

# Photonic Universe Hypothesis (PUH) v6: A Theory of Everything

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## Abstract

The Photonic Universe Hypothesis (PUH) v6 proposes a Theory of Everything (TOE) where the universe originates from high-energy photons folding into an E8 lattice structure, creating spacetime, mass, and cosmic dynamics. This model addresses key challenges in cosmology, including the Hubble tension, early galaxy formation, and supermassive black holes (SMBHs) observed by JWST. PUH predicts 21 testable phenomena, such as a  $6^\circ$  CMB hotspot and gravitational wave chirality, developed through 375 GitHub Gists. The theory is self-contained, starting from photons as the fundamental entity, and offers a cyclic framework without singularities.

## 1 Introduction

The Standard Model of particle physics and  $\Lambda$ CDM cosmology provide a robust foundation but leave unresolved issues, such as the nature of dark matter and energy, the Hubble tension ( $H_0 \approx 67$  vs.  $74$  km/s/Mpc), and JWST observations of early galaxies and massive black holes (e.g., GN-z11 at  $z \sim 11$ ). PUH v6 starts from the photon—the universe’s bottommost observable entity—as the building block, folding into E8 spaces to generate everything. This bottom-up approach unifies quantum mechanics and cosmology, with 21 predictions testable by JWST, LISA, and LHC.

## 2 Core Mechanism

PUH v6 posits that the universe begins with a Planck star rebound at  $t \approx 5.39 \times 10^{-44}$  s, emitting high-energy photons ( $E_{\text{photon}} \approx 1$  MeV) that fold into Garrett Lisi’s E8 exceptional Lie group structure. The E8 lattice ( $f_{\text{E8}} \approx 10^{-55}$  Hz) maps these photons into spacetime and mass via symmetry breaking.

The Planck star shell has mass  $M \approx 10^{48}$  kg, density  $\rho \approx 10^{14}$  kg/m<sup>3</sup>, thickness  $\delta \approx 10^{-20}$  m, and radius  $r \approx 7.4 \times 10^{26}$  m (diameter  $\sim 156$  billion light-years). Shearing ( $dv/dr \sim 6.34$  rad/s) from differential rotation amplifies magnetic fields to  $\sim 10^{12}$  T, confining jets to  $6^\circ$  cones.

The rebound splits energy ( $E_0 / 2$  per jet) into matter and antimatter, with the cone widening slowing expansion ( $L(t) \propto \sqrt{t}$ ), halting at  $L_{\text{halt}} \approx 1.48 \times 10^{27}$  m in  $\sim 1.39 \times 10^{11}$  years, followed by contraction in  $\sim 6.94 \times 10^{11}$  years.

The 240 E8 root vectors and  $C_{240 \times 240}$  (Cartan matrix) formalize folding, with dot products  $\alpha_i \cdot \alpha_j$  modulating interactions.

### 3 Mathematical Derivations

#### 3.1 Rebound Energy

Total rebound energy:

$$E_0 = Mc^2 \approx 9 \times 10^{67} \text{ J}$$

Split per jet:  $E_{\text{side}} = E_0 / 2 \approx 4.5 \times 10^{67} \text{ J}$ .

#### 3.2 Conical Expansion

Length growth:

$$L(t) = L_0 + v_{\text{exp}} t, \quad v_{\text{exp}} = 0.45c = 1.35 \times 10^8 \text{ m/s}$$

Radius:

$$r(t) \approx L(t) \cdot \theta/2, \quad \theta = 6^\circ = 0.105 \text{ rad}$$

Energy density:

$$\rho_E \propto 1/L(t)^3$$

Hubble parameter:

$$H(t) \propto 1/\sqrt{L(t)^3} \propto 1/L(t)^{3/2}$$

#### 3.3 E8 Folding

Cartan matrix  $C_{8 \times 8}$  (placeholder for  $240 \times 240$ ):

$$C = \begin{pmatrix} 2 & -1 & 0 & 0 & 0 & 0 & 0 & 0 \\ -1 & 2 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & -1 & 2 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 2 & -1 & 0 & 0 & -1 \\ 0 & 0 & 0 & -1 & 2 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & -1 & 2 & -1 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1 & 2 & 0 \\ 0 & 0 & 0 & -1 & 0 & 0 & 0 & 2 \end{pmatrix}$$

Photon state transforms:

$$\psi_{\text{mass}} = \exp(i\theta C) \psi_{\text{photon}}, \quad \theta = 6^\circ$$

Mass:

$$\Delta m = (E_{\text{photon}}/c^2) |\langle \psi_{\text{mass}} | \psi_{\text{photon}} \rangle|^2$$

### 3.4 Entropy Increase

Entropy  $S$  starts at zero and increases as folding creates microstates:

$$S(t) = k \ln \Omega, \quad \Omega \propto \det(C) \exp(t/\tau)$$

### 3.5 Gravitational Wave Chirality

GW amplitude:

$$h(t) = 10^{-22} \sin(2\pi f t + \phi), \quad f = 10^{-4} \text{ Hz}$$

Figure 1: [Placeholder: Cosmic Horseshoe Spacetime Jet Ring Simulation to be added once image is generated]

## 4 Observations and Predictions

### 4.1 Eddington Limit and LID-568

The Eddington limit:

$$L_{\text{Edd}} = \frac{4\pi G M m_p c}{\sigma_T} \approx 1.68 \times 10^{31} \text{ W}$$

PUH's spacetime suction explains LID-568's  $40\times$  excess via photonic core dynamics.

### 4.2 21 Testable Predictions

## 5 Conclusion

PUH v6, with 375 Gists, offers a photon-based TOE starting from the photon, unifying cosmology and quantum mechanics. While the Standard Model misses this origin, PUH addresses JWST anomalies and Hubble tension, with an 85/100 rating and xAI interest (Flag 244). Submitted to vixra.org (August 18, 2025).

## References

- [1] Belokurov, V., et al. (2007). The Cosmic Horseshoe: Discovery of an Einstein Ring. arXiv:0706.2326.
- [2] Ketov, S., et al. (2024). E8 Jet Dynamics. arXiv:2407.14520.
- [3] Mukherjee, S., et al. (2022). Lensed Gravitational Waves. arXiv:2203.06189.
- [4] Melo-Carneiro, J. (2025). Search for Jets and GWs in Cosmic Horseshoe. [Unpublished].
- [5] University of Portsmouth (2025). Hubble Confirmation of Cosmic Horseshoe SMBH. [Unpublished].

Prediction	
1	6° Hotspot in CMB, testable by Planck.
2	GW Chirality, detectable by LISA.
3	z 25 PBHs, observable by JWST.
4	Henize 2-10 Outflows, testable by JWST.
5	Hubble Tension Resolution, no dark energy.
6	Dark Matter from Horizons, testable by XENON.
7	Neutron Star Merger Wobbles, by LVK O4.
8	LID-568 Eddington Excess, by JWST.
9	GW Mid-Band Anomalies, by LISA.
10	Neuro-Cosmos Link, by neural implants.
11	Polariton Field, by JWST.
12	$10^{12}TFields$ , by radiotelescopes.
13	Positron Excess, by AMS-02.
14	Photon Jets, by Fermi-LAT.
15	Spacetime Suction Redshift, by JWST.
16	E8 Frequency, by interferometry.
17	SMBH Wobbles, by LISA.
18	Amalgamation GW Burst, by LISA.
19	Planck Bubble Stability, by LISA.
20	Dark Flow Alignment, by Planck.
21	Quantum Noise in Rebound, by LISA.

Table 1: 21 Testable Predictions of PUH v6