Gravity Accelerates the Universe

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Abstract Space waves. Mass (matter) changes the wavelengths of space waves. Gravity is the difference of wavelengths of space waves caused by masses. This definition of space-matter theory uncovers a new characteristic of mass and space; masses accelerate the Universe. Note space-matter theory has been worked out to describe the force of thought. Thought force seems to be far from gravity. No, it isn't. Thought force and gravity have common roots. The working method of gravity is a multidisciplinary phenomenon. The new definition of gravity is a new and important additional result of space-matter theory.

Keywords: space-matter, wave of time, wave of space, gravity, accelerating Universe, double-slit experiment

1. PACE-MATTER MODEL

The Space-Matter Theory[1] is new theory. In this model space waves. Mass (and every matter) changes the wavelength of space waves. In the case of mass: the bigger (the faster) the mass, the longer the wavelength and the smaller the frequency of the space wave will be. This is in harmony with the theory of relativity, see Reference 1. Note space-matter is not a special version of space-time, in the space-matter time is not a dimension, but a physical phenomenon, that is, time has speed, for example.

Time comes into existence when space and matter meet; and whenever space and matter meet, the result is time. Time is a co-production of matter and space. In our life time is the space waves caused by masses.

2. PITCH OF SPACE-MATTER MODEL

Matter causes waves in space. Solely through the use of space waves, we can express spatial distance, time and energy. Why? Because space waves have the shortest wavelength, the fastest speed, and the smallest energy expressed in our terms.

- Every spatial distance can be expressed using the wavelength of space waves.
  In our physics terms: This is the shortest unit of distance.
- Every unit of time can be expressed using the periodicity of space wave.
  In our physics terms: This is the shortest unit of time.
- Every amount of action (energy) can be expressed using the value of the action of space wave.
  In our physics terms: This is the smallest unit of energy.

See the calculated values using a simple two-dimensional cosine model as space wave in Reference 1.

3. GRAVITY AS SPACE WAVES

The space-matter model allows us to discern new features of gravity. The main part of the gravity in space-matter model is the existence of gravitational waves. LIGO detected gravitational waves, they exist. According to space-matter theory gravity is the difference of the wavelengths of space waves. The velocity of gravity is irrelevant from this viewpoint. The following model works in both cases: if $\mathrm{v}_{\mathrm{gravity}} = \mathrm{c}$ or $\mathrm{v}_{\mathrm{gravity}} >> \mathrm{c}$.

3.1. Speed of gravity is disputable

The velocity of gravity does not change the working method of gravity in the space-matter model. This is not true in the space-time model. In the space-time model, no particles (whether actual or hypothetical) can move faster than light cp. Standard Model of Physics[2]. According to this concept even (a wave of) gravity, which travels in the fabric of space, has c velocity.

$$v_{gravity} = c \qquad (1)$$

In 1974 Hulse and Taylor[3, 4] proposed measuring the gravitational wave to find Eq. (1). They were awarded the Nobel Prize with this measuring[5], but the question remained open. In 2013 scientists in China were supposed to measure the same value[6]. The question is still open, since the measurements was made by light, so the scientists may have measured the speed of light. There are physicists who state gravity must be much faster than light. For example Flandern states: $v_{gravity} \geq 2 \times 10^{10} c$. This value is based on laboratory, solar system, and astrophysical experiments[7].

The first measurement of gravitational waves were made by LIGO. Space waves. Fact.

What about the velocity of gravity (space waves)? The physicists of LIGO work within the space-time model, so they accept Eq. (1) as fact. Based upon it, LIGO's scientists are supposed to have measured the gravitational waves of two black holes that collided. Their theory is known: the event took place 1.3 billion years ago[8]. But there is a fact: the Fermi space telescope detected a burst of gamma rays 0.4 seconds later after the measurement of LIGO. In my opinion, LIGO did not measure the gravitational effect of two black holes that merged, but gravity's effect caused by the electromagnetic energy[9, 10]. Physicists at LIGO certainly refuse this interpretation[11].

From the perspective of the space-matter model, what LIGO's measurement precisely demonstrates is that everything, even light (electromagnetic energy), alters space (and time) waves. What is more, everything has time. This is exactly what the space-matter model propounds.

4. GRAVITY AS DIFFERENCE OF WAVELENGTHS OF SPACE WAVES CAUSED BY MASSES

The gravity is when space pushes masses:

$$\sum \vec{F}_{space} \neq 0, \tag{2}$$

where $\vec{F}_{space}$ are vectors of the force (action) of space waves from the viewpoint of mass. Mass moves the direction of the resultant vector (except in special cases not detailed here).

Among bodies experiencing gravity, the frequency of space waves decreases. That is, the space "pressure" between the bodies decreases. Gravity arises, because the portions of space with higher force (action) shift the masses. If on one side of a mass the space wave has f_{s1} frequency, and on the opposite side of this mass the space wave has f_{s2} frequency and $f_{s1} < f_{s2}$, then the mass goes into the direction of f_{s1}. The greater f_{s2} frequency - the greater force (action) of space - moves the mass forward, see FIG.1.

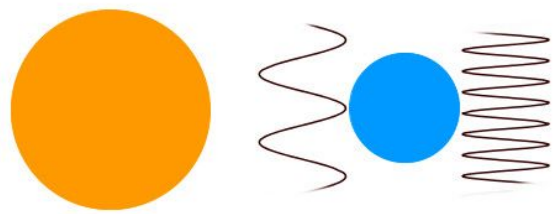

FIG. 1. Space wave model of gravity (model, not proportional). Big (yellow) and small (blue) masses and space waves. Gravity is when space waves push. Or, even more clearly, though less scientifically, “You’ll get such a slap, you’ll go flying!” If the blue planet gets four slaps from the right and one from the left, it will move left.

5. SPACE WAVES CONNEC GRAVITY AND QUANTUM MECHANICS

Young performed the first two-slit experiment[12] ever. In 1801 he found that light paints an interference pattern on the observing screen.

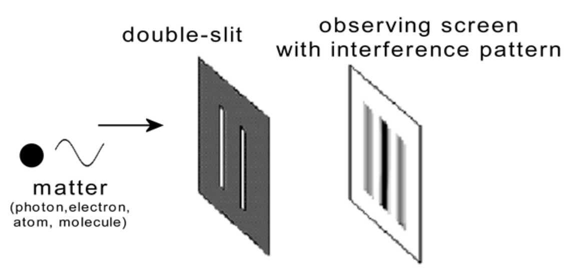

FIG.2. Double-slit experiment, model, not proportional.

Light reaches the screen at discrete points (that is as a particle), but an interference pattern appears on the observing screen using single photons, that is light waves. See FIG.2. Each photon seems to interfere with itself. Jönsonn gave a new meaning to the double-slit experiment; in 1961 he performed the double-spit experiment with electrons[13]. Electrons have masses, that is (small) matter with and without mass produces the interference. In 1974 Merli, Missiroli, and Pozzi[14] [15] in their experiment used single electrons, showing that each electron interferes with itself. There are also molecules that are able to interfere themselves[16].

How can we explain that light (electron, atom, molecule) interferes with itself? There are more known interpretations I won't cite here.

In the space-matter model the interpretation of this phenomenon is the simplest ever: space waves. The waves of space interfere with themselves. The matter is floating on these space waves. The interference doesn't come into being in matter's wave but in the space waves. Saying this, the double-split experiment shows, that mass and photon generates space waves, that is, photon has its own time.

On the other hand this is the bridge between the quantum mechanics and the general theory of relativity, if we accept that the space-matter includes space-time.

4. GRAVITY INFLATES THE UNIVERSE

Gravity is the sum of different forces of space waves. The moving mass changes the wavelengths of space waves.

$$\frac{d}{dt}v = l\frac{d}{dt}\lambda , \quad (3)$$

where l is a proportionality factor.

The longer wavelengths of space waves cause a higher acceleration of mass. The accelerating mass makes the wavelength of the space wave longer, and the longer space waves accelerate the mass. This is why the gravity is an accelerating force.

The acceleration itself of the Universe is able to inflate the Universe, since the wavelengths of the space wave are constantly growing.

5. WHAT ACCELERATES THE UNIVERSE?

Lemaitre[17] and Hubble[18] gave the first theoretical and observational evidences for the expansion of the Universe. The Hubble Law shows that the recessional speed of an object (galaxy) depends on the distance between Earth and the object (galaxy). The Hubble constant has been researched since 1927. The measurements are more and more precise; the show is on to refine its value.

Perlmutter, Riess and Schmidt[19, 20] found observational evidence for an accelerating Universe in 1998. The Universe expands at an increasing rate, that is, the velocity at which a distant galaxy is receding from the observer is continuously increasing with time.

Using the new definition of gravity described above, we can give a working explanation, where gravity itself causes as the accelerating Universe. Gravity makes the wavelength of space waves longer. In space-matter theory the space waves give the time waves. The unit spatial distance and the time unit are connected, they change together. What does it mean?

6. NEW CONSTANT

If time waves are derived from space waves there arises a strange phenomenon—the time and the distance are the two sides of the same medal from the viewpoint of mass.

$$f_{space\ wave} = f_{time\ wave} \quad \text{and} \quad \lambda_{time\ wave} = \lambda_{space\ wave} \ , \tag{4}$$

where $f_{space\ wave}, f_{time\ wave}$ are frequencies and $\lambda_{time\ wave}, \lambda_{space\ wave}$ are wavelengths.

If a mass generates growing wavelengths of space, the frequency of the space wave decreases, that is, the time unit for the mass grows in the same portion. Mass always needs the same time expressed as $f_{time\ wave}$ to travel the one $\lambda_{space\ wave}$. Mass can travel never faster, never more slowly in space from its own viewpoint. According to a Hungarian proverb: "It is not possible to jump over its own shadow", that is, "The leopard cannot change his spots". This is displayed in the Eq. (5) by v_{sm}. Accelerating motion appears in a non-space inertia frame of reference according to the mass, but it doesn't appear in the framework of waving space according to the mass.

$$v_{sm} = c \tag{5}$$

Eq. (5) comes from the space-matter model combined with the special theory of relativity[21]. c is the speed of light. (5) is true, because of Eq. (6).

An observer can realize the acceleration of mass in space, if the observer is able to measure the changing wavelengths of space waves around the mass. The mass itself isn't able, since its time depends on its space waves. Eq. (5) doesn't mean at all that the velocity of an object cannot be higher than c according to an observer. Eq. (5) characterizes how objects "can see their shadows" in the waving space.

In Eq. (5) we can see the same phenomenon in mass-space relation, what we know about the relation between mass and light. The speed of light is independent of the v velocity of the mass, it is always c, according to the given mass. Mass and light follow the same rule, but their spaces are different. Mass travels in space, light travels on the space wave generated by mass. This highlights the reason of the gravitational red shift of light. Light's frequency level (*FL*) is constant in the case of the given photon:

$$FL = const = f_{light} / f_{time\ wave} \quad . \tag{6}$$

Mass and light have different spaces, that is, there *are* different spaces. Objects opt for what is space for them. Mass and light (and other hypothetical or real particles) use different spaces, where the wavelengths of space waves are different. The different wavelengths of space waves result that there are spaces, where $v_{limit} >> c$, where v_{limit} is a velocity measured by mass. These spaces can be seen as wormholes. What is a wormhole in the space-time model? A wormhole[22] or an Einstein–Rosen bridge[23] is a hypothetical "bridge" connecting two sheets of space-time.

There is no wormhole in the space-matter model, but different spaces. The different spaces seem to make the spatial distances shorter, because the wavelengths of space waves are longer here. From the viewpoint of masses, the following seems to be true: $v_{limit} >> c$.

7. GRAVITY ACCELERATES THE UNIVERSE

How? The explanation is very simple using the space-matter model. (3) remains true in every case, every mass (matter) accelerates the same way and the same rate, since (5) also remains true.

$$a_{grav} = const \quad . \tag{7}$$

where a_{grav} is the gravitational acceleration we know. But the a_{grav} is connected with mass. From the viewpoint of space waves, there are different space waves and time waves. The galaxies of our Universe have different ages. The different ages of galaxies create an accelerating Universe. Why? The galaxies have been moving. The differences of age mean differences of time period of their moving. The velocity of a galaxy will continuously grow. The sooner started the moving, the faster is the today's moving. That causes a growing acceleration. If

$$v_{mass1} > v_{mass2} \ , \tag{8}$$

then

$$\lambda_{space\ wave\ by\ mass1} > \lambda_{space\ wave\ by\ mass2} \ , \tag{9}$$

$$\lambda_{time\ wave\ by\ mass1} > \lambda_{stime\ wave\ by\ mass2} \ , \tag{10}$$

According to space as an observer, the wavelengths of space waves around $mass_1$ are longer then around $mass_2$. The time unit of $mass_1$ is longer then the time unit of $mass_2$, that is, the time of $mass_1$ is slower. If we measure $mass_1$ with our time units and our spatial distances (as $mass_2$), we get the result: the acceleration of $mass_1$ accelerates from our point of view.

$$\frac{d}{dt}a_{mass1} > \frac{d}{dt}a_{mass2} \ , \tag{11}$$

Saying this, gravity accelerates the Universe.

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