

Black holes and gravitational waves in light of the new physical paradigm

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Abstract. The theory of general relativity (GR) has been very successful in predicting many cosmic phenomena. However, the GR theory was derived from mathematical considerations; thus, the limitations under which this theory is valid are unknown. In particular, in the case of black holes, the solution to Einstein's equations leads to a singularity, which is physically impossible. Here, we consider the new physical paradigm, based on a physical concept, that solves the problem of the black hole singularity and 22 other unsolved problems in physics [1].

1. Introduction

In 2020, a new physical paradigm was published [2] [3]. This paradigm provides a physical basis for general relativity (GR), allowing the phenomena of gravity, dark energy, and dark matter to be explained from a unified perspective, a feat that would have been impossible without a physical understanding of gravity.

This new paradigm is based on a continuous fundamental medium (in Nikola Tesla's words, a "primary substance" [4]). In a homogeneous state, the primary substance is not detectable, but when the primary substance is inhomogeneous, we recognize it as a gravitational field.

Matter—elementary particles, atoms, etc.—represents vortices of this medium. It has been shown that an inhomogeneous density of primary substance accelerates these vortices toward higher-density regions. Earth's familiar gravitational field is created by a partial mass loss of its atoms, resulting in a higher density of primary substance near Earth's surface compared with at a distance (Fig. 1).



Fig. 1. The density of the primary substance around Earth is depicted in shades of gray.

Mass plays an indirect role in the creation of gravity. If the primary substance is inhomogeneous, gravity can exist without the participation of mass, as occurs in the phenomena of dark matter and dark energy (see Figs. 2 and 3).

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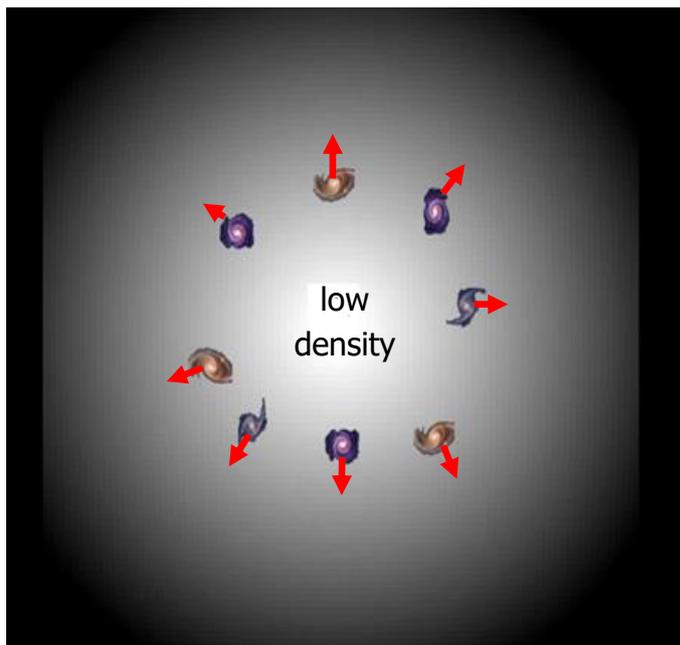


Fig. 2. A zone with a lower density of primary substance results in an inverse gravitational field; in such cases, stars and galaxies are accelerated outward.

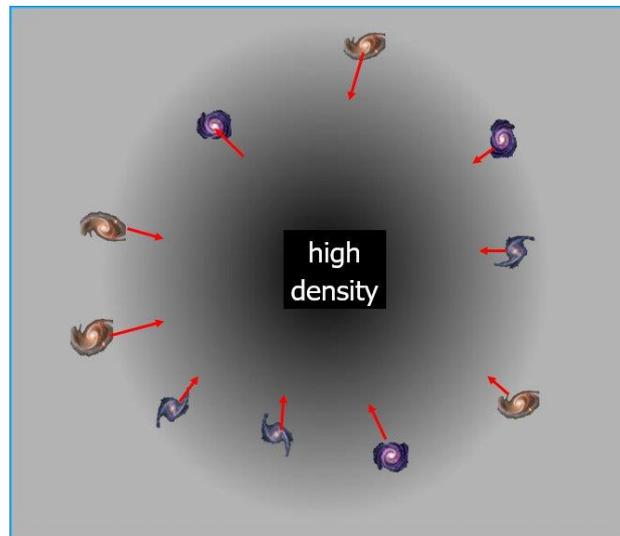


Fig. 3. The phenomenon of dark matter occurs in regions with an increased density of primary substance.

Pablo Bueno et al. [5] coined the term "pure gravity," which implies that gravity can exist without the participation of mass. This viewpoint is similar to that of the new paradigm.

2. Gravitational waves in the new paradigm

In the new paradigm, the term "gravitational" means "associated with the heterogeneity of the primary substance." Thus, a gravitational wave of the dominant paradigm corresponds to a density wave of the primary substance.

These waves arise because of a splash in the density of the primary substance. In November 2023, astronomers detected a gravitational wave signal from two black holes merging into a single, larger black hole [6] (see Fig. 4 for illustration).

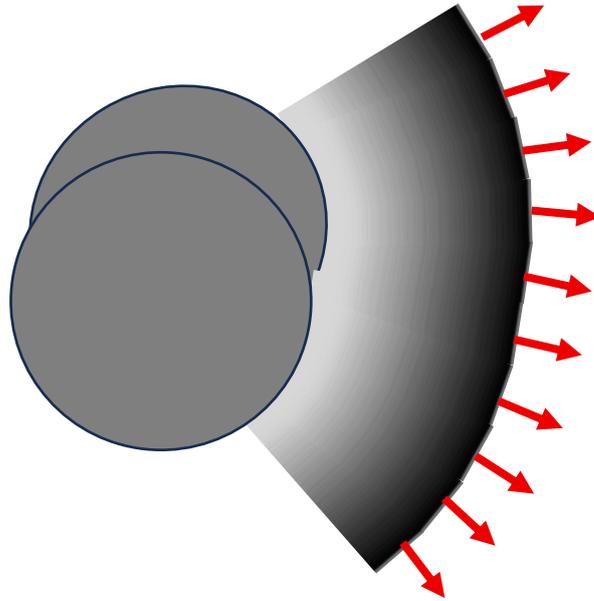


Fig. 4. The emission of a huge density wave of primary substance from the collision of two black holes is depicted using shades of gray.

It should be noted that a density wave does not constitute a transfer of primary substance but rather a propagation of a density zone, like heat propagates in a solid without movement of the solid's parts.

3. Mechanism for creating photons "out of nothing": Simulation

The new paradigm answers the question of where photons came from, as no atoms existed at the beginning of the universe. The answer is based on only one natural property of the medium: the speed of a primary substance density wave depends on the density of the medium through which it propagates. As a result, the density wave changes direction in an inhomogeneous medium.

We have simulated the process of two density waves intersecting in the environment of a black hole (Fig. 5).

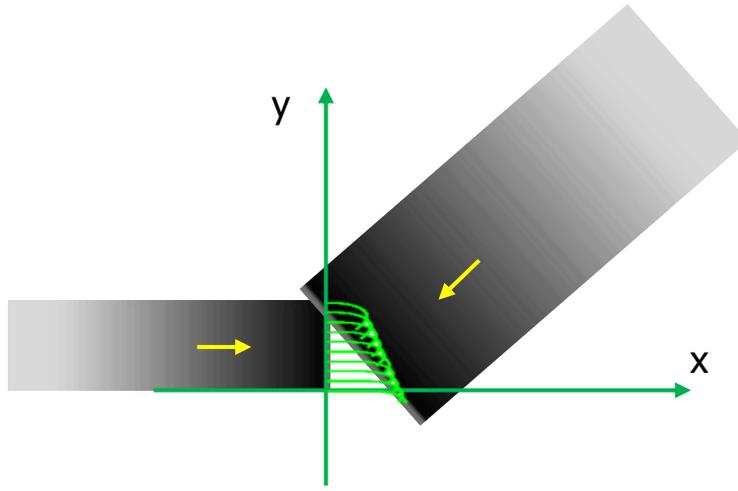


Fig. 5. This illustration demonstrates the transition of a wave structure into a vortex-photon when two density waves intersect. One density wave swirls while crossing the front of another density wave. The trajectories of points on the front of the left wave are shown in green, in order to be visible on the black background.

In Fig. 5, the left wave moves in the direction of the x-axis with velocity u , and the right wave moves towards the first wave at an angle of $\pi/4$. The right wave serves as an inhomogeneous medium for the first wave, and likewise, the left wave presents an inhomogeneous medium for the right wave.

When the front of the left wave meets the front of the second wave, its velocity \vec{u} changes direction according to the general formula [2]:

$$d\theta = -\nabla u \sin \alpha dt$$

Here, θ is the polar angle for a point on the left wave front, and $\alpha = \varphi - \theta$, where φ is the angle between ∇u and the x-axis.

The time-varying equation of the right wave front is as follows:

$$y_{front2}(t) = h - x + v_x t$$

where v_x is the (negative) projection of the right wave velocity onto the x-axis.

The simulation shows that the front of the left wave bends, causing the wave itself to swirl, creating a torus-shaped whirl. Yet, for an elementary particle to be created, the torus must be stable.

If the mass of the torus matches that of an electron, it becomes an electron (Fig. 5). Otherwise, the torus-vortex elongates and becomes another stable particle: a photon. Free photons are stable over a wide range of energies and sizes (Fig. 5).

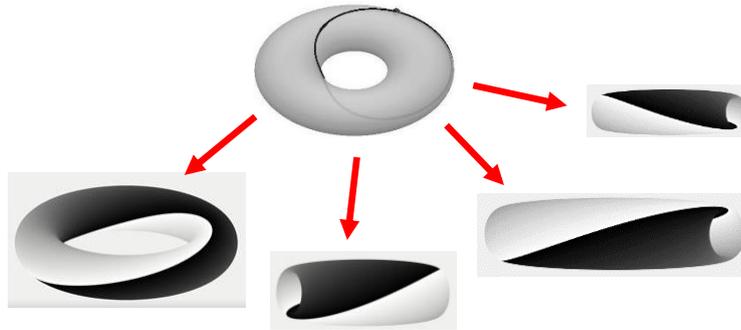


Fig. 5. Variants of the evolution of a torus-vortex into the simplest stable vortices of primary substance: electrons and photons. The photon has a highly elongated toroidal shape.

This process has an analog in another area of physics. The swirling of a sea wave as it reaches the shore (Fig. 6) is caused by the same reason as the swirling that produces photons. Namely, as the water wave approaches the shore, the lower water layer by the sea bottom slows down compared with the higher water layers, leading to a difference in the velocities of the water layers, as in the case of the intersection of two density waves.



Fig. 6. The swirling of a sea wave when it comes ashore.

4. Supernovae in the new paradigm (galaxy genesis)

When a quantum of radiation enters a region with a high density of primary substance, its mass rapidly increases because of absorption; it then reaches the upper limit of stability and radiates. The new radiation swirls into a whirl-torus, and so on. Thus, a chain reaction of particle creation is initiated. This phenomenon is known as a supernova outburst.

Such outbursts frequently occur in the environment of black holes, but we do not observe them because black holes draw in these outbursts along with their radiation. Only those few outbursts that emerge far enough from the black hole and lag behind the latter acquire an orbital velocity; these supernova outbursts are observed by astronomers.

Thus, rather than being a deadlock, a black hole may give rise to a galaxy with stars and planets. Eventually, these stars and planets come to constitute a plane formation with several spirals twisting toward the center of the black hole.

Thus, the explanations of supernovae in the new and old paradigms contradict each other. According to the old paradigm, a supernova is formed when a massive star explodes at the end of its life; the new paradigm posits that a supernova represents the birth of a new star in the surroundings of a black hole.

The presence of a black hole is necessary because newly created particles require an extremely hard particle surface that is collision-resistant. Thus, each galaxy has arisen from a black hole that is located at the center of that galaxy.

Just as turning on a floodlight does not represent an explosion, the beginning of a supernova is not an explosion either.

Another disagreement exists between the two paradigms: the old paradigm, based on the acceleration of stars, posits that black holes are objects with enormous mass. Yet, according to the new paradigm, gravitational acceleration can exist without the participation of mass ("pure gravity" in [5]).

5. Black holes in the new paradigm

From the solution of Einstein's equations, it follows that a black hole crushes matter until that matter collapses to a point; thus, the universe is unstable, because the processes of destruction are irreversible. However, such singularities may not be a physical reality.

Recently, some scientists have suggested that black holes may play a critical role in the formation and evolution of galaxies [7].

In the new paradigm, the process of matter destruction by black holes is countered by an inverse process: matter creation. The enormous density of primary substance in the surroundings of a black hole creates favorable conditions for particle production, even at a great distance from the black hole's center. The creation of matter reduces the density of primary substance in that region.

Tesla knew about these transformations and described them in 1908, when there was no established terminology for this field [4]:

" . . . starting and stopping ether whirls to cause matter to form and disappear. "

Readers may have questions about other aspects of the new paradigm. Answers to some of these questions are provided in the Appendix.

Conclusion

In this work, we have discussed discrepancies between the old and new paradigms regarding black holes and supernovae. In the new paradigm,

the evolution of a black hole does not lead to a singularity. The generative role of black holes in the creation of galaxies reduces the density of primary substance near those black holes. Consequently, the universe is stable.

Some common terminology is misleading: "massive" black holes do not necessarily have enormous mass, and the creation of a supernova is not an explosion.

Appendix. Answers to questions about the new paradigm.

Question 1: How can the density of the primary substance be measured?

At the present stage, there is no direct way to measure the density of the primary substance. However, an indirect observable exists: the local velocity of light c in this medium.

Just as the refractive index $n = c_0/c$ characterizes an optical medium, in the new paradigm, variations in c reflect variations in the density of the primary substance. Thus, the measurable quantity c serves as a proxy for the density distribution of the underlying medium.

Question 2: How does the pressure gradient act on particles moving toward higher density?

In the new paradigm, gravitational acceleration is not caused by mechanical pressure.

Optical refraction provides a useful analogy: when a light ray enters a denser medium (e.g., from air into glass), it bends toward the region of higher optical density without the action of any external force. Similarly, elementary vortices of the primary substance naturally move toward regions of greater medium density. This process is governed by the medium's spatial gradient of propagation velocity u , rather than by pressure in a hydrodynamic sense.

Question 3: How does the new paradigm reproduce the four classical tests of GR?

The key factor of the new paradigm is its rejection of the postulate that c is constant.

By using Euclidean geometry and absolute time with a spatially dependent speed of light, all four classical tests of GR can be derived without invoking a curved spacetime. This approach was initiated by Sjödin [8] in 1990 and extended by Broekaert [9] (2005), who showed that a scalar potential can replace the tensor formalism of GR while reproducing its observational predictions.

Sjödin [8] and Broekaert [9] proposed a formula for the speed of light in a spherically symmetric static gravitational field as follows:

$$c(r) = c_0 \Phi(r)^2 \quad (1)$$

where $\Phi(r) = \exp(-\kappa/r)$, representing a scalar potential of the field, and $\kappa = MG/c^2$ (half the Schwarzschild radius).

This same dependence explains both the deflection of light near the Sun and the precession of Mercury's perihelion.

Moreover, gravitational redshift experiments (e.g. the Pound–Rebka–Snider experiment [10]) are naturally interpreted not as a photon energy change but as a frequency shift of atomic transitions due to varying $c(r)$.

The Shapiro delay is likewise a direct manifestation of a reduced speed of light near massive bodies, as even Shapiro noted [11] (1964):

“According to the general theory, the speed of a light wave depends on the strength of the gravitational potential along the path.”

Thus, the four classical tests arise from the spatial variation of c , not from spacetime curvature.

Question 4: Why did the Michelson–Morley experiment not detect motion relative to the primary substance?

The traditional interpretation of the Michelson–Morley experiment overlooked a subtle kinematic effect. When a beam is reflected from a moving semi-transparent mirror, the reflection angle differs slightly from that of a stationary mirror — analogous to a ping-pong ball rebounding differently from a moving paddle.

Accounting for this angular correction (as shown in [12]) removes the apparent contradiction and reconciles the null result with the hypothesis of an absolute reference frame. The observed invariance of the interference pattern then becomes a natural optical consequence, rather than proof of the absence of a medium.

Question 5: How does the distribution of the primary substance explain galactic rotation curves?

Before we can derive galactic rotation curves, we must revise the universal gravitation law itself.

In the new paradigm, gravitational acceleration is not directly proportional to the total mass of a body, but depends on the rate of processes within it — analogous to how the heat of a fireplace depends not on the total mass of firewood, but on the mass actively burning per unit time.

This viewpoint also explains why gravitational acceleration cannot be reliably used to infer mass in astronomical systems, eliminating the need for “dark matter” corrections.

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