International Journal of Innovation Scientific Research and Review
Vol. 07, Issue, 11, pp.9187-9189, November 2025
Available online at http://www.journalijisr.com
SJIF Impact Factor 2025: 7.913

Research Article

ISSN: 2582-6131

NEARSIGHTEDNESS-BLACK HOLE AND LIGHT CONE REFLECTIVE UNIVERSE MODEL

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Received 17th September 2025; Accepted 18th October 2025; Published online 30th November 2025

ABSTRACT

Scientists frequently examine the concept of black hole vaporization; however, they rarely consider the process of black hole contraction. In discussions of black hole vaporization, the information paradox is a central topic. The fundamental premise is that nothing can escape from a black hole,even light; yet, the question remains: what exists within a black hole? When all incident light is absorbed, what is the true nature of the black hole's interior? Could it initiate a black hole universe originating from the reflection of our universe's light, effectively a nascent universe inside a black hole? In this research paper, we aim to explore the phenomena associated with black hole contraction and the potential formation of black hole universes during this process. What are the implications of such contraction, and how might it influence our understanding of space-time topology and multiverse theories?

Keywords: Nearsightedness-black hole, Black hole vaporization, Space-time topology, Multiverse.

INTRODUCTION

In the conventional theoretical framework of black hole evaporation, the process ultimately culminates in the complete emission of Hawking radiation [1], leading to the gradual depletion of the black hole's mass and angular momentum. This quantum mechanical phenomenon, as described by Hawking [1], causes the black hole to radiate particles such as photons, neutrinos, and other elementary particles, thereby reducing its overall energy content until it eventually disappears. The emission process is driven by quantum field theory in curved space-time, where particle-antiparticle pairs are created near the event horizon, with one falling in and the other escaping as radiation. During this evaporation phase, the black hole undergoes a contraction, characterized by a decreasing Schwarzschild radius and horizon area. This paper aims to analyze the dynamical contraction of the black hole intrinsic to the Hawking radiation mechanism, emphasizing the interplay between quantum field effects and space-time geometry during mass loss.

In 1911, Albert Einstein [2][3] authored a seminal paper addressing the kinematic properties of acceleration within the framework of special relativity. He articulated that an object undergoing uniform acceleration in flat space-time, absent of gravitational influences, would be physically indistinguishable from an inertial object at rest within a gravitational field, illustrating the principle of equivalence. Einstein's [2][3] paper also quantitatively predicted the gravitational bending of light, a phenomenon now known as gravitational lensing, as electromagnetic radiation passes in the vicinity of massive celestial bodies. By 1915, Einstein extended these concepts to develop the general theory of relativity [4], a geometric theory of gravitation positing that mass-energy distribution causes space-time curvature, which in turn dictates the geodesic motion of matter and radiation. This theoretical framework provided the foundational principles for the modern understanding of black hole astrophysics, describing regions of space-time with escape velocities exceeding the speed of light. Notably, Einstein later attempted to formulate a classical counterargument rejecting the existence of black holesspecifically, the Schwarzschild singularity, although subsequent observations and theoretical developments confirmed their physical reality.

General term in the mass-energy concept of blackhole:

$$\frac{Q^2}{4\pi\epsilon_0} + \frac{c^2 J^2}{GM^2} \leq GM^2$$

[5]

The mass of a black hole can, in theory, be any positive value; however, its charge and angular momentum are limited by its mass. The total electric charge, Q, and the total angular momentum, J, are expected to satisfy certain inequalities related to the black hole's mass, M.

Schwarzschild singularity

Radius:

$$r_s = \frac{2GM}{c^2} \approx 2.95\,\frac{M}{M_\odot}\ \mathrm{km}.$$

So,

$$r_+ = \frac{GM}{c^2}$$

The first simulated image of a black hole was created by Jean-Pierre Luminet in 1978. This groundbreaking visualization displays the black hole's shadow, showing the event horizon against the luminous photon sphere consisting of photons in unstable circular orbits. It also highlights the gravitational lensing of the accretion disk, with brightness asymmetry caused by relativistic Doppler beaming effects, making one side appear much brighter as it moves toward the observer. [6]

During Spin Period:

$$J \leq \frac{GM^2}{c}.$$

So,

$$0 \leq \frac{cJ}{GM^2} \leq 1.$$

During the spin period of a black hole, the angular momentum of the black hole results in frame dragging effects. This phase involves complex relativistic phenomena such as the ergosphere formation and the extraction of rotational energy through processes like the Penrose process. The detailed dynamics are governed by the Kerr metric, which describes the spacetime geometry around a rotating black hole.

Nearsightedness-black hole

In this research paper, we introduce a new concept of a contraction of a black hole, which we term "a Nearsightedness-black hole". In this model, the majority of the emitted light reflected from our universe appears to become increasingly focused and less perceptible, resembling shortsightedness. Additionally, within this contracting black hole, the passage of time accelerates relative to the external universe, owing to the intense gravitational effects and horizon dynamics associated with the contraction process.

Nearsightedness-black hole is a phenomenon where, during black hole contraction, as the spin rate increases, the stretched image appears longer than usual when there is a greater distance between the black hole's lens and the retina in space-time. This causes a reverse light time effect, and it also makes distant objects appear differently, as a short-sightedness event.

Assuming the outer event space-time universe = to the side of the side of the blackhole radius:

The outer event space-time universe:

So,

$$M + \sqrt{M^2 - (J/M)^2 - Q^2} \ = r_+$$

$$r_+ = \frac{GM}{c^2}$$

Which means that before the event horizon, at the pure stage, there should be enough real particles to support the system. But after the event horizon, virtual particles will become real particles at a specific time, stage, and moment. (as light reflects). In addition, most importantly, the event in the blackhole inside should depend on the radius of the blackhole. That is the height (radius) inside the black hole, so when the black hole is in the contraction period, the light cone in the real universe will reverse its shape into the black hole due to light reflection in our universe.

Nearsightedness-Black Hole and Light Cone Universe Reflective Model

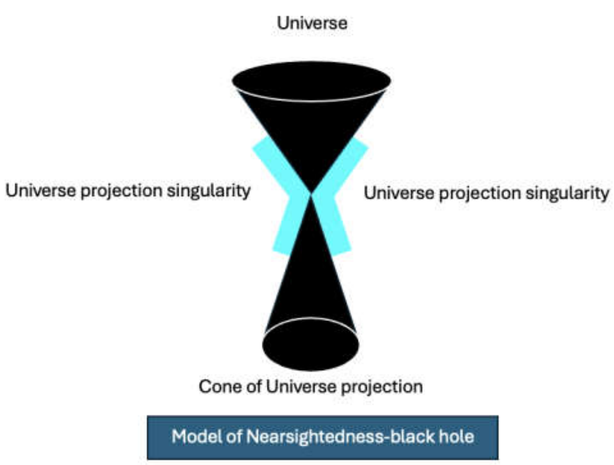

Figure 1: Model of Nearsightedness-blackhole (Phase I)

During blackhole contraction period I, as the spin rate increases, the stretched image will appear difference than usual when there is a greater distance between the blackhole's lens in space-time. This phenomenon is called nearsightedness blackhole period I.

If, assumpt:

$$J \le \frac{GM^2}{c} = m_P = \sqrt{\frac{\hbar c}{G}} \approx 1.2 \times 10^{19}$$

Then:

$$S\mathcal{R} = \mathcal{R}_0 \times \left(1 - \frac{\propto}{1 + \beta C(t)}\right)$$

$\mathcal{R}_0$refer to normal reflection coefficient of an object outside the black hole
C(t) refer to contraction phase function of the black hole over time t, quantifying the temporary internal contraction that slows light reflection

$\frac{\alpha}{1+\beta C(t)}$ refer to factor diminishing reflection

This phenomenon is referred to as the nearsightedness black hole. The principle is analogous to the use of nearsighted glasses with concave lenses, which function by the amount of light entering the blackhole eye through within the black hole. Specifically, the black hole internally experiences a temporary phase of myopic behavior (slow motion), during which the reflection of light from distant objects is altered due to the contraction of the black hole (Phase I).

The Nearsightedness-Black Hole and Light Cone Reflective Model, which we call the Light Cone Reflective Universe Model {}, involves advanced concepts in gravitational lensing and space-time geometry. Our model explores the innovative concept of the near-sighted effects observed near black hole event horizons, utilizing light cone structures within the framework of general relativity to analyze reflective phenomena in space-time. Our model integrates the principles of relativistic optics, event horizon dynamics, and the causal structure of space-time manifolds to provide a comprehensive understanding of light propagation and reflective behaviors in extreme gravitational fields.

In the phase II period, while the black hole becomessmaller and smaller.When light from our universe enters a black hole, its radius determines the size of the black hole's reflective area. That is this research paper's emphasis, the so-called retina of the black hole. The reflection index increases as the radius enlarges, correlating with the black hole's size. If the black hole's radius is smaller, the reflection cone shrinks (and vice versa), resulting in a shorter reflective area. Consequently, light must travel faster to reflect within this shorter distance, making the reflection event of action process occur more quickly. This process is similar tofast-forward playback, speeding up the speed of light and the reflection within our universe inside the black-hole-cone.(Figure-2).

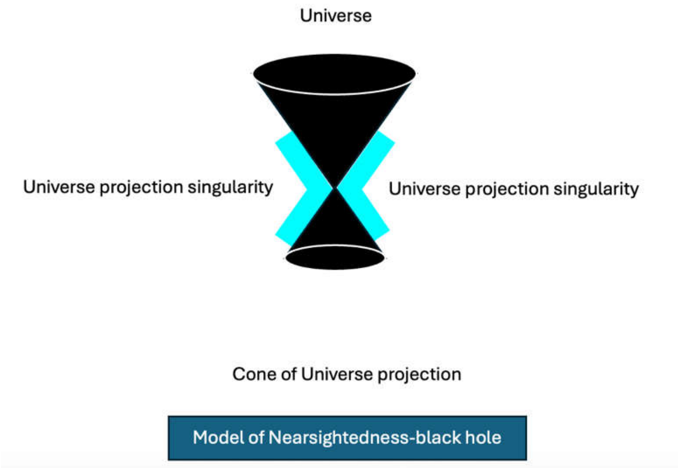

Figure 2: Model of Nearsightedness-blackhole contraction (Phase II)

During the contraction phase of a black hole, the gravitational well intensifies, leading to an acceleration of internal processes relative to an external within our universe. This phenomenon results in an increased rate of event action inside the black hole when viewed through the event horizon's causal cone. The propagation of light signals emanating from within the black hole will appear to occur at an accelerated pace compared to standard space-time, because the effective path length diminishes, that light (event) must traverse faster as the black hole's contracts. As the radius of the black holedecreases during the contraction phase, the associated causal cone narrows at first phase and shrink at the second phase, effectively shortening the temporal and spatial intervals inside the blackhole cone. Consequently, this shortening of the effective causal structure causes temporal dilation effects to be more pronounced, making internal processes of event seem to happen at an increased rate from the perspective of cone shrinks. In essence, the contraction amplifies the illusion of accelerated internal events through the shrinking of the radius and the resulting modification of the light cone structure.

Innovative Formula:

$$\mathcal{R}(t) = \lambda^{*} \left| \int_{Pass\ t}^{Now\ t} \frac{C}{L'(t)} \Omega(t) \right|$$

This process involves interactions change between gravitational lensing effects and the spacetime curvature induced by the black hole, that is, capture and reflection, leading to a transient distortion in the apparent position of distant light sources, which is the light wave universe inside the blackhole.

New Formula Approach:

$$\mathcal{R}(t) = \lambda \cdot c' L(t_{\Omega})$$

R refer to the radius of the black hole
(t) refer to the time of the event which is traveling inside the blackhole (reflectively from our universe)

Super fat Particle(co-existence)

Furthermore, we posit that the universes within black holes serve as a form of optical reflection of our own universe. During the phase of gravitational contraction leading to black hole formation, these internal universes exhibit a form of nearsightedness in their causal structure. This process coincides with the emergence of super massive virtual particles analogous to the hypothesized virtual particle populations in quantum field theory alongside ordinary particles that originate from our universe. During the contraction phase of the black hole, the presence of super massive virtual particles becomes more pronounced. This contraction process, in turn, aligns with the principles of quantum physics, which predict the existence of exotic particles, such as super massive virtual entities (super fat particle), that coexist with standard model particles, consistent with quantum field theoretic and string theoretic frameworks. That means, there will be a super-fat particle alongside with a normal particle.

CONCLUSION

This paper explores the phenomenon of black hole contraction and the potential for black hole universes to form during this process. And we discuss the implications of such contraction for our understanding of space-time and multiverse theories, which may create a light-wave universe that is reflected from our universe. In addition, we invent the Nearsightedness-black hole concept, which may help to explain the space-time inside the black hole. We hope this research can contribute to the world and humanity.

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