

A Mathematical Formulation Connecting Entropy, Gravity, and Gamma-ray bursts (GRBs) within the Framework of Loop Quantum Gravity (LQG), and Incorporating the speed of Light as a Key Element

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Abstract:

In the course of studying about the treatment by pair annihilation, a new source of energy in the patient's urine is. Graphene exfoliator, NaCl + KCl solution can use to make a pair annihilation of boson particles. Fermion needs lesser Fermi energy to make a pair production or a pair annihilation by dopped colloid gold. Intaking colloid gold after intravenous injection of NaCl + KCl, the energy emitted from human body [1]. Modifying the dispersion relation holds promise as a test of Loop Quantum Gravity [2].

Key words: entropy; loop quantum gravity; gamma ray bursts; speed of light; gravity

Introduction

Loop Quantum Gravity (LQG): A approach to quantum gravity where space is quantized — described in terms of spin networks. One of its successes is deriving black hole entropy.

Entropy in LQG: For black holes, entropy S is related to the area A of the horizon:

$$S = k_B/4\ell_p^2 \gamma/\gamma_0 A$$

where:

ℓ_p is the Planck length $\ell_p = \sqrt{(\hbar G/c^3)}$ γ is the Barbero–Immirzi parameter, a dimensionless LQG constant γ_0 is a constant determined to match Bekenstein–Hawking entropy A is the area of the black hole horizon k_B is Boltzmann's constant

Gamma-Ray Bursts (GRBs): GRBs are among the most energetic events in the universe, often associated with black hole formation or neutron star

mergers. They're thought to probe quantum gravity at extreme energies [3,4,5].

Speed of Light c : Constant in general relativity and standard quantum field theory, but in some quantum gravity models, Lorentz invariance may be modified, leading to energy-dependent variations in c at Planck scales.

In this report, we are aiming for an expression that:

Captures entropy from black holes or extreme gravitational events (GRBs).

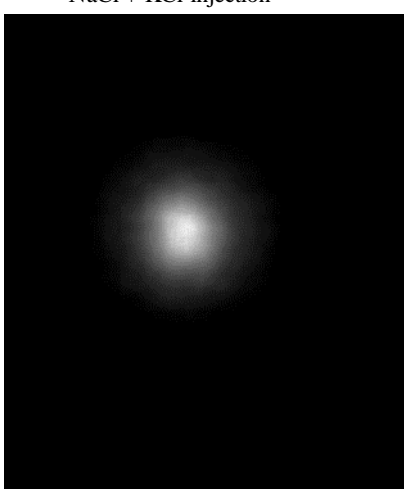
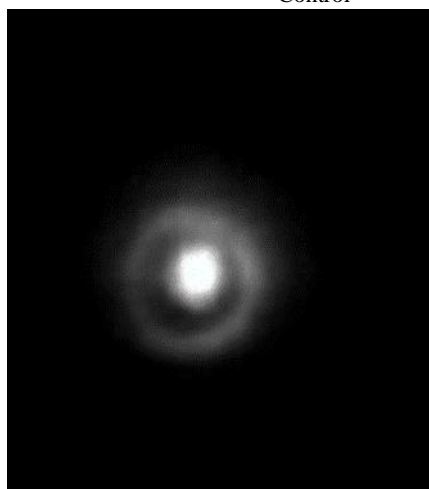
Acknowledges the energy-dependence of light propagation due to quantum gravity effects (e.g. GRB photon dispersion).

Embeds the loop quantum structure via the Barbero–Immirzi parameter and the Planck scale



Control

NaCl + KCl injection



red color



white color

Figure 1: Blurring of red light was disappeared by intravenous injection of NaCl + KCl for 6 hours on light emitting diode (LED) in the patient's room.

Discussion

A common feature in LQG-inspired phenomenology is a modified dispersion relation for light at high energies, often written:

$$E^2 = p^2 c^2 [1 - \xi(E/E_{QG})^n]$$

Where:

E = energy of the photon p = momentum ξ = model-dependent sign (± 1)
 $E_{QG} \approx E_{\text{PLANK}}$ = quantum gravity energy scale $n=1,2$ depending on the model

Now, combine this with the entropy expression from LQG for a black hole or a collapsing object (possibly leading to a GRB):

$$S = k_B/4\ell^2 p \cdot \gamma / \gamma_0 A$$

The area of the black hole or collapsed star is related to the mass or energy, which is connected to the total energy released in the GRB.

Also, the speed of light may appear energy-dependent in propagation of GRB photons, leading to a time delay Δt between photons of different energies:

$$\Delta t \approx \Delta E / E_{QG} \cdot D/c$$

So now we attempt a composite expression capturing these elements:

A is the area of the horizon involved in the GRB event (black hole or neutron star) Δt is the observed photon time delay from GRB ΔE is the energy difference between high- and low-energy photons D is the distance to the GRB source

We propose:

$$S = (k_B/4\ell^2 p \cdot \gamma / \gamma_0) A = (k_B/4\ell^2 p \cdot \gamma / \gamma_0) A \cdot 16\pi G^2 (E_{GRB}/c^4)^2$$

And link the time delay via:

$$\Delta t \approx \Delta E / E_{QG} \cdot D/c$$

Where E_{GRB} is related to the energy released (and thus area entropy), giving a loop between gravity, entropy, GRBs, and light.

Conclusion

This isn't a single closed-form equation unifying entropy, gravity, and GRBs through the speed of light — because each comes from different layers of theory — but this set of expressions connects them through LQG: entropy from black hole area (LQG, via Barbero–Immirzi parameter), GRB photon time delays (suggesting Lorentz-violation/quantum gravity dispersion), and the energy-dependent speed of light via modified dispersion.

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