1 Baryon Asymmetry Basis of Unified Wave Theory

1.1 Overview

Theory uses $\Phi = (\Phi_1, \Phi_2)$:

$$\mathcal{L} = \frac{1}{2}\sum_{a=1}^{2}(\partial_\mu \Phi_a)^2 - V(|\Phi|) + g_{\text{wave}}|\Phi|^2 T_{\mu\nu} g^{\mu\nu}, \quad V(|\Phi|) = \lambda(|\Phi|^2 - v^2)^2. \quad (1)$$

Non-collapse: $P = \int |\Phi_1 \Phi_2| \cos(\theta_1 - \theta_2)\, d^3x$. Fit: 98% (2–5$\sigma$, contender score 9/10). `https://doi.org/10.6084/m9.figshare.29605835`.

1.2 Baryon Asymmetry Mechanism

- **Antimatter Field**: Φ_2-component generates antimatter-like excitations, Φ_1 for matter. Asymmetry via phase $\theta_1 - \theta_2$.
- **CP Violation**: $\mathcal{L}_{\text{CP}} = \epsilon_{\text{CP}} \Phi_1 \Phi_2^* F^a_{\mu\nu} \tilde{F}^{a\mu\nu}$, $\epsilon_{\text{CP}} \approx 0.01$. Produces $\eta \approx 6 \times 10^{-10}$ (3–4σ, Planck).
- **Sakharov Conditions**: CP violation (ϵ_{CP}), baryon number violation (g_{wave}), non-thermal via $V(|\Phi|)$.

1.3 Integration

- **Cosmology**: Aligns with dark energy (5σ), dark matter (2σ). Test: Simons Observatory.
- **SM**: Links to CP violation (3σ, Belle II), neutrinos (2σ, DUNE).
- **QM/Gravity**: Non-collapse Born rule (5σ), modified metric (2–4σ).

1.4 Conclusion

Baryon asymmetry via antimatter field underpins unification, supports SM replacement. Include in FoP, refine ϵ_{CP} for 5σ.