The Photonic Universe Hypothesis: Testing Spin-Driven Matter/Antimatter Production with GW231123

Brian Martell
gb12345@rogers.com
Whitby, Ontario, Canada

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Abstract

The Photonic Universe Hypothesis (PUH) and Optical Lambda Quantum Energy Model (OLQEM) propose that Planck stars with photon cores ($N_\gamma \approx 10^{80}$, $E_\gamma \gtrsim 1\,\mathrm{MeV}$) in a Planck lattice ($R_P \propto \ell_P(\rho_m/\rho_m^0)^{0.1}$) drive matter/antimatter production and cyclic cosmology. We align PUH with GW231123 (masses $137^{+22}_{-17}/103^{+20}_{-52}\ M_\odot$, spins $0.9^{+0.10}_{-0.19}/0.8^{+0.20}_{-0.51}$), detected by LIGO-Virgo-KAGRA on November 23, 2023. High spins suggest spin-orbit coupling and CP violation, while masses indicate photon core formation. We propose tests with LISA, CMB-S4, and IceCube to prove or disprove PUH, supported by Breit-Wheeler and SLAC experiments.

1 Introduction

PUH posits that Planck stars replace black hole singularities, with photon cores driving matter creation and spacetime dynamics [1]. GW231123's high spins and masses beyond the pair-instability gap (60–130 $M_\odot$) challenge standard models [2]. We explore PUH's predictions and falsification criteria.

2 Photon Core and Planck Lattice

The photon core mass is:

$$M_{\text{core}} \approx N_\gamma \frac{E_\gamma}{c^2}, \quad E_\gamma \sim M_P c^2, \quad M_P \approx 2.176 \times 10^{-8}\,\mathrm{kg}. \tag{1}$$

The Planck lattice radius is:

$$R_P \propto \ell_P \left(\frac{\rho_m}{\rho_m^0}\right)^{0.1}, \quad \ell_P \approx 1.616 \times 10^{-35}\,\mathrm{m}, \quad \rho_m^0 \sim 10^{-27}\,\mathrm{kg/m^3}. \tag{2}$$

GW231123's masses suggest hierarchical mergers bypassing PISN limits [3].

3 Spin-Driven Matter/Antimatter Production

High spins induce coupling:

$$\mathcal{L}_{\text{spin}} = \xi J^2 \phi^2, \quad \xi \approx \frac{g^2}{\ell_P^2 M_P^2}, \quad J \approx aMc, \quad a \approx 0.9, \quad g \approx 7 \times 10^{-4}. \tag{3}$$

Photon interactions produce matter/antimatter:

$$\mathcal{L}_{\text{int}} = g\phi\gamma\gamma\psi, \quad \frac{dN_\gamma}{dt} \approx \frac{F_{\text{photon}}}{\ell_P^3} \cdot \frac{g^2\phi^2}{\hbar} \cdot \frac{N_\gamma}{2}. \tag{4}$$

CP violation biases the ratio:

$$\delta_{\text{CP}} \propto \frac{\xi J^2}{M_P^2}. \tag{5}$$

This aligns with GW231123's spins and Breit-Wheeler pair production [4].

4 Testing PUH

4.1 Observational Tests

- **LISA**: Detect GW echoes ($f \approx 0.1\,\text{Hz}$) from photon core disruption [6].
- **CMB-S4**: Search for B-modes ($\ell \approx 1000$) indicating CP violation [7].
- **IceCube DeepCore**: Reanalyze for neutrinos (0.5–5 GeV) from GW231123 [5].
- **DESI**: Measure $H_0(z)$ at $z \gtrsim 10$ for photon-driven expansion [8].

4.2 Falsification Criteria

- No GW echoes or B-modes after multiple LISA/CMB-S4 observations.
- Persistent null neutrino/GRB detections in future mergers.
- Standard BH models consistently explain mass gap violations.

5 Conclusion

GW231123's spins and masses support PUH's photon core and cyclic cosmology. LISA, CMB-S4, and IceCube tests will prove or disprove PUH, advancing our understanding of the universe's fundamental nature. Contact: Brian Martell, `gb12345@rogers.com`, Whitby, Ontario, Canada.

References

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