The Luminodynamic Theory of Gravitation (TGL)

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Abstract

We introduce the **Luminodynamic Theory of Gravitation (TGL)**, a unifying framework in which light, when subjected to extreme gravitational regimes, does not vanish but becomes temporally fixed, forming a stationary field Ψ. This field encapsulates coherence, memory, and symbolic potential. We formulate its Lagrangian and Hamiltonian structure, quantize the corresponding excitations (*psions*), and propose a reinterpretation of black holes, dark matter, and dark energy in terms of luminodynamic permanence. TGL provides falsifiable predictions, such as coherent weak lensing, gravitational echoes with tiny time delays, and fractal distributions in cosmological statistics. The theory offers a novel pathway to unify relativistic and quantum descriptions of gravity by introducing light as the fundamental organizing principle of spacetime.

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1. Introduction

The pursuit of a unified framework connecting **General Relativity (GR)** and **Quantum Mechanics (QM)** remains one of the most significant challenges in theoretical physics. Despite decades of research, no consistent description simultaneously accounts for the geometric nature of gravitation and the probabilistic microdynamics of matter and radiation.

This gap is particularly striking given the unexplained nature of **dark matter** and **dark energy**, which together constitute about 95% of the energy content of the universe. Moreover, the measurement problem and the role of the observer in quantum theory highlight the absence of a complete physical explanation for the emergence of time, memory, and persistence.

The **Luminodynamic Theory of Gravitation (TGL)** addresses these issues by reinterpreting light not merely as wave or particle, but as a **stationary form** stabilized by gravitation. In this framework, gravity is not only curvature of spacetime but the operator

of **permanence**. Light fixed by gravitation forms a field Ψ, whose dynamics encode coherence and symbolic structure. This unifying perspective opens a new ontological and mathematical basis for spacetime, time, and consciousness-like phenomena.

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2. Theoretical Framework

2.1 The Luminodynamic Field

We define the luminodynamic field Ψ(x,t) as a **scalar stationary field**, representing the form of light fixed under extreme gravitational collapse. Unlike the electromagnetic vector field, which is propagating, Ψ is bound, coherent, and non-propagating.

$$\Psi(x,t) \equiv \lim_{\lambda \to 0} \frac{h\nu}{G} \quad \Rightarrow \quad t = t_{\text{fixed}},\ E_{\text{LD}}$$

[Ψ(x,t)≡limλ→0hνG⇒t=tfixed, ELD]

This expresses the **luminodynamic singularity**, where wavelength tends to zero, time freezes, and light's energy becomes structural.

2.2 Lagrangian

The dynamics of Ψ are described by a modified Klein–Gordon-type Lagrangian:

$$\mathcal{L}_{LD} = \frac{1}{2} g^{\mu\nu} \nabla_\mu \Psi \, \nabla_\nu \Psi - V(\Psi, g_{\mu\nu}),$$

[LLD=12gμν∇μΨ ∇νΨ−V(Ψ,gμν),]

with potential

$$V(\Psi, g_{\mu\nu}) = \frac{1}{2} m_{\text{eff}}^2 \Psi^2 + \alpha \frac{h\nu}{G} \Psi,$$

[V(Ψ,gμν)=12meff2Ψ2+αhνGΨ,]

where meff is the effective stationary mass of the field, encoding its permanence, and the linear term represents temporal fixation by gravity.

2.3 Equation of Motion

Variation yields:

$$\nabla_\mu \nabla^\mu \Psi + m_{\text{eff}}^2 \Psi = -\alpha \frac{h\nu}{G}.$$

[∇μ∇μΨ+meff2Ψ=−αhνG.]

The source term defines the **luminodynamic fixation impulse**, distinguishing TGL from conventional field theories.

2.4 Quantization

Canonical quantization introduces creation and annihilation operators for stationary quanta of Ψ, which we term **psions**:

$$\Psi(x,t) = \sum_n \left(a_n u_n(x,t) + a_n^\dagger u_n^*(x,t) \right), \quad [a_m, a_n^\dagger] = \delta_{mn}.$$

[Ψ(x,t)=∑n(anun(x,t)+an†un∗(x,t)),[am,an†]=δmn.]

Psions represent **quanta of memory and permanence**, distinct from photons (propagation quanta). The **graviton in TGL** emerges as a correlated two-psion state, a pulse of permanence linking two fixed fields.

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3. Predictions and Falsifiability

TGL differs from GR and QM not only conceptually but in its observational consequences:

1. **Coherent weak lensing**: small but distinct deviations in lensing patterns caused by oscillations of the luminodynamic mirror.

2. **Gravitational echoes and time delays**: minuscule delays proportional to ϕ/c^3, detectable in post-merger black hole signals.
3. **Fractal cosmological statistics**: self-similar distributions in the cosmic microwave background and large-scale structures, arising from psion modes.
4. **Dark matter and dark energy unification**: interpreted as two regimes of the same field – oscillatory (granular psions, $w \approx 0$) and potential-dominated (global mode, $w \approx -1$).

Each of these predictions provides **testable falsifiability criteria**, distinguishing TGL from both GR and scalar-field alternatives.

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4. Discussion

TGL suggests a radical reinterpretation of **black holes**: not as regions of destruction but as **universal mirrors** where 3D spacetime is holographically refracted from a 2D luminodynamic surface. All astrophysical black holes are fractal projections of a single universal mirror stabilized by c^3.

By reframing light as permanence rather than propagation, TGL introduces a **new category of field quanta (psions)** and positions the graviton as a pulse of coherence rather than a simple force mediator. This conceptual shift aligns naturally with cosmological puzzles and extends the framework of quantum field theory into the domain of memory and time.

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5. Conclusion

The **Luminodynamic Theory of Gravitation** offers a unifying framework where gravity acts as the permanence operator of light, fixing it into stationary forms that constitute memory, structure, and symbolic potential. Its mathematical formalism introduces the luminodynamic field, psions, and the graviton as a pulse of permanence. The theory provides **clear, testable predictions** in astrophysical and cosmological contexts, opening new avenues for experimental investigation.

Future work will focus on explicit solutions in Friedmann–Robertson–Walker cosmology, numerical simulations of psion dynamics, and potential laboratory realizations via artificial reflective cavities (BNIs). TGL thus establishes itself as a falsifiable, mathematically grounded, and ontologically novel approach to unifying gravity and quantum theory.
