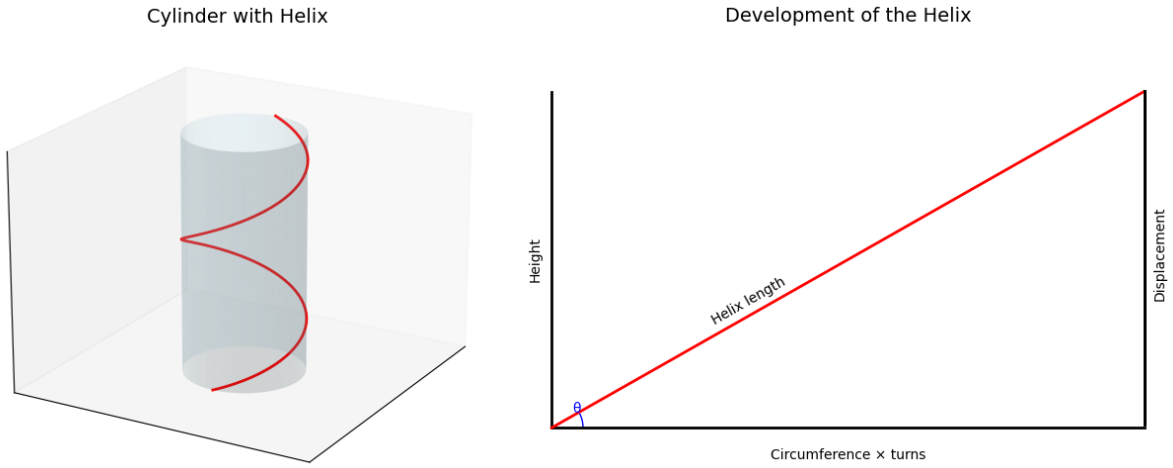

Figure 1: helix development. Right triangle with small sides equal to the path dedicated to translation and internal loops.

References

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