The Kha theory of gravity

The most exciting thing about the Kha theory's explanation of gravity is that there is no need to introduce a mystical dark matter in order to save Newtons law of gravity. In this article I will explain the main points of the Kha theory of gravity. My wish and hope is that the theory will be explored further and put to the test by other physicists in the future. I always welcome any form of feedback on the Kha theory.
The word "kha" means "unbounded space" and according to the Kha theory the universe is unbounded and eternal. The Kha theory believes the universe is filled with cosmic neutrinos. In the original neutrino "soup" the energy density was very high and neutrinos produced pairs of neutrons and anti-neutrons. However the number of these particles was small, because they often annihilated each other.

In the Kha theory the force of gravity on particles is due to the pressure from cosmic neutrinos. In my article "Kha an alternative to Big Bang" I explain how the black holes and the fireballs were formed by the enormous pressure from the neutrinos in the original soup. In our contemporary universe the pressure from the cosmic neutrinos is much less, but the cosmic neutrinos are still responsible for the gravitation.

The contemporary cosmic neutrinos

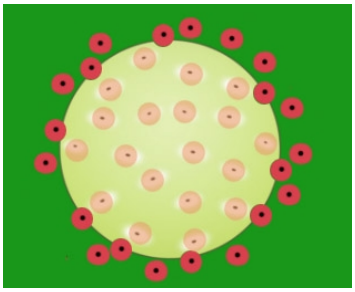

Figure 1

The fireballs in the original soup contained neutrinos, photons and magnetons plus the particles: partons, neutrons, anti-neutrons and annihilation products. The high temperature and pressure in the fireballs caused a huge explosion called the Big Blast. Figure 1 shows in principle the situation at the end of the Big Blast.

It is probable that the radius of the universe of fireballs was multiplied with 3 during the Big Blast. This means that the density of particles was multiplied with $(1/3)^3 = 0.012$. And this in turn means that the mean free pass was multiplied with $0.012^{-1} = 83$. Due to this dilution the production of partons, neutrons and antineutrons stopped at this point, and less neutrinos were produced.

At the same time the temperature decreased and the radii of the fireballs decreased. This meant that neutrinos from the fireballs were able to move freely between the fireballs and eventually disappear from the inner universe. The lack of neutrinos is marked with a yellow colour in figure 1. The acceleration of the fireballs stopped and they moved away from the inner universe with the velocity they had achieved in the Big Blast.

The situation was different for the outermost fireballs. They had contact with the original soup in the outer universe (dark green) and it's high energy density from the many neutrinos. We see in figure 2 that the left side of the fireball (red) is in contact with the inner universe (light green) with it's lower energy density, while the right side of the fireball is in contact with the outer universe (dark gren) with a much higher energy density.

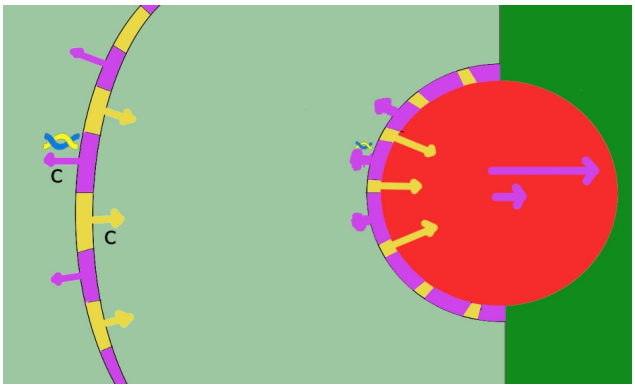

Figure 2

Figure 2 also illustrates the origin of the cosmic neutrinos. Some fireballs have a velocity considerably over c and are completely surrounded by the dark green outer universe. However we will concentrate on the fireballs on the edge of the outer universe. The red fireball in figure 2 with its particles, moves with a velocity a little greater than c away from us. Inside the fireball are neutrinos moving in all directions with velocity c relative to the fireball. The Kha field of neutrinos have a mean velocity zero relative to the fireball. Two neutrinos with velocities c and -c relative to the fireball have velocities relative to us marked with light violet arrows. From this we see that no neutrinos from the fireball itself or photons from inside the fireball, can be observed by us.

The microwave background

According to the Kha theory a photon is composed of a positive energy moving parallel to a negative energy. The velocity of a photon and the velocity of a neutrino is c, relative to the mean velocity of the neutrinos it passes.

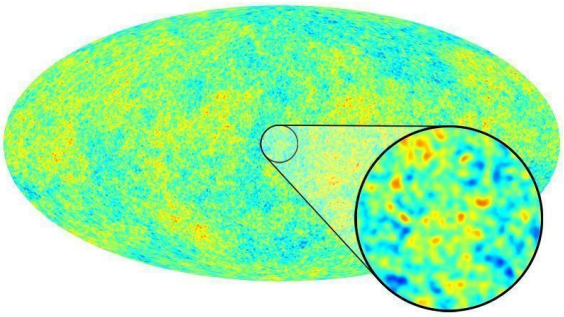

Figure 3

Figure 3 shows the background radiation of microwaves from the entire sky, measured by the Planck satellite. The observed photons have a mean wavelength of:

$L_2 = 1.0*10^{-3}$

When the photons were emitted from the fireballs they had less wavelength. At the surface of the fireball the temperature might be 10000 K, like at the surface of the brightest stars. According to Wien's law the average wavelength is:

$L_1 = 2.9*10^{-3} / 10000 = 2.9*10^{-7}$

Let's look at figure 2. again. In front of the fireball many neutrinos are emitted (violet). These neutrinos are coming from the fireball and moving towards the inner universe. There are also a smaller number of neutrinos (yellow) coming from the inner universe and moving towards the fireball. This means that the

mean velocity of the neutrinos in the ball shell facing the inner universe is a velocity directed towards the inner universe, relative to the fireball.

We have to take into consideration that the fireball moves towards the outer universe with a velocity around c, and the photons coming from it move with a velocity -c. The photons and neutrinos in the ball shell move with a velocity directed towards the inner universe relative to us $-v_1$.

In the Kha theory of relativity, the velocity *v* of a photon has a relation to the wavelength:

$$\frac{L2}{L1} = \frac{v2}{v1}$$

In figure 2. at a considerable distance from the fireball, the number of neutrinos from the ball shell have declined (depicted by the yellow and purple striped curve). Here the mean velocity of the neutrinos is zero as the yellow and purple stream of neutrinos outweigh each other. $v_2 = c$.

Now we have:

$$\frac{10^{-3}}{2.9 * 10^{-7}} = \frac{c}{v1}$$

The emission velocity v_1 of the photons and neutrinos, relative to us, is:

$v1 = 2.9*10^{-4} * c$

Our external universe has a density similar to the original universe. The temperature is about 10^{11} K and a great deal of annihilations are taking place. I presume that neutrinos with an average energy of 30 MeV = $3*10^7$ eV are being produced in the external universe.

Like a photon a neutrino has a length, and the longer the neutrino is the lower it's energy density. We can calculate the average energy E of a single neutrino in outer space like this:

E1/E2 =v2/v1

$3*10^7$ eV/E = c/$2.9*10^{-4}$ *c

E = $8.7*10^3$ eV

The pressure from cosmic neutrinos

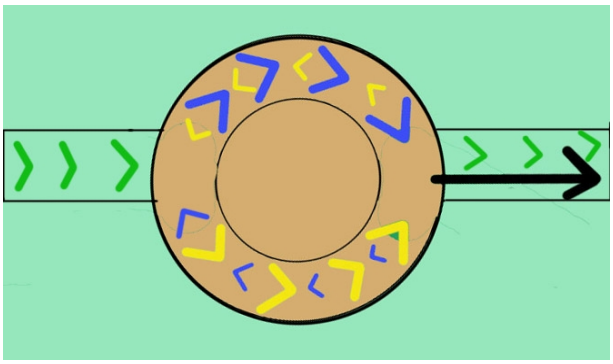

Figure 4

In the Kha theory the reason for gravity is the pressure from cosmic neutrinos.

Figure 4. illustrates how a neutrino influences a neutron. The neutrino arrives from the left (the three green chevrons symbolize the energy of the neutrino). We will let the nucleon have the energy E_1 and the neutrino the energy E_2. The nucleon is composed of two opposite rotating currents. Its positive current is marked with **small** yellow chevrons, and its negative current is marked with **small** blue chevrons. A neutrino consists of a neutral current (green chevrons).

When the neutrino enters the nucleus of the neutron, it is diverted into a positive and a negative current. The **large** yellow chevrons represent the original positive current of the nucleus plus the positive current from the neutrino. The **large** blue chevrons likewise represent their negative counterparts. The currents represented by the **large** chevrons have the energy:

$$½ E_1 + E_2$$

These currents have the mean velocity directed to the right:

$$(½ E_1 + E_2)c /(E_1 + E_2)$$

We will let xc be the velocity of the neutron after the scattering. The currents inside the neutron, directed to the right relative to the neutron, are:

$$(½ E_1 + E_2)c /(E_1 + E_2) - xc$$

The currents inside the neutron directed to the left, relative to the neutron, are:

$$½ E_1 \, c/(E_1 + E_2) + xc$$

The currents directed to the left are equal to the currents directed to the right:

$$(½ E_1 + E_2)c /(E_1 + E_2) - xc = ½ E_1 \, c/(E_1 + E_2) + xc$$

$$xc = ½ E_2 /(E_1 + E_2)*c \qquad (4)$$

Formula (4) is here proved by using the Kha theory's idea that a neutron is composed of rotating currents. Formula (4) gives the formula for the velocity xc of the nucleon after the neutrino scattering, and represents a transfer of energy from the neutrino to the nucleon. This is marked with a black arrow in figure 5.

Based on the calculations above we can conclude that neutrinos exert pressure on nucleons. We will see that this pressure can explain the force of gravity.

As the energy of a cosmic neutrino E_2 is small, the neutron it penetrates will not be affected much by a single neutrino. However the number of cosmic neutrinos arriving from the outer universe at any one time is enormous, and the combined pressure from these neutrinos create an immense force that we call gravity.

In figure 4 we see what happens when a neutrino enters a nucleon. We introduce E_1 the energy of the nucleon and E_2 the energy of the neutrino

$$E_1 = 940 \text{ MeV} \quad E_2 = 8.7*10^3 \text{ eV}$$

Formula (4) gives us the velocity xc of the nucleon after the scattering

$$xc = ½ \, 8.7*10^3 \text{ eV} /(9.4*10^8 \text{ eV} + 8.7*10^3 \text{ eV})*c$$

$$xc = 4.6*10^{-6} *c$$

The velocity is so small that we can use the classic formula for kinetic energy

$E_{kin}=½\ mv^2=½(\ E_1/c^2\ )*(xc)^2=½*9.4*10^8*(4.6*10^{-6}\ )^2$

E_{kin}= 0.0099 eV

This very small energy is absorbed by the nucleon, as a result of the scattering of one neutrino. The absorbed energy from a single neutrino is very small, compared to the energy of a nucleon. However the nucleon is hit by an enormous number of neutrinos every second, in the present universal Kha field. We will see that these neutrinos can explain gravity.

The calculations of x and E_{kin} is based on an estimate of the original neutrino energy to be 30 MeV. The original neutrinos probably had a different energies, and possibly an average energy higher than 30 MeV.

In the present chapter we have heard that the visible universe of galaxies is filled with an invisible Kha field of neutrinos. These neutrinos with the energy of **$8.7*10^3$ eV** originate in the external universe, penetrate the visible universe and are finally absorbed again in the external universe. The trip across the visible universe takes the time of $13.8*10^9$ years. A minor part of the neutrinos pass through nucleons in stars, and loose an energy of **0.0099 eV** per nucleon in this process.

Gravity at the earth

The neutrinos in the Kha field originate in the external universe with the same intensity from all directions.

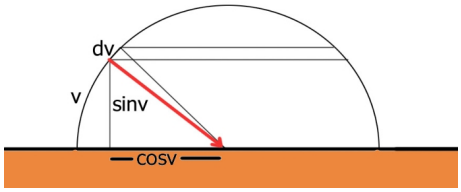

Figure 5

Now we will study how the universal energy density *e* penetrates into the earth. In figure 5. we see the surface of the earth (brown). The universal Kha energy with density *e* arrives from all angles of the universe *(*4 π). We will now evaluate the part of *e* arriving from the direction given by the angle dv:

2 π cosv e dv/4 π =½cosv e dv

The energy density inside the earth is found by integration for the half of the entire space from v=0 to v= π/2

$e_i=\int ½\cos v\ e\ dv\ = e/2$

The result e/2 is no surprise since the earth shadows half of the neutrinos from outer space. If the energy of the neutrinos was absorbed by the earth, they would exert a pressure (marked red in figure 47). The vertical part of the pressure P is calculated by integration from v=0 to v= π/6 (or from v=π/6 to v= π/2)

$P(0^0 – 30^0) =\ e*1/16\ ,\quad P(30^0\text{-}90^0) = e*3/16$

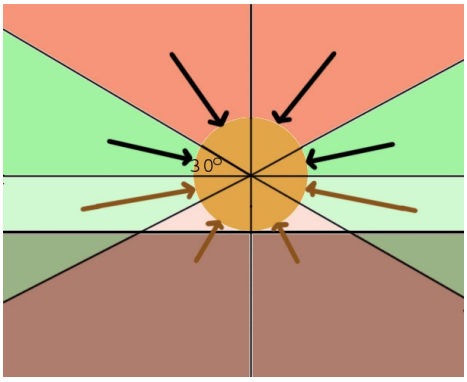

Figure 6

Figure 6 shows a nucleon,(yellow) near the surface of the earth (brown). Forces from different parts of space are symbolized with arrows. First we will study the force from the red part of space.

Only a small part of any single neutrinos energy is absorbed in the nucleon. In the last chapter we found that only 0.0099 eV is absorbed from a neutrino with energy$8.7*10^3$ eV. The absorbed part is

$0.0099/ 8.7*10^3 = 1.1*10^{-6}$

The pressure from the red space is

$P(30^0\text{-}90^0) = e*3/16*1.1*10^{-6} = 2.1*10^{-7}e$

In order to find the force on the nucleon, we need the cross section area. Unfortunately the cross section area A of a nucleon, for scattering weak neutrinos, has not been measured. The section area for a nucleon is $2.0*10^{-30}$, but this value of the section area is too high. Instead I propose we estimate $A = 5.0*10^{-31}$.

Thus the force from the red space is:

$F = P*A = 2.1*10^{-7}e * 5.0*10^{-31} = 1.0*10^{-39}e$

The forces from the green spaces can be ignored. One reason
for that is that $P(0^0 – 30^0)$ is small. Another reason is that the neutrinos from the light green space have traveled a short distance through the earth. They have almost the same energy as the neutrinos from the green space and they will neutralize each other.

However, we have to take into account the pressure from the brown area below. From the brown area comes the same number of neutrinos as from the red area, however these neutrinos have passed through the entire earth, and have lost some of their energy by penetrating many nucleons.

The number of nucleons per volume can be found from the density of the earth $5.5*10^3$ and the mass of a nucleon $1.7*10^{-27}$. We have estimated the cross section area for an individual nucleon to be $5.0*10^{-31}$. We have to consider that the nucleons in the earth are placed in nuclei and are not individual. It might be more realistic to estimate the cross section area for a nucleon in the earth to be $2.0*10^{-32}$.

Thus the mean free pass *h* for the neutrinos in the earth would be:

$h = 1.7*10^{-27} / (5.5*10^3 * 2*10^{-32}) = 15\text{m}$

After the neutrinos have passed the distance *h* half of the neutrinos have lost 0.0099 eV of their energy. On average the neutrinos have lost 0.0050 eV. We want to know at what distance x(1) the neutrino stream has lost relatively 0.1 of the energy. The energy loss is 0.0050 eV for every distance *h*. The loss per scattering

will be gradually smaller during the distance x(1) because the neutrinos' energies are falling from 1 to 0.9. As an approximation the average energy loss per scattering is multiplied with 0.925^2.

$x(1)*0.0050/15* 0.925^2=0.1*8.7*10^3$

$x(1) = 3.0*10^6$

After x(1) we find the further distance x(2) where the neutrino stream has lost relatively 0.1 of its energy. For that purpose the neutrino energy has a factor 0.9 and the energy of a scattering has the factor $0.9^{2.}$ Then we have:

$x(2) = x(1)* 0.9*/0.9^2 = 3.3 *10^6$

$x(3) = x(2) / 0.9 = 3.7*10^6$

$x(4) = x(3) / 0.9 = 4.1*10^6$

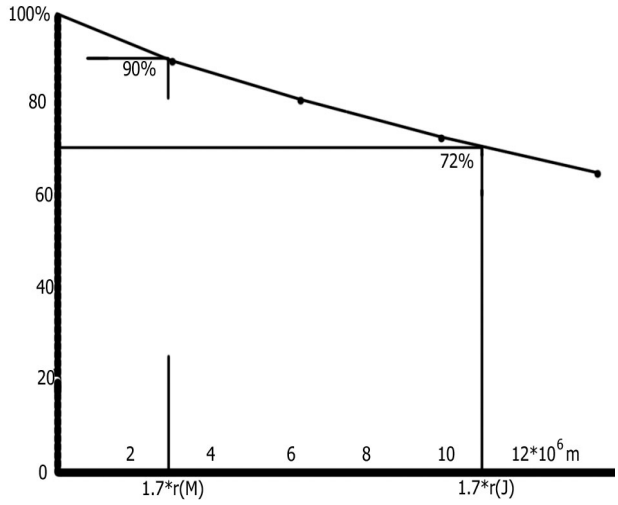

Figure 7

In figure 7 we see the energy of neutrinos as they pass through the earth. The neutrinos loose energy from scattering with the nucleons in the earth.

Let us look at the neutrinos that come from the brown space in figure 6. They have passed 1.7 rJ $=11*10^6$m . They now have 72% of their original energy left, and they can transfer $72\%^2 = 52\%$ of the energy they originally could transfer to nucleons. The force of the neutrinos from the brown field eliminates 52% of the force from the neutrinos from the red field. Thus only 48% of the force from the red field is not neutralised.

We will now calculate the resulting force F (Kha) on the nucleon in figure 48.

$F(Kha) = 48\%*1.0*10^{-39}e =0.5* 10^{-39}e$

The gravitational force on the nucleon is:

$F(gra) =mg = 1.7*10^{-27} * 9.8 =1.7*10^{-26}$

We put F(Kha) =F(gra)

and get the energy density of the present universal Kha field

$e = 1.7*10^{-26} / \ 0.5*10^{-39} = \mathbf{3.4*10^{13}\ J/m^3}$

Neutrinos that pass through the moon can be treated the same way, if we presume that the moon has the same mean free pass. The neutrinos in the moon pass 1.7 rM= $2.9*10^6$m. They can transfer $90\%^2$=81% and thus only 19% are not neutralised.

Let us compare the resulting energy transfer, i.e.19% for the moon and 48% for the earth. The ratio is 19/48 = 40%. The gravity on the moon is estimated to be 16.6% of the gravity on earth. Why are the two ratios so far from each other? The discrepancy probably comes from the incorrect presumption that the mean free pass is the same.

Contrary to the earth, the moon has no water. A water molecule contains two single protons from hydrogen. Neutrinos are scattered by nucleons. It is very probable that some nucleons in the heavy nuclei of the moon will be in the "shadow" of other nucleons in the nuclei. Therefore the mean free pass d for neutrinos will be larger in the moon, and thus the energy will be larger than 90% for the neutrinos that pass through the moon. This explains why the gravity on the moon is lower than the gravity on earth.

Gravity from the Sun

The sun consists of protons. The density of the sun is believed to be t = $1.4*10^{3.}$, and the proton mass m = $1.7*10^{-27}$. The proton density p is:

p =$1.4*10^3 / 1.7*10^{-27} = 8.3*10^{29}$

Again we estimate the section area A= $2*10^{-32}$ of the proton
and have the mean free pass of neutrinos in the sun

$$\text{mean free pass} = \frac{1}{p * A} = \frac{1}{8.3 * 10^{29} * 2 * 10^{-32}} = 48$$

When we compare the mean free pass with the radius of the sun rS = $7.0*10^8$ it is possible that a neutrino in the sun will penetrate 30 times as many nucleons as a neutrino in the earth. Therefore neutrinos that pass through the sun will loose much more energy than they do in the earth. Consequently we will ignore neutrinos that move straight through the sun.

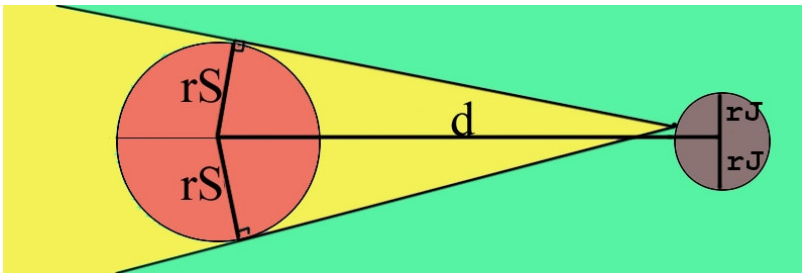

Figure 8

Figure 8 is a sketch of the sun (red) and the earth (brown). The neutrinos in the Kha field (green) are coming to the earth from the external universe in all directions. Neutrinos are scattered by the nucleons in the earth and generate a force on the earth. If the neutrinos were coming from all directions the total force on the earth would vanish and the resulting force on the earth would be zero. However the sun afford shade from part of the external universe.

The size of the yellow solid angle compared to the full sphere is calculated with the help of the radius rS of the sun and the distance d of the sun.

$$\frac{(rS)^2}{4 * d^2}$$

The energy density of the total Kha field coming from afar is *e*. The energy density of the neutrinos missing from the yellow circular arc at a point on the earth is

$$- \frac{(rS)^2}{4 * d^2} * e$$

The missing energy density is a missing pressure on the earth. The missing pressure is negative and causes an attraction of the earth. If neutrinos were totally absorbed in the earth, the pressure would be equal to the energy density *P=e*. In the last chapter we found that the neutrinos that have passed the earth have 72% of their energy left. Therefore 28% of the energy is absorbed into the earth

$$P = -28\% * \frac{(rS)^2}{4 * d^2} * e$$

The missing force F on the earth can be calculated with the section area A of the earth

$$F = P*A = -28\%* \frac{(rS)^2}{4 * d^2} * e * \pi rJ^2$$

$$= - 28\% e * \pi \quad \frac{rS^2 * rJ^2}{d^2}$$

$$= - 28\% e * \pi \frac{(7.0 * 10^8)^2 * (6.4 * 10^6)^2}{(1.4 * 10^{11})^2} = - 7.9*10^8 \ e$$

The force F is negative because it is an attraction. We can calculate the force on any globe from any other globe in a similar way. We see that attractive force is determined by the inverse square of the distance d. Newtons law of gravitation has the same dependence on the distance. The attractive force seems to depend on the section areas of the globes, and not on their masses. We might have to correct the masses of the earth and other globes.

We can calculate the force F because we know the velocity v of the earth, the mass M of the earth and the radius r of the orbit.

$$F = \frac{M * v^2}{r} = \frac{6 * 10^{24} * (3.0 * 10^4)^2}{1.4 * 10^{11}} = 3.9*10^{22}$$

If we equal the two expressions for the force F we get the energy density of the present universal Kha field.

$e = 3.9*10^{22} / 7.9*10^8 =$ **$4.9*10^{13}$J/m³**

Here we have a second result for the density of the present universal Kha field. The agreement with the first result $e =$ **$3.4*10^{13}$J/m³** is acceptable. Both results are based on rough estimates because we do not have measurements of the physical quantities. The neutrinos from the external universe are estimated to have an energy of 30 MeV. The energy of the individual neutrino might be higher, and then the energy density *e* of the universal Kha field would be correspondingly lower. The mean free pass and the cross section is estimated arbitrarily in order to get a reasonable result.

Anyhow the calculations show that it is possible to explain the physical observations if we use adequate sizes of the physical quantities. I hope that the calculations will be improved by other physicists.

In the preceding calculation we have used the gravitational mass of the Earth, which is not measured but calculated from Newtons formula of gravitation. As Newtons formula is not valid in the Kha theory, we prefer to use the inertial mass of the Earth, which is probably somewhat higher.

Space shuttles traveling in outer space have a stronger attractive acceleration towards the sun, than the planets. This can not be explained with Newtons law of gravity.

According to the Kha theory the acceleration towards the sun is caused by the neutrinos from outer space. More precisely it is caused by the neutrinos that arrive at the planet, from the solid space opposite the direction of the sun.

From the precedent chapter Gravity at the earth we know that these neutrinos only transfer 52% of their original energy to nucleons at the surface of the eart in the direction of the Sun..The nucleons in the rest of the Earth will have a higher energy transfer up to 100% for the nucleons at the surface opposite the Sun. I estimate that the energy transfer to the nucleons in the earth could be on average 85% of the original energy transfer.

A space shuttle is made of thin plates of iron, and thus the neutrinos that pass through the plates will have practically 100% energy transfer to the nucleons. Consequently the attractive acceleration of the earth is only 85% of the acceleration of the space shuttle.

The “dark space”

The most distant galaxies have a velocity of about 0.8 c. The microwave background (Figure 3.) has a velocity of about c. Between these two is a so called ‘dark space’, which is sometimes explained with Newtons law as gravitational attraction of the distant galaxies from the entire galaxy universe. But why were the outermost fireballs not attracted to the galaxy universe?

The Kha theory has another explanation for the creation of the ‘Dark space’. In figure 2. many more neutrinos are moving towards the inner universe than towards the outer universe, in the area near the ball shell facing the inner universe. This is indicated with more violet than yellow colour on the ball shell.

Furthermore the galaxies in the interior universe shadow the neutrinos from the opposite edge of the universe. This creates a pressure, from the neutrinos, on the galaxies near the fireballs. It is this pressure that creates the ‘dark space’, according to the Kha theory.

Gravity in the past

The density of the neutrinos coming from the fireballs at the edge has decreased during the expansion of the universe, because the distance to the fireballs has increased. Now $13.6*10_9$ y after BB, the neutrinos are emitted from the distance $½*13.6*10_9$ ly. $4.5*10_9$ y ago. The Earth and Moon is believed to be created $(13.6-4.5)*10_9$ y after BB. At that time the neutrinos were emitted from the distance $½*9.1*10_9$ ly. We now see that the distance has changed with the factor:

½*13.6*109 ly / ½*9.1*109 ly = 1.5

Assuming that all fireballs emit the same energy in the form of neutrinos, we can use the inverse square law and find that gravity has changed with a factor:

$1.5^{-2} = 0.45$

The equation for a circular movement is $a = rw_2$, where a is the gravitational acceleration, r is the radius and w is the angular velocity. We have changed the equation to the following

$a*0.45 = (r/0.45)(w*0.45)^2$

At the time of the creation the radius of the orbit of the earth was only 45% of its contemporary radius. The angular velocity of the earth was 0.45_{-1} of the contemporary angular velocity. Because of this a year was only 45% as long as a contemporary year.

Rotation of the galaxies

For hundreds of years astronomers have wondered about the fast rotation of the outermost spiral arms of the galaxies. This high rotational velocity can not be explained by the attraction from the mass in the central part of the galaxy with Newtons law of gravity. Many astronomers believe in a so called "Dark Matter" with a mass six times the mass of the galaxies. Nobody knows what this mystical dark matter is made of and where it is located.

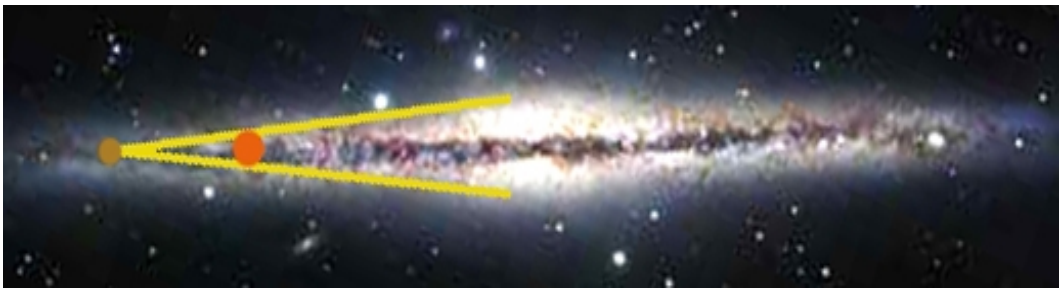

Figure 9

However the Kha theory of gravity might explain this high rotational velocity. More precisely the cosmic neutrinos and the shadow principle might explain this phenomenon. The brown spot in figure 9 marks the outermost spiral of a galaxy. The red spot marks an inter median spiral. The yellow lines mark the solid angle from where the cosmic neutrinos pass through the red spiral and reach the brown spiral. However the stars and the dust in the red spiral will stop many cosmic neutrinos. Therefore the brown galaxy is only attracted to the red galaxy's stars and dust. On the other hand the red spiral will be attracted to the brown spiral, as well as to a spiral in the direction of the centre. Thus the total force on the red spiral will logically be smaller than the force on the brown spiral.

This explanation is only principal. I hope that other physicists will perform calculations on these forces, based on observations.

Movement of th galaxies

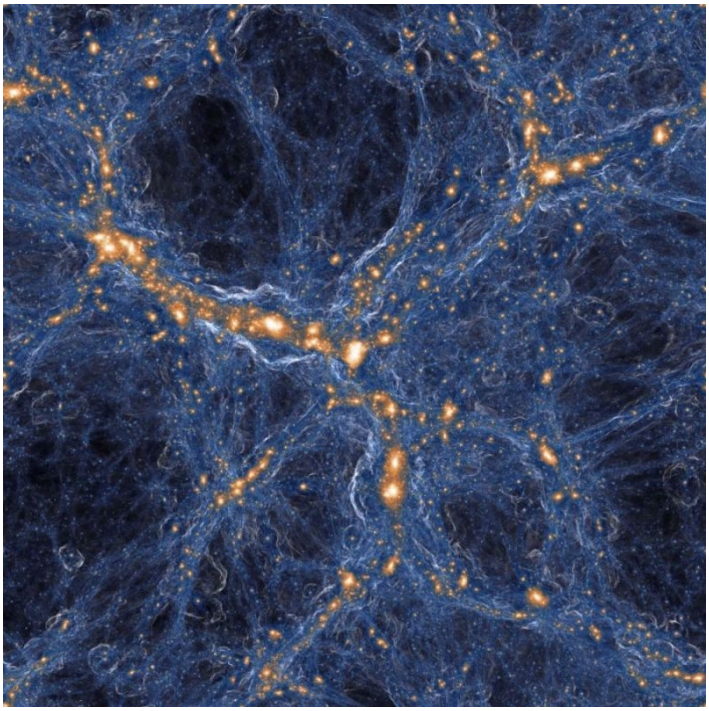

Figure 10.

Figure 10 is a map of matter of galaxies (yellow) and dark matter (blue) from the University of Chicago, 2023. Astronomers used two different telescopes and put the maps together, to create the map in figur 10. The galaxies on the map have been under the influence of gravity ever since the BB. At the present time, 13.8*109 y after the Big Blast, we know the energy density of the field of cosmic neutrinos e. We also know the distance to the fireballs outside the visible world, which is $6.9*10_9$ ly.

Now let us imagine the situation when the distance to the fireballs was only 10% of the present distance. According to the inverse square law the energy density of the Kha field would have been 100 times the present, and gravity would have been 100 times the present. Therefore the movement of the galaxies would have been a lot faster than today.

When we look at figure 10. we see that dark matter forms a light blue string between a row of yellow galaxies and an empty black space. In the Kha theory the galaxies shadow the cosmic neutrinos, creating a strong force of gravity from the empty black space. It might be possible to make a map of gravity, according to the Kha theory. Unfortunately I have not had the computer resources to achieve this so far, but I hope that other physicists will do computer-calculations based on observed distributions of matter in a galaxy.

The most exciting thing about the Kha theory's explanation of gravity is that there is no need to introduce a mystical dark matter in order to save Newtons law of gravity. My wish and hope is that the theory will be explored and put to the test by other physicists and that it might help to explain questions about gravity, and about the universe, in the future.

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