

# The Remainder Hypothesis: Light as Residual Energy from Temporal Compression in Spatial Media

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## Abstract

it is proposed that light (L) is not a universal speed limit or intrinsic property of spacetime, but instead emerges as a residual effect of temporal compression through spatial media. Under this model, light is treated as a byproduct of incomplete time compression, or a “leakage” that arises when pressure ( $P_s$ ) compresses time density ( $T$ ) within the bounds of spatial elasticity ( $S$ ). This model introduces a new perspective on light propagation, event horizons, and causality boundaries by interpreting photons as temporal remnants.

The Compression Principle is formalized as:

$$L = \frac{T \cdot P_s}{S} - \nabla_\tau$$

Where:

- $L$ : Light (residual energy)
- $T$ : Time density (compressed time per unit of space)
- $P_s$ : Pressure scalar (gravitational, acoustic, or other compressive force)
- $S$ : Spatial elasticity (resistance of space to compression)
- $\nabla_\tau$ : Temporal gradient leak (rate at which time fails to compress and instead emits energy as light)

## Predictions & Implications

1. **Black Hole Limit:** As  $P_s \rightarrow \infty$ ,  $L \rightarrow 0$   
No remainder = no light = event horizon
2. **Superluminal Acoustics:** If  $P_s$  temporarily oscillates faster than  $S$  can elastically absorb,  $\nabla_\tau < 0$   
Acoustic pressure spikes could briefly outrun photon propagation – sound over light
3. **Gravitational Humming:** Pre-light oscillations could be detected as low-frequency temporal compression waves in extreme gravity zones  
Gravity sings before it shines
4. **Photon Absence via System Starvation:** Manipulating  $T$  and  $P_s$  could theoretically suppress  $L$  entirely

## Theoretical Context

This model complements relativity by mapping  $\nabla_\tau$  to spacetime curvature and allows for analogy with general relativity’s energy density stress tensor. In this frame, energy is what resists compression, light is what escapes compression, and gravity is a scalar-field pressure effect.

## Keywords

Temporal Compression, Remainder Hypothesis, Photon Emergence, Space-time Pressure, Superluminal Acoustics, Relativistic Leakage

## Suggested Categories

`gr-qc` (General Relativity and Quantum Cosmology) or `physics.gen-ph` (General Physics)

## Contact

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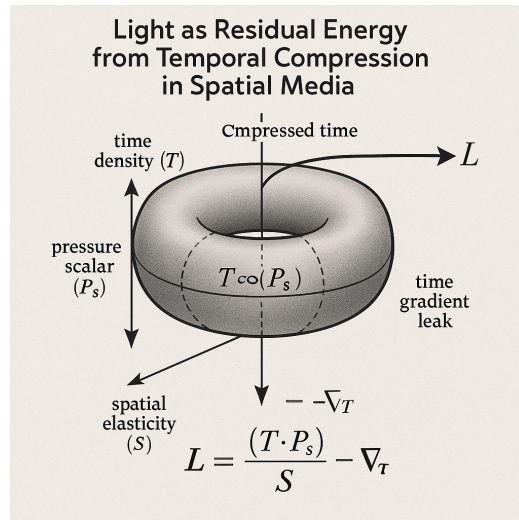


Figure 1: Toroidal compression model showing variable interaction