International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Space Flow Kinetics and a New Universal Constant: Insights into Spiral Galaxies

Jose Oreste Mazzini

Lima, Perú
Corresponding Author Email: *oremazz[at]gmail.com*

Abstract: ***This study explores the dynamics of space flow influenced by radial gravitational effects and the rotation of black hole to explain the formation of spiral galaxies. It challenges traditional concepts of dark matter and dark energy while introducing a universal constant to replace Newton´s gravitational constant (G). Building on a previous theory, this research integrates quantum and relativistic insights to propose an intermittent space replacement that produces a non - linear flow of space throughout the universe. It offers a novel perspective on cosmic phenomena and advancing our understanding of the universe.***

Keywords: gravitational energy, spiral galaxies, dark matter, dark energy, space flow, quantum gravity, theory of space

1. Introduction

In 1925, Bertil Lindblad studied the rotation of our galaxy and the formation of its spiral arms. In 1936, Edwin Hubble categorized the morphological types of galaxies, describing spiral galaxies as systems of rotating stars, gas, and dust with a central concentration of stars referred to as the bulge. From the center, an extended region of stars forms the spiral arms. Later, in 1963, Roy Kerr [1] studied galaxies with massive rotating black holes and developed the consequent equations.

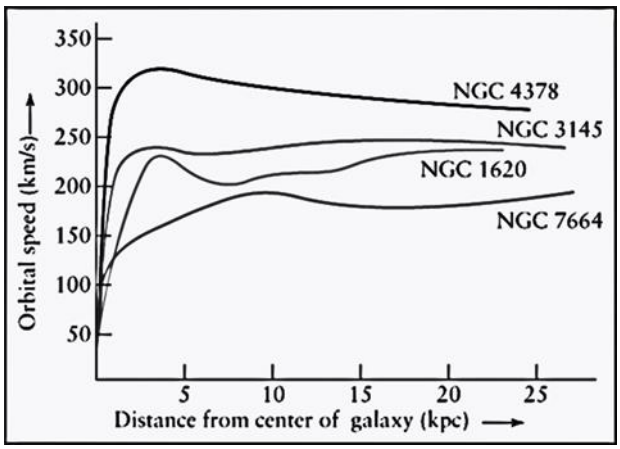

Figure 1: Figure 26 - 28 from reference [2]

Newtonian mechanics and Keplerian orbits predict an orbital speed inversely proportional to the square root of the radius, quite different from observations of various galaxies (Figure 1). For reference, 1 kpc (kiloparsec) is approximately 3.26 light - years; the Milky Way spans about 30 kpc, with the Sun located around 8 kpc from the center, and the Solar System at approximately 1/10^5 kpc.

According to Kepler's law, the mass of our galaxy Mgr contained within a sphere of radius R corresponds to a given star's orbit and period P, resulting in a tangential speed Vtr. Note that if the galaxy has a regular distribution of stars, then the gravitational effect of the outside "shells, " from orbit R, is neglectable.

$$Vtr = 2\pi R/P = SQRT\ (G\ Mgr/R) \quad (1)$$

$$Mgr = 4\ \pi^2\ R^3\ /\ (G * P^2) = Vtr^2\ R/G \quad (2)$$

An orbital speed proportional to the star's radius from the galaxy center implies that doubling the distance would double the enclosed mass. However, the observed mass is significantly less than required for this high orbital velocity. Furthermore, stars far from the galaxy center exhibit orbital velocities implying only 10% of the necessary mass. This discrepancy between observed mass and orbital velocity is the mystery addressed in this paper.

Many explanations have been proposed for this discrepancy, including massive compact halo objects (MACHO), weakly interacting massive particles (WIMP), and modified Newtonian dynamics (MOND).

Another approach involves additional unseen mass, termed "dark matter, " which would need to be more than five times the observed mass of the universe, relegating the physical universe to an important but inexplicable special type of mass.

Nonetheless, these spiral galaxies offer an opportunity for testing our understanding of the universe; especially with gravitational theories.

2. Theory of Space: A Flow of Space

Recently, the author presented a quantum and relativistic understanding of gravity [3], advancing Einstein's equivalence acceleration and Schwarzschild's equivalence escape velocity. The old question about inertial mass and gravitational mass is understood as the same mass, i. e., gravitational energy comes from kinetics. This theory introduces a flow of space due to the absorption of energetic sources, an intermittent absorption proportional to the quantum volume and its oscillation period (tau = h/E).

For the case of an energetic source Me, non - charged, non - rotating, and spherically uniform, the equivalent compacted mass is contained within a Schwarzschild radius Rs, forming an event horizon. Using C as the speed of light and G as the gravitational constant, the equation is:

$$Rs = 2GMe/C^2 \quad (3)$$

Since G and C are constant, that implies that the contained mass Me is directly proportional to Schwarzschild´s radius Rs; not with a volumetric proportionality of Rs cube. In other words, the relation Rs/Me is constant (1.48523 10^ - 27 m/kg).

From $MeC^2 = h * \nu$, Schwarzschild´s radius will be:

$$Rs = [2G\ h/C\text{^}4]\ \nu = \zeta\ \nu \quad (4)$$
$$\zeta = 1.09499\ 10\text{^} - 77\ [m\ s] \quad (5)$$

Similar to Planck´s first quantum equation, there is a direct proportionality with frequency. So, a higher energetic frequency will correspond to a bigger Schwarzschild´s radius (equation 4). In units, this new constant ζ is length x time or action / force.

The "Planck units" of length, mass and time can be related to quantum - space flow reasons replacing the Newtonian gravitational constant G. The new relation includes the speed C, the constant $\hbar$ and this new constant ζ. So, the new "Quantum units" will be:

$$Lq = SQRT\ [\zeta\ C] = 5.7295\ 10\text{^} - 35\ m \text{ for length} \quad (6)$$
$$Mq = SQRT\ [\hbar^2 / (\zeta\ C^3)\ ] = 6.1396\ 10\text{^} - 9\ kg \text{ for mass} \quad (7)$$
$$Tq = SQRT\ [\zeta / C] = 1.9111\ 10\text{^} - 43\ s \text{ for time} \quad (8)$$

Since Planck´s units consider h - bar, these units differ by the value SQRT [4 pi]. For reference, Einstein´s stress - energy tensor is multiplied by $8\pi G/ C\text{^}4$; this factor will be replaced with $2\zeta/ \hbar$ (in units of an inverse force).

In the same previous paper [3], the gravitational potential energy is a positive value. In free - fall towards the energetic source, objects don't acquire energy unless they interact or receive some energetic impediment in following the space flow. The message A of Figure 2 illustrates a free - fall where its energy is maintained until impact; its gravitational energy is fully acquired from the impact. Message B reveals the same energy content during the free - fall, this time reaching the relative speed C at the distance Rs and then it will acquire its MC^2 gravitational energy. A finite amount as indicated in message C; not an amount going to infinity as seen in the next sentence. Inside the horizon event, energy is constant (message D), and time dilation is maximum, implying no longitudinal variation (delta l equals zero). There is no argument for extending the gravitational effect to a singularity concept at its center (involving a gain or loss of energy).
The space flow is radial towards the energetic source, but if the source rotates, the total flow combines radial and rotational effects (a coherence rotation is needed). The radial movement of space was analyzed in a previous paper [3], showing orthogonal speed as inversely proportional to the square root of R, diminishing farther from the galaxy center. This partial effect comes from bulge stars and decoherent black hole absorption (if it´s present).

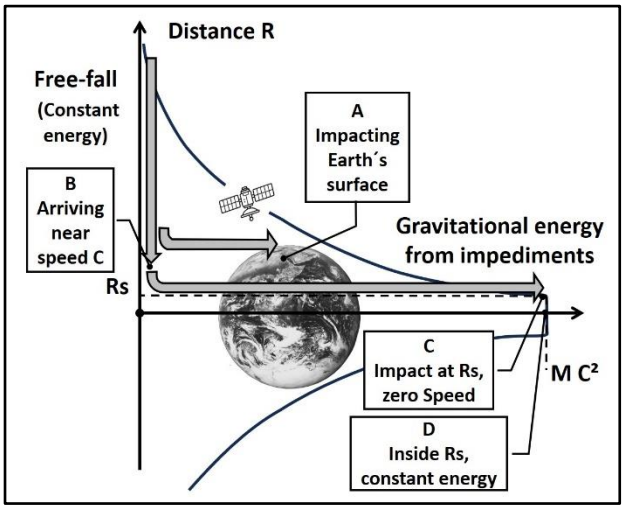

Figure 2

The other partial effect comes from the rotating black hole at the galaxy's center spins its immediate space, providing a surrounding circular movement. Like a moving disc where the rotational speed is proportional to its radius. For this, some coherence is required from this type of black hole. Its intermittent absorbing quantum volume is oriented in some common direction and is proportional to the first order of its energetic wavelength Lambda (Ctau). Meanwhile, a random orientation of all the quantum systems inside the black hole, won't provide a rotational absorption. Note that since these absorptions are intermittent (in - and - out 3D effect), some "turbulence" in the flow is expected near Rs.

When the location is near the galaxy´s center, its dominant effect is a rotational velocity proportional to R (see left part in Figure 1). Aside from the gravitational effect proportional to R studied inside a dense mass.

In a farther position outside the disky bulges star (pseudo bulges), the stars behave more independently, resulting in slipping rotational speed because they maintain their speed independent of their radius. There is no connection between the central stars with the farther ones to maintain the same angular velocity. So, this circular movement of the space (independent from R) around the center of the galaxies is quite different from the case of a gravitational attraction. The non - Keplerian velocity of the stars in the Spiral galaxy demands a new approach; this space flow kinetics offer one and open new doors for our understanding.

3. Conclusions

This paper emphasizes the role of the flow of space as a gravitational phenomenon. The implication is significant as it challenges existing paradigms in astrophysics by offering a unified approach to gravitational dynamics that bridges quantum mechanics and relativity without new physical models or exotic matter hypotheses.

The well - known phrase "stuff in a media" matches this theory of space. Where particles coexist with its wavy quantum space. The energy is contained by the elementary particles meanwhile, the space fluctuates in - and - out 3D and displaces towards the energetic sources. The values of this moving space - media don´t carry energy but depend on the

energetic presence; i. e., with a scaled value described by Lorentz´s gamma factor.

This paper presents a direct proportionality between Schwarzschild´s radius and its energetic frequency; similar to Planck´s first quantum equation. The constant of this proportionality is ζ and its value is 1.09499 10^ - 77 m s (action divided by force). This new universal constant ζ contains quantum concepts and the dynamic of space explaining the gravitational phenomena. For this reason, units of length, mass and time is deduced from C, h and ζ instead of the Newtonian G constant.

Inside the Schwarzschild radius, there is no argument for expecting an increment of energy nor justified an additional singularity at its center. Through the whole Schwarzschild sphere, energy is conserved with delta time and delta length equal to zero, i. e., with the same longitudinal value in its inside and with the same value of time while the passage of time continues.

The intermittent absorption effect can explain some astronomical phenomena, as well as any other relative movements of space. The immediate question is, what happens with the space that is replaced by the surrounding one? What if… this missing space is reincorporated in the universe? This incorporation can be evenly distributed or by multiple holes as sources of space (anti - gravity). This concept can move galaxies toward the limits of the universe. A dynamic space - media that paves the way for further exploration into the dynamic nature of space. A prudent hold to the “dark energy” concept, which is another mystery that is almost the triple of the inexplainable “dark matter.”

Aside from this novel model of gravity, the other goal of this theory is to offer an intuitive understanding of quantum mechanics and relativity (4^{th} D). It proposes that particles behave with an in - and - out 3D at the rate of their energetic period. This oscillatory presence in 3D explains the quantum effects overcoming the measurement problem and some unintuitive observations. Additionally, an almost superposition of multiple states contributes to overcoming some philosophical questions of this modern theory. i. e., an alternance of eigenstates [4].

Declarations

The author declares no conflicts of interest regarding the publication of this paper.

References

[1] Roy P. Kerr, (1963). "Gravitational field of a spinning mass as an example of algebraically special metrics". Phys. Rev. Lett.**11**/5, 237–238. DOI: 10.1103/ PhysRevLett.11.237.
[2] University of Aberta, ASTRO_122, lecture 24 “Spiral Galaxies.” Chapter 26, 691 – 700.
[3] J. Oreste Mazzini, (November 2024) “Quantum and relativistic gravity: Understanding Potential energy through space flow Kinetics” Int’l Journal of Science and Research **13**/11, 337 – 341. DOI: 10.21275/ SR241105050956.
[4] J. Oreste Mazzini, (December 2023) “Philosophy in Quantum Mechanics novel interpretation supports Einstein´s objection” Int’l Journal of Science and Research **12**/12, 1295 - 1297. DOI: 10.21275/ SR231215193142.