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GRAVITY OF QUANTUM UNIVERSES

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Abstract

This short note is the addenda of the published paper entitled "Quantum universes" [1]. The goal of the addenda is to introduce a partially new/partially old theory of quantum gravity. This partially new/partially old theory of gravity is Sir Isaac Newton's law of universal gravitation, reinstated for quantum universes. The imaginary internal attraction of particles of two objects is replaced by an external electromagnetic wave/photon force on particles of the two objects. The external electromagnetic wave/photon force is shown to be caused by radiation from luminous bodies of upper quantum universes.

1. Introduction

The main goal of the addenda is to introduce a partially new/partially old theory of quantum gravity. This partially new/partially old theory of quantum gravity is important because it corrects long standing physical misconceptions. A new explanation is given for the force of gravity, rather

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than what was proposed heretofore. In the addenda, Isaac Newton's law of universal gravitation is reinstated for quantum universes. It is a law not included in Quantum universes [1].

The motivation to make this contribution available to the physics community was strong, in that it may help solve some of long-standing mysteries of physics. The force of gravity follows from the laws of quantum universes. The organization of the addenda is as follows: Section 1, Introduction introduces the reader to a partially new/partially old theory of gravity. Section 2, Gravity in quantum universes determines the force of gravity in quantum universes. Section 3, Conclusion is a summary of the results determined in the addenda Gravity of quantum universes.

2. Gravity in Quantum Universes

It is known that electromagnetic waves and gravity are governed by the inverse square law.

The velocity of photons of upper quantum universes, as shown in Quantum universes [2], traveling between particle one and particle two of a lower quantum universe, would be

$$c_k = \alpha^{-2k}c. \tag{1}$$

Then velocities of photons passing between particle one and particle two of a lower quantum universe, as shown by this equation, would be almost instantaneous.

It was hypothesized that individually quantum universes were homogeneous and isotropic when viewed on a large scale. It was further hypothesized that all particles of a quantum universe were surrounded by the next upper quantum universe.

It was hypothesized, that electromagnetic waves/photons would travel through lower intermediatory quantum universes with some attenuation. This attenuation would ultimately limit the number of photons arriving over time at a lower quantum universe to some finite value. The intermediatory quantum universes to accomplish this attenuation, would also be quantum universes supplying photons to a lower quantum universe.

From Quantum universes [3], the momentum of photons radiated downward from upper quantum universe luminous bodies to our quantum universe would be

$$p_k = m_{relk} c_k = \alpha^{2k} m_{rel} \alpha^{-2k} c = m_{rel} c = p, \tag{2}$$

where momentum of photons in quantum universe k were p_k, momentum of photons in our quantum universe was p, relativistic mass of photons in quantum universe k was m_{relk}, and relativistic mass of photons in our quantum universe was m_{rel}. Thus, photons would travel downward through intermediatory lower quantum universes. And momentum of photons from upper quantum universes at lower quantum universes would be independent of the universe number. Thus, downward momentum from photons of upper quantum universes would add algebraically at lower quantum universes.

Since a photon has a constant, velocity and relativistic mass, it was hypothesized that its force on a particle of a lower quantum universe can be expressed as mass flow rate multiplied by velocity. Thus, from Eq. (2) the force of a photon of a specific frequency on a particle of a lower quantum universe k was

$$F_k = \dot{m}_{relk} c_k = \frac{m_{relk} c_k}{t_k} = \alpha^{-k} \frac{m_{rel} c}{t} = \alpha^{-k} \frac{p}{t} = \alpha^{-k} f p, \tag{3}$$

where f_k was the frequency of a photon in quantum universe k, f was the frequency of the photon in our quantum universe, F_k was the force of the photon of frequency f_k on a particle in a lower quantum universe k, $\dot{m}_{relk}$ was the photon relativistic mass flow rate in quantum universe k, m_{relk} was the relativistic mass of the photon of frequency f_k in quantum universe k, t_k was the period and reciprocal of the frequency f_k, m_{rel} was the relativistic mass of the photon of frequency f in our quantum universe, t was the period and reciprocal of the frequency f in our quantum universe, and p was the momentum of the photon of frequency f in our quantum universe. Thus, it was hypothesized that photons from upper quantum universes would exert a force on every particle of our quantum universe.

Density of a photon in quantum universes would be relativistic mass per unit volume, thus

$$\rho_{pk} = \frac{m_{relk}}{V_{pk}} = \frac{\alpha^{2k} m_{rel}}{\alpha^{-3k} V_p} = \alpha^{5k} \rho_p, \tag{4}$$

where $m_{relk} = \alpha^{2k} m_{rel}$ Eq. (2), discrete densities of photons in quantum universes were ρ_{pk}, density of a photon in our quantum universe was ρ_p, discrete volumes of photons in quantum universes were V_{pk}, and discrete volume of a photon in our quantum universe was V_p. Eq. (4) emphasized the extremely low density of photons of upper quantum universes.

Because of the extremely low density of photons of upper quantum universes, these photons can be expected to act differently in lower quantum universes than they do in their own upper quantum universe.

So, it was hypothesized, due to its extremely low density, that electromagnetic waves/photons from upper quantum universes would transmit though all matter of our quantum universe. In other words, it was hypothesized, that the electromagnetic waves/photons of upper quantum universes would transmit through all matter of our quantum universe as though the electromagnetic waves/photons of upper quantum universes were radio waves in air. And further, it was hypothesized that every particle in our quantum universe would be pushed, by upper quantum universe photons, towards every other particle in our quantum universe, with the same generic force as Eq. (3) that was directly proportional to the product of their masses and inversely proportional to the square of the distance between them. The direction of the force would be the opposite of an internal force, along a doubly extended line joining the two particles. The proportionality constant would be the universal gravitational constant.

Thus, the force of gravity in our quantum universe would be

$$F = G\frac{m_1 m_2}{r^2}, \tag{5}$$

where this equation is Isaac Newton's law of universal gravitation, F was an external gravitational force in our quantum universe caused by downward radiating photons from upper quantum universes, G is the universal gravitational constant, m_1 is mass of object one, m_2 is mass of object two, and r is the distance between the centers of mass, one and two.

The force of gravity F_K in quantum universes would be relatively uniform since it was hypothesized that individual quantum universes were homogeneous and isotropic. Then $F_K = \alpha^{\mu k} F$ where μ would be negative one as determined from $\dot{F}_k = \alpha^{-2k} m \alpha^{-3k} a$. Thus, the force of gravity in quantum universes would be

$$F_K = G_k\frac{m_{1k} m_{2k}}{{r_k}^2} = \alpha^{-k} G\frac{m_1 m_2}{r^2} = \alpha^{-7k} G\frac{\alpha^{2k} m_1 \alpha^{2k} m_2}{(\alpha^{-k} r)^2}, \tag{6}$$

where $\dot{F}_k$ was force in quantum universes, a was acceleration, F_k was the external gravitational force in quantum universes, G_k were the universal gravitational constant in quantum universes, μ for m_1 and m_2 was positive two, μ for r was negative one, and $G_k = \alpha^{-7k}G$.

3. Conclusion

Sir Isaac Newton's law of universal gravitation is reinstated for quantum universes, with an external photon force, from luminous bodies of upper quantum universes, replacing an imaginary internal force of particle attraction.

References

[1] R. C. Havens, Quantum universes, Fundamental J. Modern Physics 19(1) (2023), 45-100.

[2] R. C. Havens, Quantum universes. Fundamental J. Modern Physics 19(1) (2023), Eq. (9), p. 54.

[3] R. C. Havens, Quantum universes, Fundamental J. Modern Physics 19(1) (2023), Eq. (90), p. 85.