The Photonic Universe Hypothesis and Optical Lambda Quantum Energy Model: Spin-Driven Matter/Antimatter Production in GW231123

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Abstract

The Photonic Universe Hypothesis (PUH) and its Optical Lambda Quantum Energy Model (OLQEM) propose that Planck stars with photon cores replace black hole singularities, with high spins driving matter/antimatter production in cyclic cosmologies. We analyze the GW231123 merger (masses 137^{+22}_{-17} and 103^{+20}_{-52} $M_\odot$, spins $0.9^{+0.10}_{-0.19}$ and $0.8^{+0.20}_{-0.51}$) detected by the LIGO-Virgo-KAGRA Collaboration on November 23, 2023, as evidence for PUH's framework. We demonstrate how near-extremal spins influence photon lattice dynamics, potentially seeding matter/antimatter asymmetries via CP violation. The absence of emissions is explained by beamed emission or condensate damping. We propose tests with LISA and CMB-S4 and align with photon-to-particle experiments (Breit-Wheeler, SLAC).

1 Introduction

The Photonic Universe Hypothesis (PUH) posits that Planck stars, with photon cores ($N_\gamma \approx 10^{80}$, $E_\gamma \gtrsim 1\,\mathrm{MeV}$) confined in a Planck lattice ($R_P \propto \ell_P(\rho_m/\rho_m^0)^{0.1}$, $\ell_P \approx 1.616 \times 10^{-35}\,\mathrm{m}$), replace black hole singularities [1]. The Optical Lambda Quantum Energy Model (OLQEM) formalizes photon interactions driving matter/antimatter production. The GW231123 merger, forming a 225 $M_\odot$ intermediate-mass black hole, challenges standard stellar evolution due to its masses and high spins [2]. We explore how its spin dynamics support PUH's cyclic cosmology and matter/antimatter production.

2 Photon Core and Planck Lattice

PUH replaces singularities with a photon core:

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

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 (137/103 $M_\odot$) suggest hierarchical mergers bypassing pair-instability limits [3].

3 Spin-Driven Matter/Antimatter Production

The high spins (0.9/0.8) induce spin-orbit 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 matter/antimatter ratio:

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

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

4 Null Emissions and Observational Tests

The absence of GRBs/neutrinos [5] is consistent with beamed emission ($\Omega \approx 0.01\,\text{sr}$) or damping by a polariton condensate ($\rho_{\text{pol}} \sim 10^{-30}\,\text{g/cm}^3$). Tests include:

- LISA: GW echoes at $f \approx 0.1\,\text{Hz}$ [6].
- CMB-S4: B-modes at $\ell \approx 1000$ for CP violation [7].
- IceCube DeepCore: Neutrinos at 0.5–5 GeV.

5 Conclusion

GW231123's high spins and masses support PUH's photon core and lattice dynamics, with spin-driven CP violation seeding matter/antimatter in a cyclic universe. Future LISA and CMB-S4 observations will test these predictions. Contact: Brian Martell, `gb12345@rogers.com`, Whitby, Ontario, Canada.

References

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