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The Photon And The Universe

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Abstract
This paper dicusses mass and energy questions of the photon in the universe by using quantum relativity.Questions of rest mass versus relativistic energy are dicussed and the creations of photons with the new intensity formula.Many calculations using Light Tensor are performed studying the relationship between gravitation and mass creation in the universe.Velocity and acceleration calculations in combination with expansion questions in the universe have also been done and calculated.Mass, radius and time periods have also been calculated in combination with the expansion in the universe, which also has been determined.The dark matter in our galaxy have also been determined together with mass creation using special and general relativity.Different curvatures(space-time)(elliptic, flat and hyperbolic) with different light speeds are also discussed.This leeds to a discussion between black holes versus galaxes.

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I. Introduction

The mass of the photon has been an important question for science for a long time. A key question has been if its mass can be nonzero at lower speed than the speed of light at a perfect vacuum. According to Special Relativity the mass will get bigger(rest mass) of zero speed and looses mass when it goes faster.(Figs 1a and 1b) The rest mass of the photon has been determined in this paper.

The creation of photons has one of us B.T. worked with earlier, by working in the spectroscopy field, using different light sources in combination with a photon counting spectrometer system (IDES). This system was suited for the study of intensities of spectral lines.In these works, it was possible to develope a new intensity formula used for spectral line-and analytical chemistry studies and measurements.This formula consists of several important factors for creating light and photons of different wavelengths.It is common in the literature to find papers and data from many investigations in the past, supporting the new intensity formula. This formula has been used and published a lot in the spectroscopy and stellar fields.

Calculations with the "Light Tensor" have given an increase in relativistic mass due to contraction of the hyperbolic 4-space H^4 distance into hyperbolic H^5 space (x,y,z,t,m),which will costantly increase speed in the Flat Space Time F^5 (x,y,z,t,m).

Velocity, acceleration and expansion of the universe have also been studied in relation to the speed of light at different Space Times.This will give a new "Formula of the Universe" and the expansion, mean mass and radius of the universe, which will increase in radius around 10 times bigger than older calculations.

The dark matter in the galaxy has also been determined together with dark matter creation using Special Relativity. Questions about time estimation and creation of the universe(Big Bang) have been discussed together with the balance between photons and gravitons.

Different curvatures (Elliptic positive, Euclidic flat and Hyperbolic negative) with different light speeds, are also discussed.

II. Mass of the Photon

MASS of THE PHOTON

We will here proove that the photon actually has a nonzero mass if it does not reach the speed of light, (Which may never happen anyway). This premise is valid since flat SpaceTime is equal to perfect vacuum, since mass bends SpaceTime.

The energy transferred by a photon when emitted from a Hydrogen Atom is 13.6056093123 eV/c^2 , in the first orbital. It is released when the electron reaches the critical and specific velocity.

$v = c/137.0359990845,..$ m/s = $2.187691265,\ldots * 10^6$ m/s (1)

This particle-wave oscillation energy produces a Photon from the kinetic mass , and the electron restmass denoted me. We have

m_0 = (me * v^2 / 2) / c^2 = 13.6056093123 eV/c^2 , (2)
which resembles energy E = m_0 * c^2 , or simply, E = m c^2 . The photon trades mass with velocity so the actual energy is constant and is always the quantified number
E = mc^2 = 13.6056093123,... eV , (3)
(electron Volt). The weight (or Relativistic mass) for this singular photon, (relativistic mass) diminishes with speed and vice versa. The motion of a wave creates the motion of a wave-particle (in some sense a tiny spherical wave or vortex). An energy transfer of a particle is simply done with the mass of the particle.
Proper mass (here denoted by m' , m apostrophe) equals :
m' = m_0 * √(1 - v^2 / c^2). (4)
It is the weightfunction for the Einstein's (very famous formula of Special Relativity)
m = m' / √(1 – v^2 / c^2) = lim [v -> 0] m_0 * √(1- v^2 / c^2) / √(1 – v^2 / c^2) = m_0 . (5)
Again , E = mc^2 , (or specifically E = m_0 c^2) does not change also in the case that
lim [v -> c] . Then the general , E = mc^2 is a constant and m_0 the Photon restmass. Ref 1.

The Photon conserves energy, in the sense of mass, energy and velocity together, so roughly speaking; " velocity = energy = mass ". If it goes slower it gains mass and if it goes faster it looses mass! Alltogether to balance energy , so , E=mc^2 remains constant!

The wavefunction of the Photon is Quantified in that way that it can only take states that are multiples or deciples of 13.605692...eV/c^2. This means that it's actual restmass and velocity of the Photon equals 13.605692... eV/c^2 as well as 2.998...*10^{10} meters per second! One could say that "velocity=energy=mass".Figs 1a and 1b

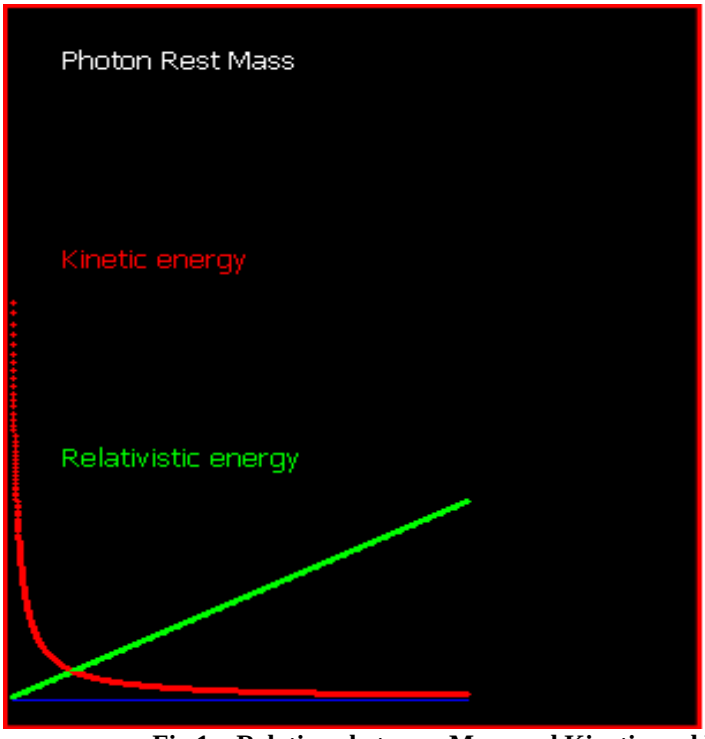

Fig 1a Relations between Mass and Kinetic and Relativistic Energy

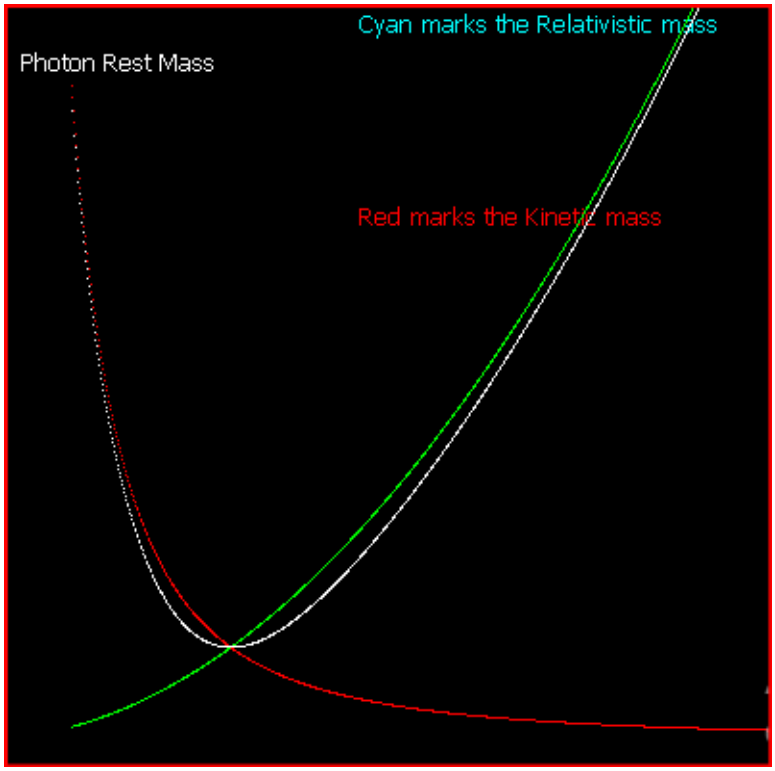

Fig 1b Relations between Kinetic and Relativistic mass and velocity.(Mass varies also with radius.) Mass of particle in the intersection.

Photon rest mass by Heisenberg Principle, Eigen frequency of the electron
The Heisenberg principle states that for the electron
$\mathbf{\Delta x*\Delta t \geq h/4\pi}$ **(6)**
Omitting the inequality then
$\mathbf{\Delta x*\Delta t = h/4\pi}$ **(7)**
Or
$\mathbf{v=\Delta x/\Delta t = (h/[4\pi])/[\Delta t]^2=(h/[4\pi])f^2}$ **(8)**
Then let $v=2.187*10^6$m/s and $h=6.623*10^{-34}$ J*s
$\mathbf{f=\sqrt{(v*4\pi/h)= \quad 2.0365977*10^{20}Hz}}$ **(9)**
now from the relativistic
$\mathbf{m=hf/c^2}$ we have the electron **mass** **(10)**
$m_e=0.73622*10^{-50}*2.0367761*10^{20}$ 6.623=1.5023817 $*10^{-30}$ kg a result within the 97% interval.
Now let
$\mathbf{m_e/m_\gamma=(f_e/f_\gamma)}$ **and** $\mathbf{f_e=\sqrt{(v*4\pi/h)=2.04*10^{20}\ Hz}}$ **(11)**
then the rest mass of the Photon equals
$\mathbf{m_\gamma =(f_\gamma/f_e)*m_e =(3.29*10^{15}/[2.0365977*10^{20}])*1.5023917*10^{-30}\ kg\approx\ 2.4270226*10^{-35}}$ kg **(12)**
Direct proof of Photon rest mass
From the definition of kinetic energy
$\mathbf{E_{kinetic} = mv^2/2}$ **(13)**
We have
$\mathbf{E_{kinetic}/m = v^2/2}$ **(14)**
Then by mathematical analog ratios we have that for the electron
$\mathbf{E_{kinetic}/m_e = v_e^2/2}$ **(15)**
Where m_e is the Electron rest mass, v_e is the velocity of the electron around the proton in the Hydrogen atom in the first orbital, similarly for the photon;
$\mathbf{E_{kinetic}/m_\gamma = v_\gamma^2/2}$ **(16)**
Then we have with ratios
$\mathbf{v_e^2/v_\gamma^2 = m_\gamma/m_e}$ **(17)**
Where m_γ is the Photon rest mass, v_γ is the velocity of the Photon emitted from the Hydrogen atom first orbital, now taking in account the geometric peak velocity factor $\sqrt{2}$ then

$(1/\sqrt{2})^2 v_e^2/v_\gamma^2 = c^2 /[137.036,\ldots*\sqrt{2}]^2 /c= m_\gamma/m_e$ (18)

Then numerically:

$137.0358,\ldots=(1/\sqrt{2})\sqrt{[510998,\ldots/13.6056092,\ldots]}\ eV/c^2$ (19)

where 137.036 is the inverse fine structure constant, 510998 is the restmass of the electron in electron volts and 13.605692 the restmass of the Photon in electron Volts.Ref 2.

III. About the creation of photons.

According to a new theory by S.Yngström Ref 3, which was created during the 1980s,together with the author (B.T.) the intensity I is given

$I = C\ \lambda^{-2}(exp (- J/ k T)) / (exp (h \nu /k T) – 1)$ (20)

J is here the ionization energy, and C is a factor given by transition probabilities, number densities and sample properties. λ and ν are here the wavelength and frequency of the atomic spectral line. This means that the new intensity formula consists of 4 parts : the C-factor, λ^{-2}-part, the J-dependence exp(-J / k T) and the Planck factor 1/((exp(h ν / k T) - 1).

Laboratory experiments supporting the new formula

The fluctuation method

The first method which was developed supporting the intensity formula with an exponential (J+hν) term is the fluctuation method. This method concerns the study of spectral line intensity ratio fluctuations in Refs (4 and 5), where many different optical light sources were used. By forming the ratio between the intensities of two simultaneously measured lines from the same sample and by using logarithmic differentiation, we obtain the following expression

$d (I^a_{mn} / I^b_{kl}) / (I^a_{mn} / I^b_{kl}) = d (C^a_{mn} / C^b_{kl}) / (C^a_{mn} / C^b_{kl}) + (1 /k T)(d T / T) D (E)$ (21)

where $D (E) = J^a – J^b + h \nu^a_{mn} - h \nu^b_{kl}$ and $d (I^a_{mn} / I^b_{kl}) / (I^a_{mn} / I^b_{kl})$ is named R value. Mathematically this formula is a straight line, which can be seen in Fig (2) from a hollow cathode experiment. In this figure fluctuation data R versus $D(E)= J^a – J^b + h \nu^a_{mn} - h \nu^b_{kl}$. (difference of ionization energy plus photon energy) were used from fifteen steel samples in a hollow cathode lamp. Seventeen elements were studied in this graph giving a correlation coefficient of 0.90 .

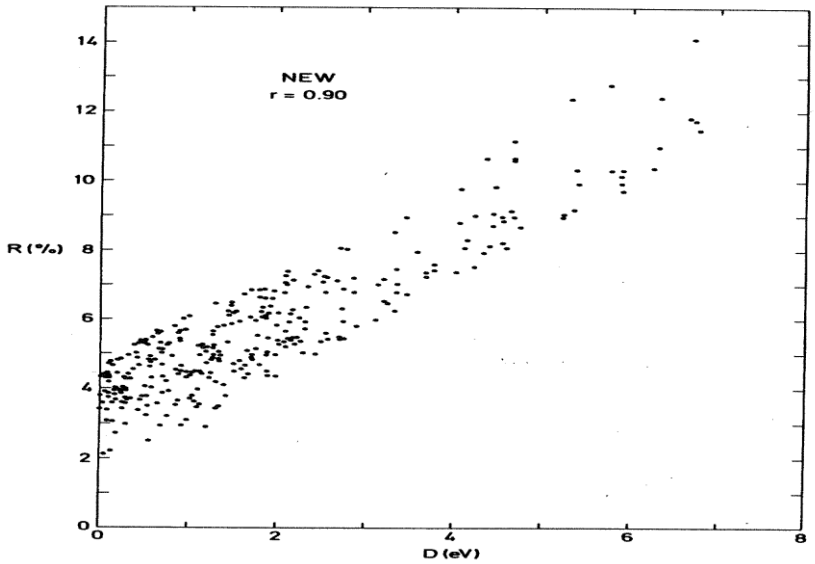

FIG 2 Plot of fluctuation data R versus $D (E) = J^a - J^b + h \nu^a_{mn} - h \nu^b_{kl}$. (difference of ionization energy plus photon energy) from fifteen steel samples used in a hollow cathode lamp. Seventeen elements were studied in this graph. Reproduction from Ref 4.

This formula has been verified by a new method about absolute intensities of atomic spectra of seventeen elements. Ionic spectra is also supporting this formula including ions with higher ionization energies. Several other optical methods by using Laser, X-ray, LED-lamps, Photoluminiscence, Electroluminiscence and ICP do support this formula Ref 6.

This formula is also important in the ionospheric field in the ionoshere on earth for he aurora and nightglow emissions.Ref 7.

In the stellar field it has been used by studying stars, where temperature, density and mass determinations have been done with very good results together with a new kind of HR-diagram. Refs 8, 9 and 6.

The inverse of the intensity formula is a photoelectric formula, which is responsible for the ionization of the ionosphere in the sun and the creation of the solar wind.Ref 6 and 15.

The formula has also shown to been responsible of the fact that dark matter is not seen below 2.7 K in the deep space. To sum up , this new intensity formula is very important and central in the stars and the universe.

IV. DRLE

In this chapter a new version of the Grand Unified Theory GUT is presented, which includes gravitation, electromagnetic-,weak and strong interactions and also dark energy.

We define the dynamic relarivistic invariamt Laplace equation DRLE, Barrera and Thelin Ref 10 as the equation :

$$(f(t)^2 (d^2\psi / dr^2) - (f(r)^2 / c^2)(d^2\psi / dt^2) = 0 \quad (22)$$

By using this formula in rectangular coordinates, this equation has a complex solution similar to a light wave. Similar calculations have been drived with spherical coordinates giving similar solutions for different systems like galaxies, planets, molecules, atoms and atomic nuclei. Many examples of these different systems have been studied using the DRLE equation. This version of Laplace equation is more frexible than earlier versions and is invariant during translation. When using spherical coordinates a gravitation wave is realized in a galaxy equation. This gravitation wave is also a solution of the DRLE equation.Such gravitation waves have been observed as density variations in the galaxies.Refs 11,12,13 and 14.

V. The couple of photons

By using the General Relativity by Schwartzchild the Photon solution forms a galaxy type of rotation of two Photons in a pair, where the mass is distibuted all over the rotation disc, giving an Electromagnetic charge for one Photon and a Magnetic charge for the other Photon.The total mass of these Photons are : $2\ m_0 = 27.211384\ eV/c^2$.

The rotation formula for these two Photons : $$V_{rot} = 2\ m_0 (1 - 2\ m_0 / R\ c^2)^{1/2} \quad (23)$$

where $2m_0/R$ less than c^2 . These ideas with doubble Photons has also been discussed in a theoretical paper by Dr Sten Yngström (Ref 3). These Photons form a lightwave satisfiying Maxwell equation and giving the Rydberg constant restmass

$$m_0 = 13.605692\ eV/c^2 = 2.42\ 10^{-35}\ kg. \quad (24)$$

The force carrier cannot carry more energy than the electromagnetic pair of Photons because these force carrier cannot go faster than light and they produce two Photons according to Table 1. .For the proton and the neutron we can see that they include one Photon each, which means that the Photon is included in all matter.

Table 1

Now accounting for the **kinetic energy of** the **force carriers** (for g = 9.807):

Electromagnetic force $m_0 * v^2/c^2 = 510998.9/137.035999^{20} = 2*13.605693\ eV/c^2 = 2m_0$ **(25)**

Gravitational force $m_G * v^2/c^2 = 6308/15.23^2 = 2*13.605693\ eV/c^2 = 2\ m_0$ **(26)**

Strong force $m_S * v^2/c^2 = 701/5.1^2 = 2*\ 13.605693\ eV/c^2 = 2\ m_0$ **(27)**

Weak force $m_W * v^2/c^2 = 4.5859*10^6/411.108^2 = 2*\ 13.605693\ eV/c^2 = 2\ m_0$ **(28)**

Proton $m_S * v^2/c^2 = 938.27208*10^6/8304..3153^2 = 13.605693\ eV/c^2 = m_0$ **(29)**

Neutron $m_W * v^2/c^2 = 939.5641*10^6/8310.03537^2 = 13.605693\ eV/c^2 = m_0$ **(30)**

We can order the strength of the four forces by looking at their **velocity in respect to their force carriers** rest mass compared to the rest mass of the Photon m_0, we can use the velocity as a strength measurement since its square together with mass gives the auto kinetic velocities in Table 2.

Table 2

- Photon $\sqrt{2}\ \sqrt{(m_0 / [2m_0])} = c = 2.9979*10^8$ m/s **(31)**
- Gravitational force $\sqrt{(m_0 / m_G)} = c/15.23 = 19.7*10^6$ m/s **(32)**
- Electromagnetic force $\sqrt{2}\ \sqrt{(m_0 / m_e)} = c/137.035999 = 2.1869*10^6$ m/s **(33)**
- Weak force $\sqrt{(m_W / m_P)} = c/411.108 = 3.65*10^5$ m/s **(34)**
- Strong force $\sqrt{(m_0 / [2m_0])} = c/5.1 = 5.88*10^7$ m/s **(35)**

VI. The Rest - mass of Light

Under gravitation (Spaces that have an elliptic metric under velocity and mass) there are mainly two kinds of velocities

1). Keplerian velocity , $\mathbf{v_1 = \sqrt{(m*G/r)}}$, having the co-Keplerian velocity ,

$\mathbf{v_2=\sqrt{(c^2-m*G/r)}}$ **(36)**

2). Reciprocal Keplerian , $\mathbf{v_s = \sqrt{(2*m_0 / m)}}$, having the co-reciprocal Keplerian ,

$\mathbf{v_s=\sqrt{(c^2 - 2*m_0 / m)}}$ **(37)**

There will be a point where the two velocities meet and intersect , that point is the Scwartzchild radius

$\mathbf{R_0 = 2*m_0 *G / c^2}$ **,** **(38)**

For the Photon this radii will be

$\mathbf{R_0 = 2*m_0 *G / c^2} \approx 3.6 *10^{-62}$ m = $3.6 *10^{-52}$ Å and $m_0 = 2.429\ 10^{-35}$ kg = 13.605692 eV/c^2

VII. The general Elliptic Tensor Equation for light

The relation of the carried energy E_c of a Photon and it's oscillation frequency υ is

$\mathbf{E_c = h\ \upsilon}$ **(39)**

Or

$\mathbf{E_c / [h\ \upsilon] =1}$ **(40)**

Where h is the Planck constant , earlier we formulated an elliptic equation for light as

$\mathbf{(m/ [2*m_0])^2 + (v / c)^2 =1}$ **(41)**

Or

$\mathbf{(m/m)^2 + (v / c)^2 =1}$ **(42)**

With Photon restmass , $m = 2*m_0 = 2*13.605692,\ldots$ eV/$c^2 \approx 2 * 2.43* 10^{-35}$ Kg $= 4.86 *10^{-35}$, (Kilogram) ,

Or since $E = m c^2$, the relativistic "proper mass" , equals

$\mathbf{m= h\ \upsilon / c^2}$ **(43)**

and substituting this into the ellipse gives

$\mathbf{(h\ \upsilon/ [2*m_0 * c^2])^2 + (v / c)^2 = 1}$ **(44)**

or

$\mathbf{(h\ \upsilon/ [m * c^2])^2 + (v / c)^2 = 1}$ **(45)**

This is our general equation for light. We could also write the equation as

$\mathbf{(E/E_0)^2 + (v/c)^2 = 1}$ **(46)**

The pythagorean sum of mass and velocity is invariant, i.e. this equation for light is a tensor.Ref 16. "The light tensor".

VIII. Relativistic Gravitation derived from the Light Tensor

From the Light Tensor

$\mathbf{(m/m)^2+ (v / c)^2 = 1}$ **(47)**

We set

$\mathbf{v=dR/dt}$ **(48)**

Or

$\mathbf{v^2=(dR/dt)^2}$ **(49)**

substituting this into the Light Tensor then

$\mathbf{(m/m)^2+(1/ c)^2 (dR/dt)^2 = 1}$ **(50)**

Next multiplying by $c^2 * dt^2$ simply yields

$\mathbf{c^2(m/m)^2dt^2 + dR^2 = c^2 dt^2}$ **(51)**

Now in Euclidean E^3 space we of course have the three dimensional metric

$\mathbf{dR^2=dx^2+dy^2+ dz^2}$ **(52)**

the spatial distance , so in X^4 Riemannian space , we can by some algebra define the hyperbolic $H^4 = H^4(x,y,z,t)$ Minkowski/Lorentz distance with tension variable term , ds^2 ;

$\mathbf{ds^2=c^2dt^2– [dx^2 + dy^2 + dz^2]}$ **(53)**

and in X^5 with mass m as the fifth dimension then we just continue our calculation and define the hyperbolic $H^5 = H^5(x,y,z,t,m)$ metric Minkowski/Lorentz distance with tension variable term

$\mathbf{ds^2=c^2dt^2–[dx^2 + dy^2 + dz^2] - c^2 (m / m)^2 dt^2}$ **(54)**

Now normalizing so m =1 and changing variables so we have light rest-mass normalized coordinates

We here call "Light Mass Coordinates"

$\mathbf{ds^2=c^2dt^2– [dx^2 + dy^2 + dz^2] - c^2 m^2 dt^2}$ **(55)**

Now turning this to the invariant gravitation tensor by setting $ds^2 = 0$ then

$\mathbf{ds^2=c^2dt^2– [dx^2 + dy^2 + dz^2] - c^2 m^2 dt^2 = 0}$ **(56)**

Or by 'flipping ' the mass carriyng term to the rightmost side, then we have a Gravitational Tensor

$$c^2dt^2–[\ dx^2 + dy^2 + dz^2\ ] = c^2\ m^2\ dt^2 \quad (57)$$

in Light-Mass coordinates, (If we normalize with respect to the light speed constant c we call the coodinates "light coordinates").

This means that we have the interpretation that "An increase of relativistic mass is due to contraction of hyperbolic 4-space H^4 distance".

Light changes mass depending on the velocity. At v = c the mass is 0 (or very close to zero), but at v = 0 the mass is equal to the Rest-mass $m = 2*m_0$. This is possible because the squared velocity plus the squared mass is constant. Velocity and mass are here equivalents, so it "trades" or interchanges mass with velocity and vice versa. It's relativistic mass or "proper" mass is

$$m=2*\ m_0*\ \sqrt{(\ 1 - v^2 / c^2\ )}. \quad (58)$$

These forces stay below or at the maximum velocity c, in an Elliptic Space-Time. If the Space Time is Hyperbolic H^5 (x,y,z,t,m) it will pass the velocity c , and for Flat Space-Time F^5(x,y,z,t,m) it accelerates constantly, where the velocity is steady increasing .

The (Riemannian/Gaussian/Ricci) curvature , K , of Space-Time controls the velocity for objects embedded inside it.

- Positive curvature (Elliptic) E^5(x,y,z,t,m), (K>0) means go slow, i.e. v<c,
- Flat F^5(x,y,z,t,m) means go constant, v = c, (K=0),
- Hyperbolic H^5 (x,y,z,t,m) negative curvature (K<0) means accelerate and go fast, v>c .

Our Space-Time here on the Earth and inside this region of the Milky-way is Elliptic, so we can not pass the speed of light c , locally, but out side the Milky way, we have a Hyperbolic Metric. Therefore, objects such as galaxies accelerates past the speed of light, resulting in extreme Red-Shift.Ref 17.

IX. Radius and Mass of the Universe

From **Schwartzschilds formula** gives

$$E\mu\upsilon=1–2m*G*g\ /[rc^3\ ] = 0 \quad (59)$$

With Radius R_0 , $R_0 = 55 *10^9$ Ly $= 55*10^9 * 9.461 *10^{15} = 5.20355 *10^{26}$, We get the mass of the universe to be

$$m=c^2\ R_0\ /[2*a_0\ ]\ \approx c^3\ R_0\ /\ [2*G*g]\ = 1.\ 0707897,..\ *\ 10^{61}\ kg. \quad (60)$$

Starting with a Universe Radius of ca: 55 billion lightyears , $R_0 \approx 5.5 *10^{10}$ Ly $\approx 5.2 *10^{26}$ m .

Then the Inverted Schwartzchild radius used for Gravitation gives our Universe the minimum mass

$$m_{Min}= c^2\ *\ R_0\ /\ [2*\ G] \approx 3.5\ *10^{53}\ kg \quad (61)$$

now using the corresponding Inverted equation but for Expansion then gives our Universe the maximum mass

$$m_{Max}=c^3\ *\ R_0\ /\ [2*\ G\ *\ g\ ] \approx 1.1\ *\ 10^{61}\ kg \quad (62)$$

the geometric mean mass will then be

$$m_{Mean}\ =\ \sqrt{(m_{Min}\ *\ m_{Max}\ )}\ =\ m_{Min}\ *\ \sqrt{(\ c\ /\ g)} \approx \sqrt{(\ 3.85\ *10^{114}\ )}\ \approx\ 1.962\ *\ 10^{57}\ Kg$$

with $\sqrt{(c/g)} \approx 5525.284024,\ldots$. (63)

X. Velocity and Acceleration of the Universe

Here we will show the expression between the acceleration and the rest mass of the photon. **$a_0 = g\ G\ /\ c\ = m_0\ c^2$**

Assume the expansion velocity v (nonlinear) ,of the Universe to be of the scaled "proper" relativistic form

$$v = k*\ c\ *\sqrt{\ (\ 1\ -\ v_{KE}^2\ /\ c^2\ )}\ =\ k*\ c\ *\ \sqrt{(\ 1\ -\ m*\ a_0\ /\ [r\ c^2\ ]\ )}\ =\ k*\ c\ *\ \sqrt{(\ 1\ -\ m*\ G\ /\ [rc^3])} \quad (64)$$

then we have after differentiation on r , (and for formality negating the sign of k) the expansion acceleration using the chain rule on this velocity equation , to be

$$a_0\ =\ (dv/dr)\ (dr\ /\ dt)\ =\ -k*\ c\ *\ (1/r)\ *\ [\ -\ m*\ G\ /\ [r\ c^3\ ]\ ]\ /\ \sqrt{(\ 1\ -\ m*\ G\ /\ [r\ c^3\ ]\ )}\ =\ -k*dv/dr=dv/dt \quad (65)$$

then with

$$1-2m*G*g/[rc^3]= 0 \quad (66)$$

Or

$$m*G*g/[rc]=c^2/2 \quad (67)$$

then the expansion acceleration a_0 , (non linear acceleration) , becomes **

$$dv/dr\ =\ -\ k\ *\ c\ *\ (1/r)\ *[-\ c^2\ /2]/\ \sqrt{(\ c^2\ /2)}\ =\ k\ *\ c\ *\ (1/r)\ *\ \sqrt{(\ c^2\ /2)} \quad (68)$$

and with $r = R_0 = 4*c* t_0$, where $t = t_0$, t_0 is the now time , s.t. the age of Universe equals 27.5 billion years ≈ 2*13.77 billion years , $t_0 = 2 * 13.77*10^9 *9.461 *10^{15}$ s , (seconds),
so that our scaling coefficient , k , equals
$k = \sqrt{2} *R_0 * G*g / c^2 = \sqrt{28.75706717,\ldots} \approx 5.362561624,\ldots \approx 5.4$ c **(69)**
$v = k* c * \sqrt{(1 - m* G *g/ [r c^3])} = [\sqrt{2} *R_0 * G*g / c] * \sqrt{(1 - m* G*g / [r c^3])}$(70)
this yields:
$v = 5.362561624,\ldots *c*\sqrt{(1 - m* G*g / [r c^3])}$ **(71)**
or
$v=[\sqrt{2}*R_0*G*g / c] * \sqrt{(1 - m* G*g / [r c^3])}$ **(72)**
with (geometric) mean velocity
$v=[R_0*G*g / c] \approx 3.791903689,\ldots$ c ≈ 3.8 c **(73)**
(very roughly 4c , four times the speed of light on Earth.) and by this substitution
$a_0=dv/dt=G*g / c \approx 2.2 *10^{-18} \approx 67$ km/s/MPsc **(74)**
$a_0 = 4*c /R_0 = 4* 2.9972458^8 * 10^8 / [5.2 *10^{26}] = 2.3061538,\ldots *10^{-18}$ m / s **(75)**
$\underline{a_0 = m_0 c^2} \approx 2.43 *10^{-35} *2.9972458,^2 * 10^{16} = 2.183975 * 10^{-18}$ m / s **(76)**
with
$\underline{m_0=G*g/c^3}=2.429,.. * 10^{-35}$ kg = 13.605692,… eV/c^2 **(77)**
Ref 18 and 19.

XI. Special Relativity Galaxy DarkMatter Calculations

(The two versions of the Galaxy Equation , Special Relativity and General Relativity)
Dark Matter (DM) , SR:
$v_2=v_{Max}*\sqrt{(1 - [mG/(r c)]^2)}=v_{Max}*\sqrt{(1–v^2/ c^2)}$ **(78)**
observe that by the triple factorization there is here only one c in power of one (1) exponentiation factor of the constant c in
the innermost parenthesis there is NO square (2) power , except outside in the next level parenthesis on the right side left to the outhermost parenthesis, . Here;
$v/c=[mG/(r c)]^2$ and the "Darkian" , $v = c* [mG/(r c)]^2$ **(79)**
Ordinary Matter (M/OM) , GR:
$v_2 = v_{Max} * \sqrt{(1 - mG/ (r v_{Max}^2))} = v_{Max} * \sqrt{(1 – v^2 / v_{Max}^2)}$ **(80)**
by the double factorization here , there is here one c in power of two (2) exponentiation factor of v_{Max} , in the innermost parenthesis
This is the relativistic rotation velocity or "proper" velocity , here ;
$v_2^2=mG/r$ andKeplerian,$v=\sqrt{ (mG/ r)}$. **(81)**
Example (Dark matter calculation for Milky way)
Using the above formulas with Radius R_0 = 53 280 light years and mean velocity , v = 226 000 m/s ,
Then the Dark matter of Milky way equals:
The mean velocity of the milky way equals about 226 000 m/s,
With a peak velocity of ca 250 000 m/s, now equating the Darkian with
The mean velocity then we have;
$(mG/[rc])^2$=226 000m/s **(82)** And inverting , solving for mass then
$M = \sqrt{(v)} * R_0 * c / G$ = $\sqrt{(226\ 000)} * (53280 * 365 *24 *60 *60) *(2.998 * 10^8)/ [6.67408 * 10^{-11}]$ =

475.4 *53280 * 9.461 * 10^{15} / [6.67408 * 10^{-11}] ≈ 1.1 * 10^{42} kg. ≈ **538.2 * 10^9** ¤ , (**solarmasses)** **(83)**
While for the ordinary matter we use the Keplerian , setting
$mG/[rv_{Max}^2] = 226\ 000$ m/s **(84)**
solving for the ordinary mass m , then ,
$m = [R_0 v_{Max}^2] / G \approx 3.86 * 10^{41}$ kg $\approx 193 * 10^9$ ¤ , (solar masses) **(85)**
Next calculating percent and rounding to integer value , yields in
this example; 35% matter and 65% dark matter. Refs 20, 21, 22, 23.
Example (Dark matter calculation for the giant spiral galaxy UGC 2885)
Dark matter of UGC 2885
Using the above formulas with Radius R_0 = 210 000 light years and mean velocity , v = 425 000 m/s ,
then we get 18.4% matter and 81.6% Dark matter.
No light is emitted when T is less than 2.7 K with the new intensity formula at deep space.

XII. What is 13.77 billion years ?

The distance we travel if we accelerate with 67 km/s/Psc during a time of 14.23 billion years
Is

$$\mathbf{S=v/c= \int a_0\, dt\, /c = G*g*t\, /c^2} \qquad \mathbf{(86)}$$

Now with $t=t_0/2 =13.77*10^9$ years we get

$$\mathbf{S=G*g*t_0/[2*c^2\,]} \approx 14.23 \text{ billion lightyears.} \qquad \mathbf{(87)}$$

So approximately the Universe will reach an expansion velocity of the speed of light c in a time of ca 13.77 billion years
Or to be more precise, 14. 23 billion years, we will have a “Light-Bang”.

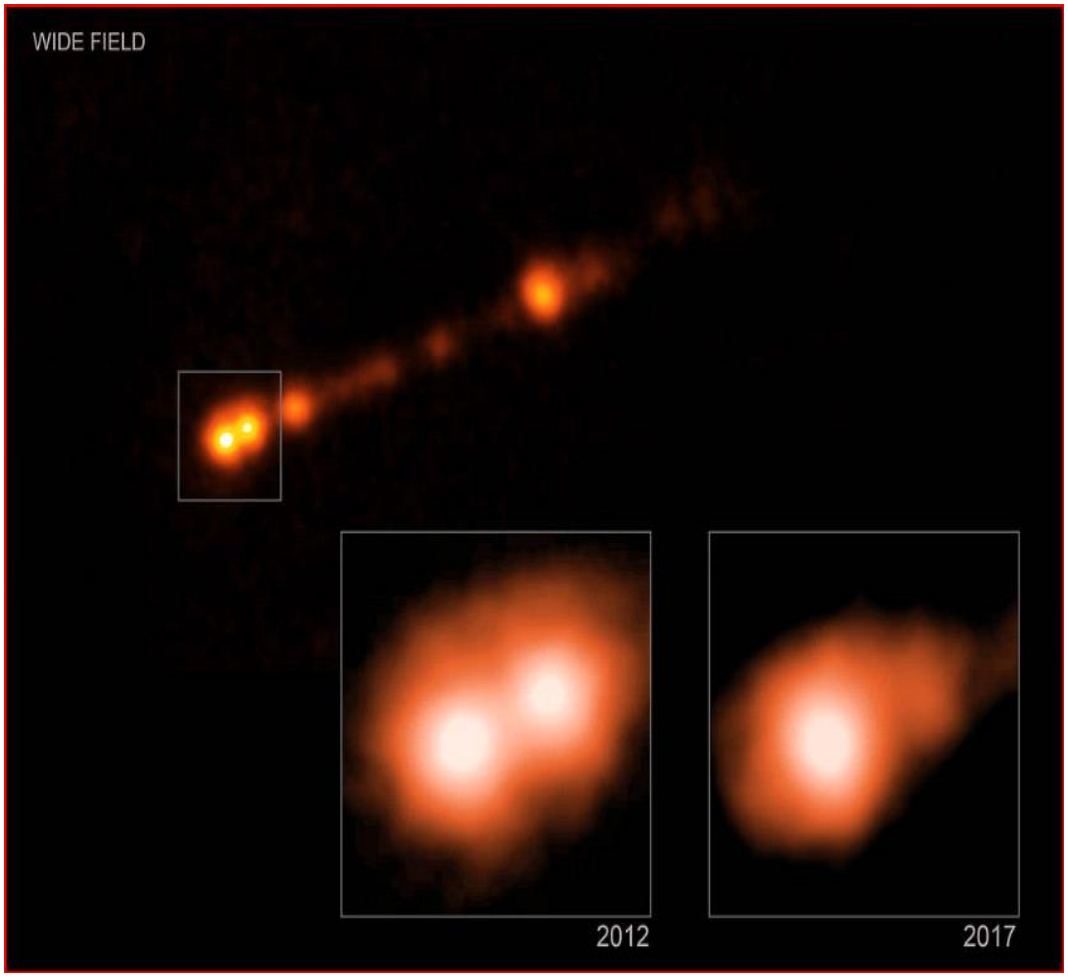

Fig 3 A picture from the Chandra telescope about two X-ray knots located within a jet with speeds 6.3 times the speed of light.

XIII. Discussion

The new intensity formula has shown to be very an important formula i the universe, by creating photons.These photons are also included in all matter and all force carriers. In the sun and stars the formula is responible for the creation of photons and ionization of the plasma by the inverse(photoelectric) formula leading to the creation of the solar wind. The energy spectrum for electrons, ions and protons from the solar wind has similar profiles as the photons, because they are connected in a long ionization process.This formula is also responsible for not seeing optically any black matter below 2.7 K in the deep space.

The DRLE-Laplace equation is very flexible and invariant during translation. Many examples of different systems have been studied using the DRLE-equation. We have used it on galaxies, planets, molecules , atoms and atomic nuclei.Gravitation waves have also been studied with this formula.These waves have been observed as density variations in the galaxies.These waves are also solutions of the DRLE-equation.

It explains that we cannot exceed "the speed of light" , c , here on Earth and in our galaxy , the Milky way because the gravitational field here locally is Elliptic (having positive curvature). The immense gravitation (especially gravitation from a galaxy which contains many hundred billions of stars with the mean size larger

than our Sun) pulling light back more and more when the velocity increases setting a limit (c) to the maximum velocity of any object inside this space.

Our results also further explains why objects and also light can exceed the "speed of light" , c ,inside a Black hole and outside our galaxy because the space away here is Hyperbolic (Negative curvature, or geometric spatially flat).The space is forming a "Horse saddle" shaped "having a shorter path in Space and time" , freeing objects from the immense gravitation of the galaxies. The speeds there can come up to over six (>6 , !!!) times "the speed of light". This can be seen in galaxies at distances of like 40 billion lightyears (only 300 - 500 million years after "Big-Bang") with a speed over 6c and has been observed in big redshifts for these galaxies.

The results can tell us that the velocity that the universe reach with an acceleration of 71.2 Km/s/Mpsc or $2.33 * 10^{-18}$ m/s^2 is our familiar number c, at a time of 13.77 billion years! so the "Big-Bang" seems to be the time when light started to exist and light up the universe. It seems to be is NOT the age of the Universe, it is the time to reach "light speed", c (c = 299792458 m/s). We can think of Big-Bang of something "similar" to a "sound Boom!" , or more exact speaking a Light Boom!

It then helps us to understand that the Universe seems to be older than 13.77 billion years, more closely we get a number of maye more than 20 billion years or up to 28 billion years (depending on how we calculate the half density of the universe, so we can know how large it is).

We have also given a model for the Universe saying that the Universe is LARGER than before thought having a half density distance of ca 55 billion light years radius being like 10 times larger than older calculations say , also explaining why it is so old.

We have also seen that all spiral galaxies (more or less) are Black - Holes , by transferring the formula of black holes into a formula for spiral galaxies and vice versa, this formulas also say that our Space-Time is locally Elliptic.

These results start off by defining a formula for light with mass and then convert this formula into Special Relativity, explaining how light can have "both" , Mass , Velocity and Frequency, (as well as momentum) and the equations for spiral galaxies are actually formulas for light.

The equation for light here the 'Light Tensor' is proven to be equivalent to the Schwartzchild metric Tensor which solves General Relativity and defines gravity.

Followingly we can deduce that gravity is due to the interaction of two particles "running" in opposite direction, the Photon , and the Graviton, their rest-masses can be found.

According to Special Relativity SR explains "dark matter", since in SR and object gets even higher mass when increasing speed , therefore we get the extra mass of galactic rotation, (for Milkyway we get 77% Dark-matter and 23% ordinary matter a mass total of ca 500 billion suns).

When matter gets close enough to a black hole, it enters into a swirling pattern called an accretion disk. Some material from the inner part of the accretion disk falls into the black hole and some of it is redirected away from the black hole in the form of narrow beams, or jets, of material along magnetic field lines. Because this infall process is irregular, the jets are made of clumps or knots that can sometimes be identified by the telescope Chandra other telescopes.

The researchers which used Chandra observations from 2012 and 2017 tracked the motion of two X-ray knots which were located within the jet about 900 and 2,500 light years away from the black hole. The X-ray data shows motion with apparent speeds of 6.3 times the speed of light for the X-ray knot, closer to the black hole and 2.4 times the speed of light, for the other.

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