PWARI-G: A Deterministic Wave-Based Framework for Matter, Light, Charge, Spin, and Gravity

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1 Introduction

PWARI-G (Photon Wave Absorption and Re-Shaping Interpretation with Gravity) is a field-theoretic model that replaces particles, collapse-based quantum mechanics, and singular gravitational structures with a deterministic, nonlinear wave framework.

PWARI-G proposes that all physical phenomena—matter, light, charge, spin, and gravity—emerge from the dynamics of a unified breathing scalar field and associated twist, gauge, and gravitational interactions.

This document presents the full theoretical basis of the model and signposts additional papers that derive, simulate, or test key predictions.

2 Core Fields and Lagrangian

PWARI-G consists of four interacting fields:
- A breathing scalar field $\phi(x,t)$, representing localized energy (matter)
- A twist phase field $\theta(x,t)$, encoding angular momentum and topological spin
- A gauge potential $A_0(x,t)$, coupling to θ to create charge-like effects
- A redshift field $A(x,t)$, encoding gravitational time dilation

Lagrangian:

$$\mathcal{L} = \frac{1}{2A}(\partial_t\phi)^2 - \frac{A}{2}(\nabla\phi)^2 - \frac{\lambda}{4}\phi^4 - \frac{1}{2}\phi^2\left[(\partial_t\theta - A_0)^2 - (\nabla\theta)^2\right] + \frac{1}{2}(\nabla A_0)^2 \tag{1}$$

This Lagrangian supports self-localizing soliton solutions (matter), traveling wave solutions (light), and nonlinear bound structures (atoms).

3 Master Field Equations

From the Euler-Lagrange equations we obtain:
- Scalar field:

$$\frac{1}{A}\partial_t^2\phi - A\nabla^2\phi + \lambda\phi^3 + \phi(\partial_t\theta - A_0)^2 + \phi(\nabla\theta)^2 = 0 \tag{2}$$

- Twist field:

$$\partial_t(\phi^2(\partial_t\theta - A_0)) - \nabla \cdot (\phi^2 \nabla\theta) = 0 \tag{3}$$

- Gauge field:

$$\nabla^2 A_0 = \phi^2(\partial_t\theta - A_0) \tag{4}$$

- Redshift field (simplified scalar gravity):

$$\partial_t A = -\frac{1}{\tau}(A - e^{-\alpha\rho}), \quad \text{where } \rho = \frac{1}{2}\dot{\phi}^2 + \frac{1}{2}(\nabla\phi)^2 + \frac{1}{2}\phi^2\dot{\theta}^2 + \frac{1}{2}\phi^2(\nabla\theta)^2 + V(\phi) \tag{5}$$

See also: *PWARI-G Soliton Atom System (Complete Field-Theoretic Model)*

4 Gravity: From Redshift to Einstein Coupling

PWARI-G introduces gravity as a result of energy localization—first via a scalar redshift field $A(x,t)$, then through full coupling to Einstein's field equations:

$$G_{\mu\nu} = 8\pi G \left(T^{\phi}_{\mu\nu} + T^{\theta}_{\mu\nu} + T^{A_0}_{\mu\nu} + T^{\psi}_{\mu\nu}\right) \tag{6}$$

where each term represents contributions from the breathing scalar, twist phase, gauge field, and (if present) spinor field.
See also: *PWARI-G Black Holes, PWARI-G Black Holes 2*

5 Quantum Features Without Collapse

PWARI-G explains traditionally quantum behaviors as deterministic field outcomes:
- Spin quantization: from topological twist winding
- Charge: from phase asymmetry of θ
- Shell exclusion: from backreaction and field saturation
- Bell violations: from coherent twist topology, not randomness

See also: *PWARI-G Bell Violations, PWARI-G Photoelectric Effect*

6 Electromagnetism and Internal Gauge Symmetry

6.1 U(1) Gauge Field (A_0)

- Emerges from phase-locking with θ
- Sourced by twist frequency changes
- Reproduces electrostatic behavior from soliton breathing dynamics

6.2 SU(2) Gauge Extension

- Scalar and spinor doublets
- Covariant derivatives preserve internal symmetry
- Supports layered shell structures similar to nuclear models

See also: *PWARI-G Soliton Atom System, Sections 7.2–7.3*

7 Emergent Fermionic Statistics

- Spin-1/2 states: from twist winding
- Pauli exclusion: from nonlinear orthogonality of spinor modes
- Shell structure: radial modes mimic orbitals, exclude overlap

See also: *PWARI-G Soliton Atom System, Section 6*

8 Fully Coupled Soliton Atoms

A stable "atom" in PWARI-G includes:

- A breathing scalar soliton core
- Bound spinor modes
- Phase-locked gauge fields
- Gravitational redshift curvature

See also: *PWARI-G Dark Matter*

9 Predictions and Testable Consequences

- **Blackbody Spectrum:** *See: PWARI-G Blackbody*
- **Casimir Force Emergence:** *See: PWARI-G Casimir*
- **Photoelectric Effect:** *See: PWARI-G Photoelectric Effect*
- **Bell Violation:** *See: PWARI-G Bell Violations*
- **Cosmic Acceleration without Λ:** *See: PWARI-G Hubble Evolution, PWARI-G Vacuum Energy*
- **Horizonless Collapse:** *See: PWARI-G Black Holes, Black Holes 2*

10 Conclusion and Open Questions

PWARI-G is a work in progress, but early results show a consistent field theory with predictive power across atomic, gravitational, and quantum domains—without particles, collapse, or infinities.

Open questions include:

- How to map PWARI-G into the full Standard Model?
- Can it reproduce scattering cross sections or perturbative QFT limits?
- How does it behave under thermalization and decoherence?
- What predictions can we extract from 3D simulations?

Further Reading and Source Material

- GDrive Folder: `https://drive.google.com/drive/folders/170aAxvfDv5UZxZ1qItjkl0wZSNqVi9G9?usp=sharing`
- GitHub Repository: `https://github.com/dash3580/PWARI-G-Shared`

Appendix A: Stress-Energy Tensor Derivations

The total stress-energy tensor $T_{\mu\nu}$ in PWARI-G is composed of contributions from the scalar field ϕ, twist field θ, gauge field A_0, and optionally spinor field ψ. Each component is derived from the Lagrangian via:

$$T_{\mu\nu} = \frac{\partial \mathcal{L}}{\partial(\partial^\mu \chi)} \partial_\nu \chi - g_{\mu\nu} \mathcal{L} \tag{7}$$

where χ is the relevant field and $g_{\mu\nu}$ is the metric tensor.

A.1 Scalar Field ϕ

$$T^{\phi}_{\mu\nu} = \frac{1}{A} \partial_\mu \phi \partial_\nu \phi - g_{\mu\nu} \left[\frac{1}{2A} (\partial_t \phi)^2 - \frac{A}{2} (\nabla \phi)^2 - \frac{\lambda}{4} \phi^4 \right] \tag{8}$$

A.2 Twist Field θ

$$T^{\theta}_{\mu\nu} = \phi^2 \partial_\mu \theta \partial_\nu \theta - \frac{1}{2} g_{\mu\nu} \phi^2 \left[(\partial_t \theta - A_0)^2 - (\nabla \theta)^2 \right] \tag{9}$$

A.3 Gauge Field A_0

$$T^{A_0}_{\mu\nu} = \partial_\mu A_0 \partial_\nu A_0 - \frac{1}{2} g_{\mu\nu} (\nabla A_0)^2 \tag{10}$$

A.4 Soliton-Bound Shell Modes (Spinor-Like Behavior)

In PWARI-G, spinor-like behavior emerges from quantized shell structures formed within the breathing scalar field. These shell modes exhibit Pauli exclusion and spin-1/2 symmetry due to nonlinear phase locking and topological constraints.

To express the stress-energy contribution of these modes in analogy with standard spinors, we can adopt a formal structure:

$$T^{\text{shell}}_{\mu\nu} = \frac{i}{2} \left[\bar{\psi} \gamma_{(\mu} D_{\nu)} \psi - (D_{(\mu} \bar{\psi}) \gamma_{\nu)} \psi \right] \tag{11}$$

Here, ψ is not a fundamental field but a mathematical representation of shell mode structure. This formulation allows energy and momentum transfer to be described within the same tensor framework used for fermions in QFT, while maintaining soliton origins.