RELATIVITY ON PLANET ETHERUS

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Summary

This story is an account of the physical phenomena existing on and around a planet Etherus situated in the vicinity of the star Alpha in a distant galaxy. The reader is invited to start the reading in a casual way by only noting the results at the end of each chapter (**in bold style).** If the matter is found interesting, the details can be studied at a later time. The main theme is the special and general theory of relativity with focus on the latter.
A number of test cases have been analyzed with the following assumptions;

Time is seen as absolute.

The universe is filled with an ether.

The velocity of light depends on the gravitational potential.

The results from **part 1 and 2** are in full agreement with accepted values.
However, the notion gravitational red shift is interpreted in a different way and the velocity of light is seen to be different in the "vertical" and "horizontal" directions.

In **part 3** a conceivable picture of a photon is created. With this picture as basis the red shift process is analyzed.

In **part 4** an analogy between electrical and gravitational potential is used to calculate the velocity of light at the surface of the Sun. The velocity of light in the vicinity of Earth is found to be approximately 3 m/s lower than the gravitation free value.

In **part 5** the gravitational field from a moving mass is analyzed. Due to the Doppler effect the form of the field is changed. As a result the" basic" force from a mass M on a mass **m** always points in the direction of M:s position at the time when the field (from M;s earlier position) has reached **m**.

In **part 6** a hypothetical expression for gravitational dipole radiation is created.

In **part 7** calculations are made on a symmetrical binary system with the purpose of identifying the amount of quadrupole radiation. The result turned out to show a power increase in parity with the hypothesis for dipole radiation in part 6. From this the conclusion is drawn that a balanced exchange of energy is taking place between mass and ether. **This exchange of energy is seen as the cause of the gravitational force.**

In **part 8** an explanation of the notions dark matter and dark energy is suggested.

In **part 9** an imaginative picture of a potent electron is created. A possible explanation of the astounding difference between electrical and gravitational forces is given. The potent electron with it´s own force resources is seen to be remotely controlled by an electrical field with a strength of reasonable value. **The net force on a moving electron from a conductor with flowing negative charges (and stationary positive charges) is found to be zero.**
The magnetic force is interpreted as an "angular momentum signal" which changes the direction of the moving electron.

1 Fundamental research on Etherus

By studying radiation from the sky a cosmic background radiation is revealed, coming from all direction. It seems to emanate from a medium at a temperature of 2.7 K. A closer look reveals that the radiation is not 100% uniform. The pattern has a marginal dipole form revealing that the solar system is in motion relative to the background with a velocity of approximately 370 km/s.

1.1 Influence of velocity on matter

The scientists on Etherus have analyzed how a light beam is reflected inside a square mirror frame. If a light beam is made to hit the sides of the frame at 45 degrees an inner (smaller)

square (turned 45 degrees) is formed. With a well polished frame an unchanged light pattern can be observed for a certain time.

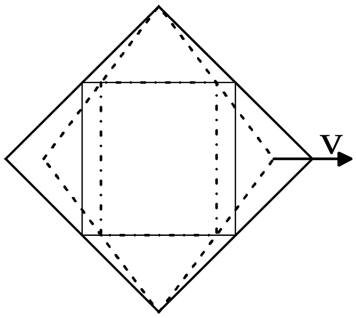


Fig.1.1

A scenario is analyzed, where the frame is set in motion with the velocity v. The sequence of light path directions will then be; (with, at right angle to, against, at right angle to) the direction of the frame motion. With c being the velocity of light in the medium one assumes the corresponding velocities of the light beam relative to the frame to be;

$$c_{rel} = \left(c - v,\ \sqrt{(c^2-v^2)},\ \ c + v,\ \sqrt{(c^2-v^2)}\right)$$

At reflection of the beam against the frame the new beam directions are calculated according to Huygens principal. The consequence of the assumed values of c_{rel} gradually leads to a totally distorted beam pattern. But if the analysis is done assuming that the frame contracts in the direction of motion with the factor $\sqrt{(1 - v^2/ c^2)}$, the order is restored. The final result becomes a rectangular beam path with the round trip time prolonged with the factor $1/\sqrt{(1 - v^2/ c^2)}$, which is recognized as the γ -factor.

The scientists on Etherus draws the conclusions that objects in motion relative to a rest frame contracts, and that every physical process is prolonged with the factor γ.

For a detailed description of the scenario see Appendix 1

1.2 The relative velocity of light

In order to verify the conclusions drawn above a new experiment is contemplated as follows. A signal from a fixed light source is deflected by means of half mirrors against photocells A and B with distance 2L apart. The output signals from these are used as start and stop signals for a timer C half way between the photocells as seen in Fig. 1.2 below.

If the light hits A at time 0, start and stop times will be; $t1 = t_{A\text{-sign}}$ resp. $t_2 = t_{light} + t_{B\text{-sign}}$. The true time interval dt becomes; $t2 - t1 = t_{light} + t_{B\text{-sign}} - t_{A\text{-sign}}$. With the measuring table at rest we get; dt = 2L/c + L/c -L/c = 2L/c. This time interval is denoted T.

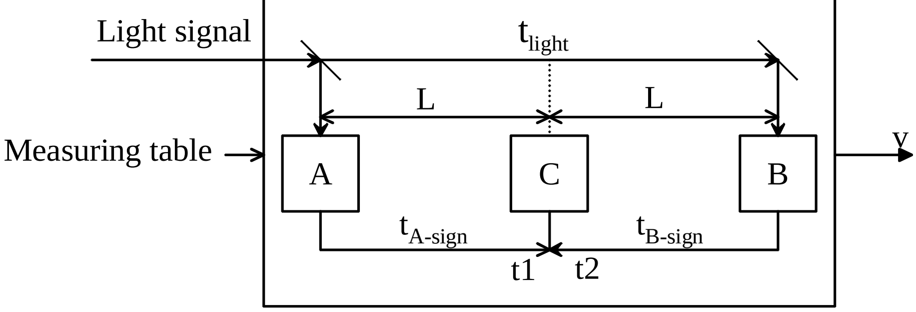


Fig.1.2

If the measuring table is given a velocity v, data according to the table below is expected. Light and signal velocities are given as velocities relative to the table. Lengths and registered times are corrected to reflect the velocity dependence according to the previous part.

Velocity	Dim. L	t_{light}	$t_{A\text{-}sign}$	$t_{B\text{-}sign}$	$dt = t_2 - t_1$	$dt_{reg} = dt/\gamma$
0	L	2L/c	L/c	L/c	2L/c = T	T
v	L/γ	2L/γ(c-v)	L/γ(c-v)	L/γ(c+v)	2Lγ/c = γT	T
-v	L/γ	2L/γ(c+v)	L/γ(c+v)	L/γ(c-v)	2Lγ/c = γT	T

The scenario shows that the velocity of light relative to an observer seemingly becomes independent of the velocity of the observer**. For the true relative velocity of light though, completely logical relations are valid.**

Remark. It has been argued that an experiment performed by the scientists Kennedy and Thorndike should overthrow the explanation of Michelson-Morley´s null-result as a consequence of relativistic length contraction. **This statement is completely wrong.** If consideration is taken to the frequency dependence of the light source on velocity during the measurement, their argument falls to the ground.

1.3 Energy for a particle in motion

To investigate how the energy of a particle in motion is affected by its velocity the following scenario is analyzed.
A light source with the frequency f_0 illuminates a mass m_0 with reflexive properties. The light consists of a stream of photons with energy $E = h\ f_0$ and momentum $P = E/c$. For the mass particle we have; $E_m = m\ c^2$ and $P_m = m\ v$:
At reflection against the mass, part of the photon energy and momentum is transferred to the mass causing it to start moving with an increasing velocity v. This velocity results in a doppler shift of the incoming photons to the frequency $f_1 = f_0(1-v/c)$.
At reflection the photons are subjected to a further doppler shift caused by the receding velocity of the mass to the frequency $f_2 = f_1/(1+v/c) = f_0(1-v/c)/(1+v/c)$
The photon suffers an energy loss $dE = h\ (f_0 – f_2) = E\ (1-f_2/f_0)$.
Energy conservation demands that this energy is transferred to the mass as $dE_m = dm\ c^2$.
Further, the change of photon momentum $dP = (1+ f_2/f_0)\ E/c$ must equal $dP_m = dm\, v + m\, dv$

Thus; $f_2 = f_0\,(1\text{-}v/c)\,/\,(1\text{+}v/c)$ $\quad E\ (1\text{-}\ f_2\,/\,f_0) = dm\, c^2$ $\quad (1\text{+}\ f_2\,/\,f_0)\ E\,/\,c = dm\, v + m\, dv$

Elimination of E from the equations above gives; $(dm\,/\,dv)\,/\,m = v\,/\,(c^2 - v^2)$

with the solution; $m = m_0\,/\,\sqrt{(1\text{-}\ v^2\,/\,c^2)} = \gamma\ m_0$ **Thus;** $\mathbf{E_m = \gamma\ m_0\, c^2}$

The energy can be rewritten in a very seductive form as;

$$\mathbf{E_m = m_0\, c^2\,/\,\gamma + \gamma\, m_0\, v^2}$$

A possible interpretation of this relationship is that the first term could be seen as the rest energy of the mass imbedded in a pattern of motion with the velocity v. The second term should then represent the energy content of this pattern of motion.

2 Gravitation and the velocity of light

2.1 Introduction

The photon is regarded as a particle without mass with energy $E = h\ \nu$. If m is seen as the “relativistic mass” the energy could be written; $E = m\ c^2$ and the momentum; $P = m\ c$.
The energy of a photon is considered to be reduced by red shift if it travels in a direction away from a gravitating mass. The reverse, energy increase by blue shift, is said to be at hand if the direction of motion is towards the gravitating source. The scientists on Etherus interpret the phenomena in another way. The measured red shift is considered to reveal the fact that the

energy of an emitting body at rest close to a gravitating source is lower than corresponding energy for a body at a greater distance.

Energy and magnitude of momentum for a photon are both seen to be preserved at a continuous passage through a gravitational field.

Energy and momentum for a photon in an environment without gravity can be written;

$$E_0 = m_0\, c_0^2 \qquad |\, P_0\,| = m_0\, c_0$$

If velocity v and mass m are influenced by gravity the following equations must be satisfied.

$$E = m_0\, c_0^2 = m\, c^2 \qquad |\, P\,| = m_0\, c_0 = m\, v$$

These relations result in: $m = m_0\, c_0^2 / c^2$ and $v = c^2 / c_0$

where c is seen as a function the gravitational potential.

The mass increase as c_0^2 / c^2 can be divided into two terms as: $c_0 / c \times c_0 / c$.

The first term is seen to reflect a real mass increase caused by a greater ether density. The second term is seen as a dynamic effect caused by the photon passing through an inhomogeneous medium. (compare the relativistic increase of mass for a body in free fall). If the free fall of the body (or photon) is halted (localization) the energy will be reduced as;

$$\mathbf{E = m_0\, (c_0 / c \times c_0 / c) \times c^2 \Rightarrow m_0\, (c_0 / c) \times c^2 = m_0\, c_0\, c}$$

2.2 C as function of the gravitational potential

If the conclusions drawn in part 2.1 concerning energy and mass content for a "localized" photon were extended to hold for bodies with mass the following must be valid;

$E = m\, c^2 = m_0\, c_0\, c = m_E \times c_0^2$ where $m_E = m_0 \times c / c_0$ gives an unambiguous measure of the energy. For the inertial (heavy) mass we have; $m_i = m_0\, c_0 / c$

The force of gravity on a mass at rest is dE/dr where r is the distance to the source of gravity. $F = dE / dr = m_0\, c_0\, dc / dr$, to be compared with the normal expression $m\, M\, G / r^2$ where m stands for the inertial mass $\mathbf{m_i}$.

$$F = m_0\, c_0\, dc / dr = \mathbf{m_i} \times M\, G / r^2, \quad \text{gives}, \quad c\, dc / dr = M\, G / r^2$$

Integration gives the result: $c = c_0 \sqrt{1 - \frac{2MG}{c_0^2 r}}$

The expression for c suggests that the velocity unavoidably goes to zero at the so called Schwarzschild radius. The phenomenon is well known as a black hole with very remarkable properties. At second thought the word unavoidable could be avoided if one realizes that the gravitating mass "M" must represent the energy content. M can be thought of as a sum of many particles with a gravitation free origin denoted M_{00}. When joined into one unit, c will be reduced to some representative value c_M and the rest energy becomes; $E = M_{00}\, c_0\, c_M$. The energy equivalent of this mass is; $M_E = E/c_0^2 = M_{00}\, c_M/c_0$.

If M in the expression for c above is replaced by M_E we get;

$$c = c_0 \sqrt{1 - \frac{2M_E G}{c_0^2 r}} = c_0 \sqrt{1 - \frac{2M_{00} G\, c_M}{c_0^3\, r}}$$

The conclusion of the reasoning is that as the mass content increases the speed of light c_M goes down and so does the ability of the mass to influence the speed of light.

The sequence becomes self limiting and c can not become zero as long as the radius r remains finite.

Remark. See though the reasoning about supernova in part 3.4.

2.3 Defection of light in a gravitational field

To investigate how light is deflected in a gravitational field a hypothetical experiment is analyzed. Two very high vertical ideal mirrors are thought to be raised from the surface of Etherus. An originally “horizontal” light beam is captured between the upper ends of the mirrors where gravity is so small that it can be ignored. Due to the vertical gradient of c the light beam is deflected with an increasing angle α towards the gravitating mass. See Fig. 2.1

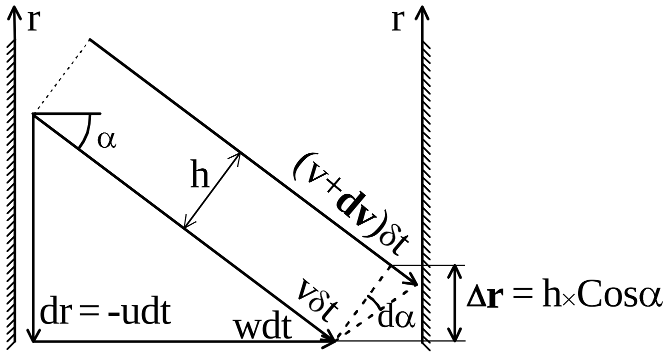


Fig.2.1

With the velocity vector v separated into a vertical and a horizontal component; u resp. w we get; $u = v\,\mathrm{Sin}\alpha$ $\quad \mathbf{dv} = \delta v / \delta r \times \mathbf{\Delta r} = \delta v / \delta r \times h\,\mathrm{Cos}\alpha$ $\quad u = -\,\delta r / \delta t$

$$\mathbf{d\alpha} = \mathbf{dv}\,\delta t / h = \delta v / \delta r \times h\,\mathrm{Cos}\alpha \times \delta t / h = \delta v / \delta r \times \mathrm{Cos}\alpha \times \delta t \;\mathbf{= -\,\delta v\,Cos\alpha / u}$$

Differentiation of; $u = v\,\mathrm{Sin}\alpha$ gives; $du = dv\,\mathrm{Sin}\alpha + v\,\mathrm{Cos}\alpha\,d\alpha$

With $\mathbf{d\alpha}$ as above and, $\mathrm{Sin}\alpha = u / v$ and $\mathrm{Cos}\alpha^2 = 1 - u^2 / v^2$ we get; $du = dv\,(2u/v - v/u)$

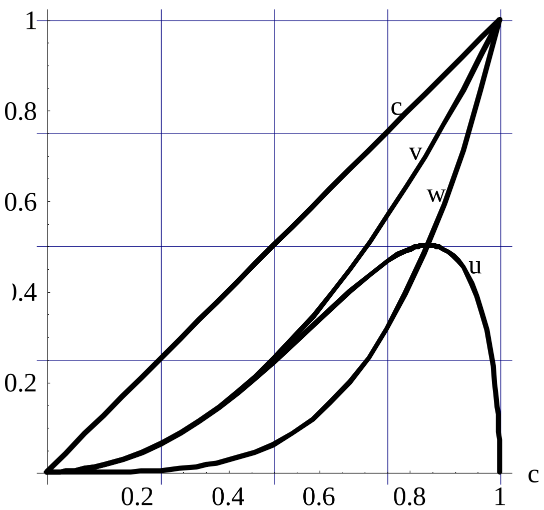
The solution to this diff. equation is: $u = v\,\sqrt{(1 - v^2/c_0^2)}$

The demand for energy and momentum conservation gave earlier; $v = c^2/c_0$.

Thus; $u = c^2/c_0\,\sqrt{(1 - c^4/c_0^4)}$ and thus; $w = \sqrt{(v^2 - u^2)} = c^4/c_0^3$

The velocities v, u, w, are shown in the figure below as a function the normalized local velocity of light c.

Fig.2.2



For a vertical photon the force of gravity is; $F_g = dP/dt = v\,dm/dt + m\,dv/dt = 0$.

2.4 Deflection of light at the Sun

A calculation of this effect is done assuming that energy and magnitude of momentum for the photons remains constant. The notions used can be seen in the figure below.
The marginal difference of light speed at the upper and lower part of the light beam causes a small deflection towards the Sun.

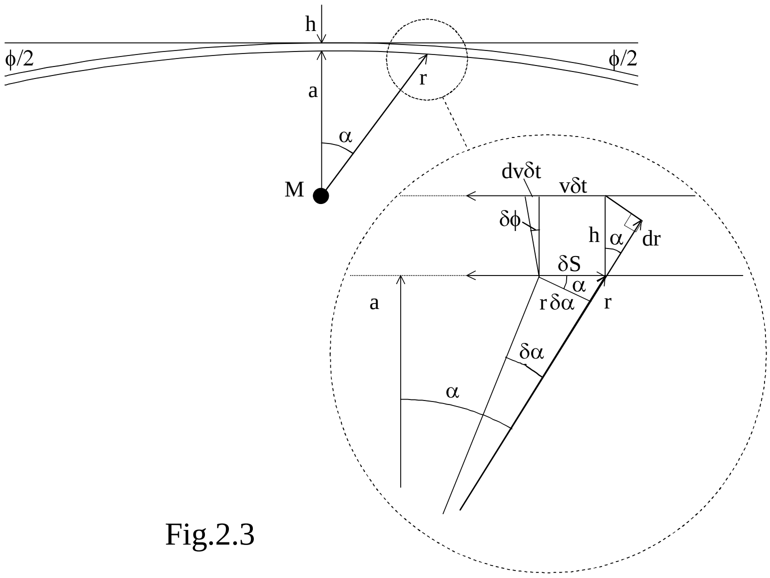


Fig.2.3

The following relations apply;

$r = \frac{a}{Cos\alpha}$; $\quad dr = h\, Cos\alpha$; $\quad dS = \frac{r\, d\alpha}{Cos\alpha} = v\, dt$; $\quad dt = \frac{r\, d\alpha}{v\, Cos\alpha} = \frac{a\, d\alpha}{v\, Cos\alpha^2}$;

$$d\varphi = \frac{dv\, dt}{h} = \frac{dv\, dr}{dr\, h} dt = \frac{dv}{dr}\, \frac{a\, d\alpha}{v\, Cos\alpha}$$

With; $c = c_0\sqrt{1 - \frac{2MG}{c_0^2 r}}$, $\quad v = c^2/c_0$, $\quad dv/dr = dv/d\alpha \times d\alpha/dr$

we get; $$d\varphi = \frac{2MG\, Cos\alpha}{c_0^2\, a - 2MG\, Cos\alpha} d\alpha$$

This expression can be simplified with an error margin of 3 ppm as;

$d\varphi = \frac{2MG\, Cos\alpha}{c_0^2 a} d\alpha$ The total deflection is given as; $\varphi = \int_{-\pi/2}^{\pi/2} d\varphi = \frac{4MG}{c_0^2 a}$

With data; $M = 1{,}989\ 10^{30}$ $\quad G = 6{,}6742\ 10^{-11}$ $\quad a = 6{,}96\ 10^{8}$ $\quad c_0 = 299792458$

φ becomes; $8{,}48874\ 10^{-6}$ radians = **1,75093 arc seconds.**
The result is in full agreement with the value according to theory of relativity.

2.5 Radar measurements towards Venus

The time delay for radar echoes against Venus have been carefully monitored for an extended period of time. The time delay is found to be influenced by the proximity of the signal path to the Sun. With knowledge of the orbit data for Earth and Venus the anticipated time delay can be calculated. The difference between anticipated and measured time delays has been monitored for a period of 2 years.
Below follows calculations with the assumptions that energy and magnitude of momentum for the "radar photons" are preserved. Notions are defined in Fig. 2.4 (Jord, Sol means Earth, Sun).

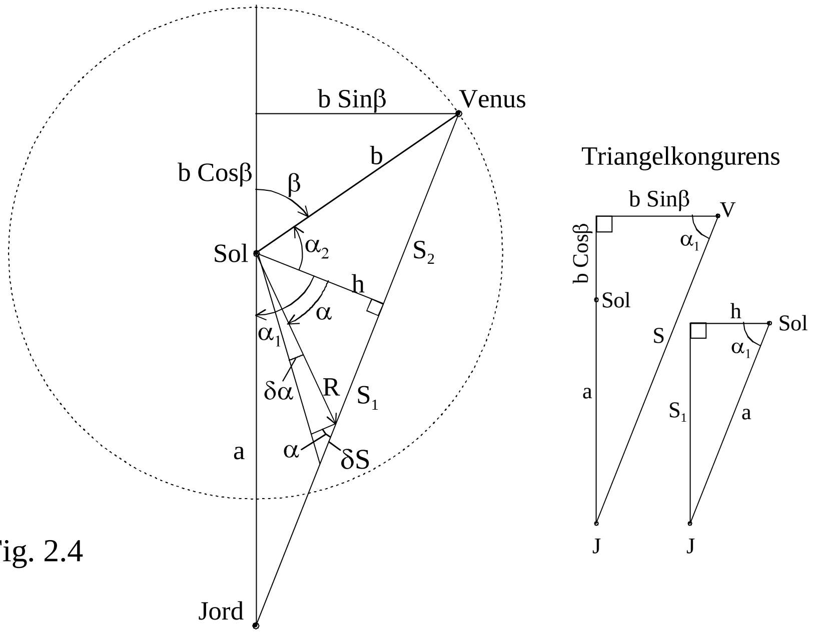


Fig. 2.4

The following relations hold:

$$S = S_1 + S_2 = \sqrt{(a + b\ Cos\beta)^2 + (b\ Sin\beta)^2} = \sqrt{a^2 + b^2 + 2ab\ Cos\beta}$$

$$R = h/Cos\alpha \qquad \delta S = R\,\delta\alpha/Cos\alpha = h\,\delta\alpha/Cos^2\alpha = v\,\delta t$$

which gives; $\delta t = h\,\delta\alpha/(v\,Cos^2\alpha)$; With; $c = c_0\sqrt{(1 - 2MG/c_0^2\, r)}$ and $v = c^2/c_0$ We get;

$$\delta t = \frac{\delta\alpha\ h}{c_0(1 - \frac{2MG\ Cos\alpha}{c_0^2 h})Cos\alpha^2} \approx \frac{\delta\alpha\ h}{c_0 Cos\alpha^2}(1 + \frac{2MG\ Cos\alpha}{c_0^2 h})$$

The difference δt_{diff} between time increments with resp. without gravitating mass M becomes;

$\delta t_{diff} = 2\,\delta\alpha\, MG/(c_0^3\, Cos\,\alpha)$; Integration gives; $t_{diff}[\alpha] = 4\,MG\ ArcTanh\,[Tan\,[\alpha/2]]\,/c_0^3$

The limits for integration are; $\alpha_1 = ArcCos\,[b\,Sin\beta/S]$ $\alpha 2 = -(\pi - \beta - \alpha 1)$

The time diff. to and from Venus, as a function of β becomes; $dt\,[\beta] = 2(tdiff\,[\alpha_1] - t_{diff}\,[\alpha_2])$

Valid data are; $a = 1.496\ 10^{11}$, $b = 1.082\ 10^{11}$, $M = 1.99\ 10^{30}$, $G = 6.674\ 10^{-11}$, $c_0 = 3\ 10^8$

The angle β can be replaced with the number of days from opposition:

$\beta = 2\ Pi\ (1/year_{Venus} - 1/year_{earth}) \times day = 2Pi\ (1/224.7 - 1/365.2) \times day$
The result dt [day] is shown in Fig.2.5 starting at day 2.5. At day 292 Venus is at a position in front of the Sun.

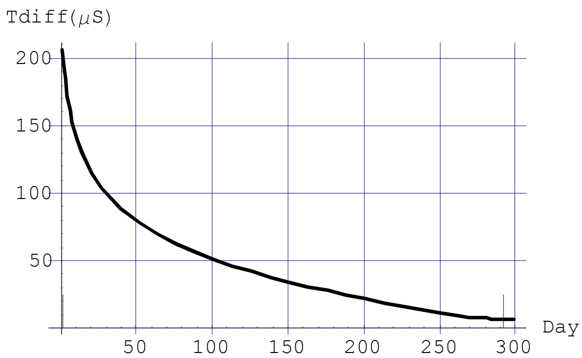


Fig. 2.5

The result is in full agreement with measured data.

2.6 Velocity for a mass in free fall

According to the previous the energy of a photon in "free fall" from infinity can be written;

$$E_{photon} = m_0 (c_0/c \times c_0/c)\, c^2 = m_0 c_0^2$$

The mass increase with the two quota c_0/c was ascribed to a static resp. dynamic consequence of the ether density becoming greater. Corresponding energy description for a mass particle in free fall from infinity, comprising the sum of potential and kinetic energies is;

$$E_{mass} = (m_0\, c_0/c \times \gamma_m)\, c^2 = m_0\, c_0^2, \qquad \text{which means;} \quad \gamma_m = c_0 / c$$

Do observe that the quotient v^2/c^2 in the expression for γ_m has to be divided into a tangential and a radial component reflecting the different speeds of light in resp. direction. The tangential and the radial components becomes; v_φ^2/c^2 resp. $v_r^2/c^4/c_0^2$.

Thus; $$\gamma_m = \frac{1}{\sqrt{1-\frac{v_\varphi^2}{c^2}-\frac{v_r^2}{c^4/c_0^2}}} = \frac{c_0}{c}$$

If v_φ is set to zero (and $v_r = v_m$) in the expression above, the vertical velocity for a particle in free fall from infinity is obtained as; $v_m = \frac{c^2}{c_0}\sqrt{1-\frac{c^2}{c_0^2}}$

The result can be compared to the corresponding velocity u for a photon captured between the mirrors in part 2.3. $$u = \frac{c^2}{c_0}\sqrt{1-\frac{c^4}{c_0^4}}$$

All velocities treated in part 2 are shown below in Fig. 2.6 as a function of the local velocity of light c.

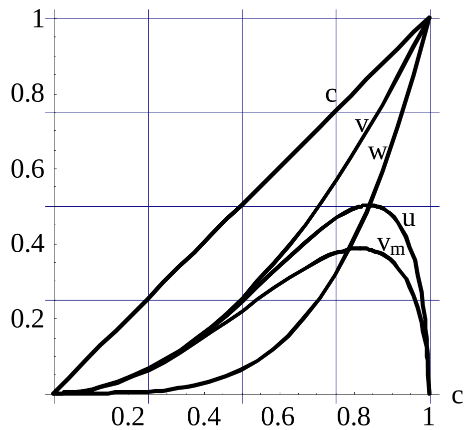


Fig. 2.6

A comparison of the force of gravity on the hypothetical photons captured between the mirrors in part 2.2 with the force on a mass particle gives the following result.

The general expression for the force is; $F = \frac{d(mv)}{dt} = \frac{dm}{dt}v + m\frac{dv}{dt} = (\frac{dm}{dc}v + m\frac{dv}{dc})\frac{dc}{dr}\frac{dr}{dt}$

As the purpose of the calculation is restricted to a comparison, the following simplifications can be made; $c0 = M = G = 1$, $m = 1/c^2$, $c = \sqrt{(1-2/r)}$, $u = c^2\sqrt{(1-c^4)}$, $v_m = c^2\sqrt{(1-c^2)}$, $r = 2/(1-c^2)$.

For the photon we have; $v = u$ och $dr/dt = -u$, for the mass; $v = v_m$ and $dr/dt = -v_m$

The force on the photon becomes; $c^4 (1-c^2)^2 / 2$ and the force on the mass; $c^2 (1-c^2)^2 / 4$

The normalized force quotient; **F_{photon} / F_{mass} becomes; $2\ c^2$.** With a reasonable level of gravitation this quotient becomes 2, in accordance with the accepted value.

2.7 Perihelion shift for Mercury

A numerical calculation of the perihelion shift for Mercury is done with notions according to the table below.

Notion	Relation / Data	Remark
M	$1.98843\ 10^{30}$ kg	Mass of Sun
G	$6.6739\ 10^{-11}$	Gravitational constant
a	$579\ 10^{8}$ m	Half major axis of Mercury
e	$2056\ 10^{-4}$	Orbit eccentricity
r		Distance Sun – Mercury
r1	a(1-e)	Min. orbit radius
r2	a(1+e)	Max. orbit radius
m_0		Gravitation free rest mass of Mercury
m_{0r}	$m_0\, c_0 / c$	Rest mass of Mercury at the orbit position
c_0 [1)]	299792458 m/s	Velocity of light at infinity
c	$c_0 \sqrt{(1-2MG/c_0^2 r)}$	Velocity of light at Mercury
v_r		Radial velocity
v_φ	($\varphi = 0$ @ r = r1)	Tangential velocity
γ	$1/\sqrt{(1-v_\varphi^2/c^2 - v_r^2 c_0^2/c^4)}$	v_φ and v_r are related to c resp. c^2/c_0
E	$\gamma\, m_{0r}\, c^2 = k_E\, m_0$	Energy (constant)
L	$\gamma\, m_{0r}\, v_\varphi\, r = k_L\, m_0$	Angular momentum (constant)

[1)] Value according to NIST. A completely grav. free value c_{00} probably is appr. 3 m/s higher.

Putting the relations for m_{0r} and γ into the equations for E and L gives the velocities;

$$v_\varphi = c^2 k_L / k_E r \qquad v_r = c^2 \sqrt{(k_E^2 r^2 - c^2 k_L^2 - c^2 c_0^2 r^2)} / (c_0 k_E r)$$

The constants k_E and k_L are obtained by solving the equations; $v_{r1} = 0$, $v_{r2} = 0$, with data for; (r_1, c_1) resp. (r_2, c_2). The solution is;

$$k_E = 8.98755167277\times10^{16} \qquad k_L = 2.71272355078\times10^{15}$$

With the values for k_E and k_L inserted into the relations for v_φ and v_r the numerical result becomes; $v_{\varphi1} = 58977.684273524$ and $v_{\varphi2} = 38861.872439337$

With the help of the relations; $v_r = dr/dt$ and $v_\varphi = r\, d\varphi/dt$ we get: $d\varphi/dr = v_\varphi /(r\, v_r)$.

A numerical integration of $d\varphi/dr$ between the limits r1 and r2 yields;

$$\Delta\varphi = Pi + 2.5095666657\times10^{-7} \text{ radians per half orbit.}$$

Sidereal period for Mercury is; 0.24085 tropical years implying 415.19618 rev. per 100 years. The turning of the major axis expressed in arcsec per 100 years becomes;

$$2 \times 2.5095666657\times10^{-7} \times 180/Pi \times 3600 \times 415.19618 = \mathbf{42.984.}$$

The result can be compared with the value 42.98 according to C. M. Will.

A comparison of the velocities and angles with corresponding values for a non relativistic system indicated with N, reveals where in the orbit the turning effect takes place. Fig.2.7 shows the relative differences between the velocities; $(v_\varphi - v_{\varphi N}) / v_{\varphi N}$ and $(v_r - v_{rN}) / v_{rN}$.
It is obvious that the radial difference is considerably greater than the tangential. While the latter changes sign during the orbit, the radial difference has the same sign during the whole orbit.

Fig.2.8 shows the relative angle differentials (dφ - dφ$_N$) /dφ$_N$. Surprisingly the turning effect is seen to be approximately constant during the whole orbit.

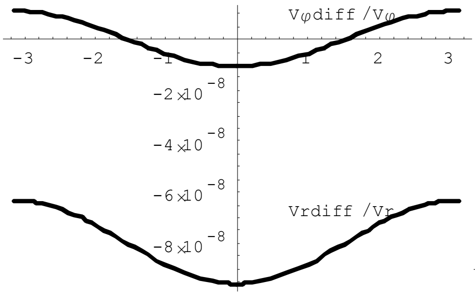


Fig.2.7

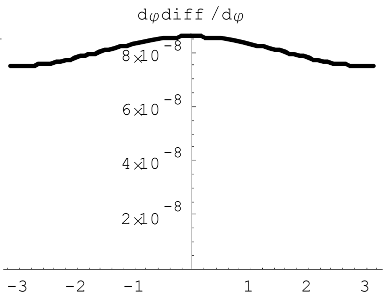


Fig.2.8

3 Speculations about the photon

3.1 How does a photon look like?

The electromagnetic force is seen to be mediated by photons. In order to explain the existence of both positive and negative force fields one have to accept the existence of both "plus" and "minus"- photons. A natural picture of an <u>optical</u> photon were to see it as combination of circular polarized "plus" and "minus"- photons, each with the energy of $mc^2/2$.
The sense of rotation (Right or Left) determines the polarity of field components.
One single photon must consist of a number of "photon embryos" witch together make up the frequency of the photon.
The simplest picture of this "photon embryo" were to see it as a punch into the ether visualized as two elliptical vortex rings (with opposite sense of rotation). which without losses travel through the ether. These counter rotating elliptical vortex rings result in a linearly polarized E-field.

3.2 How does a photon behave?

In order to account for the energy content of the proposed photon, consideration have to be taken to both longitudinal and transverse energy components. The energy of the proposed photon could be written:

$$E = E_{long.} + E_{trans.} = \frac{m_0 c_0^2}{2} + \frac{m_0 c_0^2}{2}$$

The mass m_0 could be seen as the mass of the whole photon alt. of the photon embryo.
With the aim of simplifying the description in words and in the figures a hopefully equivalent energy system is depicted in Fig. 3.2. Here the energy transport is in the form of an axial symmetric system consisting of a ring-formed radially oscillating mass m with axial velocity v. The rms value of the transvers velocity is denoted $\mathbf{v_q}$.

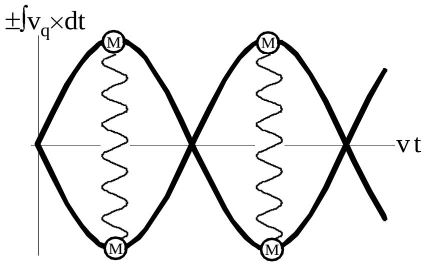


Fig.3.2

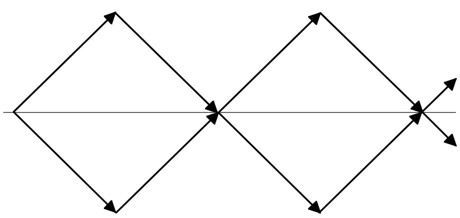


Fig.3.3

In Fig. 3.3 the time sequence is depicted with help of vector arrows representing the sum of v_q and v.

The energy of the system becomes; $E = m(\frac{v^2}{2} + \frac{v_q^2}{2})$.
In an environment without gravity we have; m = m_0 and v = v_q = c_0
According to the demand (in part 2) for the preservation of E and ∣P∣, the velocity of light v will be reduced to; c^2 / c_0 and mass will increase as; $m_0 \, c_0^2 / c^2$, where c is the local velocity of light.
The resulting energy equation becomes;

$$E = m_0 c_0^2 = m_0 \frac{c_0^2}{c^2} (\frac{c^4/c_0^2}{2} + \frac{v_q^2}{2}) \qquad \text{Which gives; } v_q = c\sqrt{2 - \frac{c^2}{c_0^2}}$$

The velocity components for a photon traveling from infinity towards a “black hole” are shown (normalized) in Fig. 3.4. It shows that $\mathbf{v_q}$ all the way is greater than the local velocity of light c. The situation close to zero could be described with the phrase “march in place”.

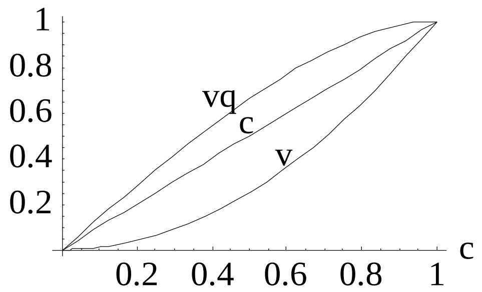


Fig.3.4

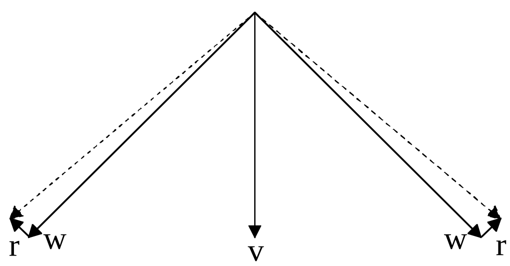


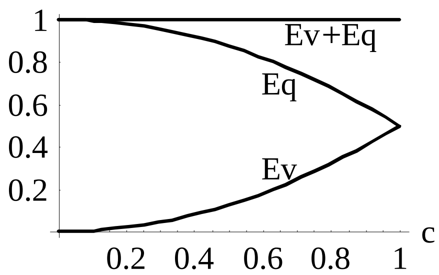
Fig.3.5

Fig. 3.5 indicates that vector sum; $w = \sqrt{v^2 + v_q^2}$ continously is subjected to reflexions during the passage down towards a denser ether medim. The phenomenon is well known in electrical contexts in conjunction with changes of the characteristic impedance.
The energy can be separated in two components as;

$$E_v = m_0 \frac{c_0^2}{c^2} \frac{v^2}{2} \qquad \text{and} \qquad E_q = m_0 \frac{c_0^2}{c^2} \frac{v_q^2}{2}$$

The energy components are shown in Fig.3.6 as a function of the local velocity of light c.

Fig. 3.6



The energy can be written in the form; $E = m_0 \frac{c_0}{c} \times \gamma_{photon} \times c^2$ with $\gamma_{photon} = \frac{c_0}{c}$
So far, only the process at the passage down towards a gravitating mass have been treated. In the following an attempt is made to describe a combined course of events.

In Fig.3.8 a photon is shown starting from infinity at A passing down towards a gravitational potential with the local velocity of light $c_0/2$ at B. The c-gradient during the down-path causes the form of the photon to change from a symmetrical to a contracted form. By reflections at the points B and C the direction is changed 90°.

Between the points B and C the form is assumed to successively become symmetrical during a time sequence with an unknown time constant. During this ”normalization-process” the photon must increase it´s speed from v = c^2/c0 to the local velocity of light c. In this process the photon loses part of it´s energy corresponding to the factor γ_{photon} (in analogy with the energy reduction at the braking of a free fall of a mass). The sequence is sketched in Fig.3.7.

A suitable metaphor would be to look at the photon at point B as a compressed spring. As the compressing force reduces, the length of the spring will increase, and the energy content of the photon will be decreased (in this case to the half value). The frequency (periods per sek.) and momentum remains constant to the end at pos. C. The wavelength will be a direct function of the velocity v onwards to pos. C.

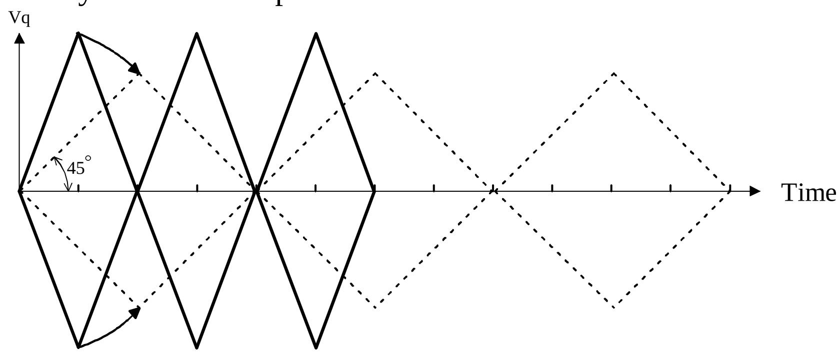
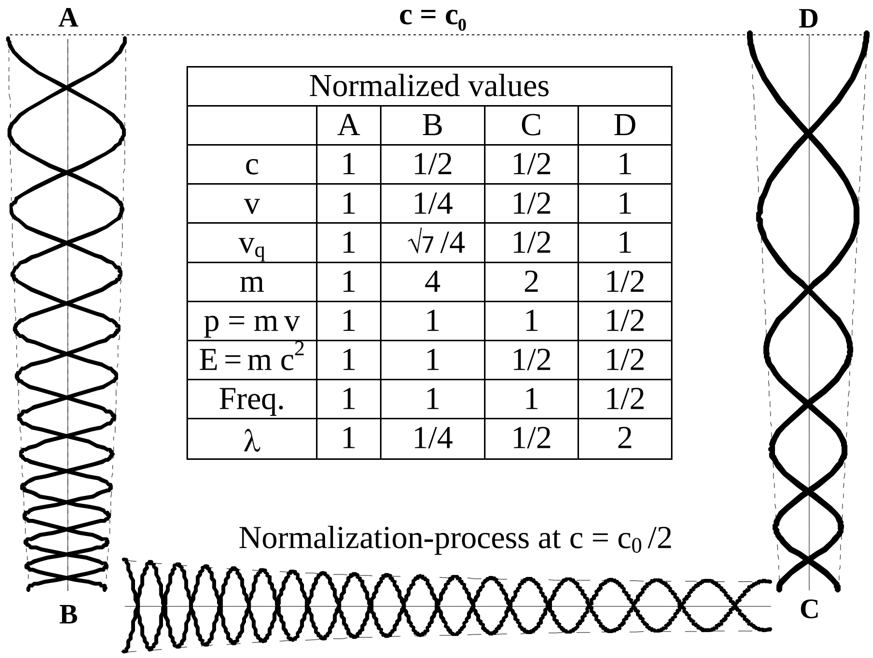


Fig. 3.7

During the passage from C to D (from $c_0/2$ to c_0) the energy remains constant.
The energy in point D will thus be half the original value at the starting point A
This demands that the frequency must be reduced accordingly and that the wavelength becomes doubled. The momentum will be reduced to half it´s original value.



Normalized values				
	A	B	C	D
c	1	1/2	1/2	1
v	1	1/4	1/2	1
v_q	1	$\sqrt{7}/4$	1/2	1
m	1	4	2	1/2
p = m v	1	1	1	1/2
$E = m c^2$	1	1	1/2	1/2
Freq.	1	1	1	1/2
λ	1	1/4	1/2	2

Fig. 3.8

Fig.3.9 below shows the velocity components v and v_q during the passage from A to B. Corresponding values for the return passage from C to D are shown in Fig.3.10.

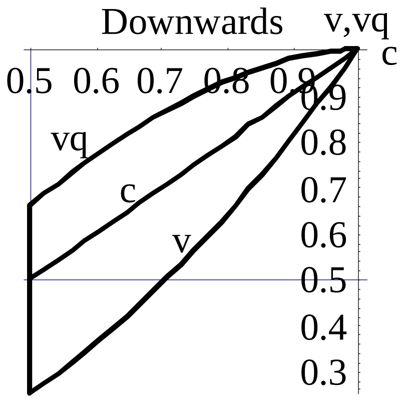


Fig.3.9

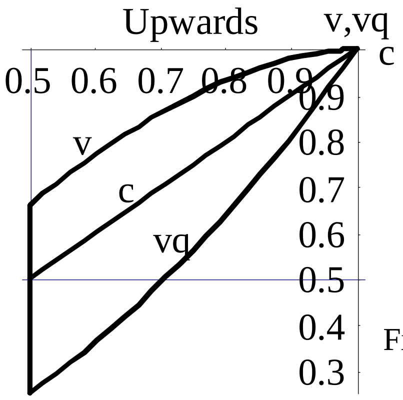


Fig.3.10

If the reasoning concerning energy losses between the points B and C is applied to photons coming from distant galaxies an alternative explanation could be given to the minimal fluctuations in the cosmic background radiation. Photons coming from great distances must be seen passing in and out of “gravitational wells” numerous times.

3.3 Interference pattern at a Double slit experiment

If a light source is illuminating a screen with two tiny holes **a** and **b** close together, an interference pattern is created behind the screen. If the light flux through each hole is set to be 1%, the result in the direction where the amplitudes add up (same phases) ought to become 2%, and in directions where the phases are opposite 0%. In reality the result becomes 4% resp. 0%? How can one explain that 1% plus 1% becomes 4%?
The scientists on Etherus have read Richard Feynmans book "QED the strange theory of light and matter", where he elaborates with a concept he calls amplitudes. His only motivation for these amplitudes is that when squaring them one obtain the probability for the event in question.
A possible explanation for the interference result is (according to part 3.1) to see the complete photon as composed of circular polarized "**R**ight" and "**L**eft" - components.
Behind the screen then the components **aR, aL, bR, bL** should exist, each with a "Feynman-amplitude" of 0.1. The interference result in the maximum direction could be written as:
aR*aL + **bR*bL** + **aR*bL** + **bR*aL** = 1% +1% + 1% + 1% = 4%

3.4 Form distortion, an alternative to curved space

Experiments done with a laser oriented first in a horizontal and then in a vertical direction have shown that the laser frequency is independent of the orientation. From this the conclusion has been drawn that the speed of light is the same in all directions**. But if all dimensions of the laser changes in accordance with the speed of light, then the conclusion will be false.**
As a consequence of the radial velocities (v_{down} resp. v_{up}) being different from the horizontal velocity (c) an originally spherical body will shrink more in the radial than in the horizontal direction as the distance from a gravitating source decreases. Resulting **static** form for a sphere as a function of c is shown in the figure 3.11 below.

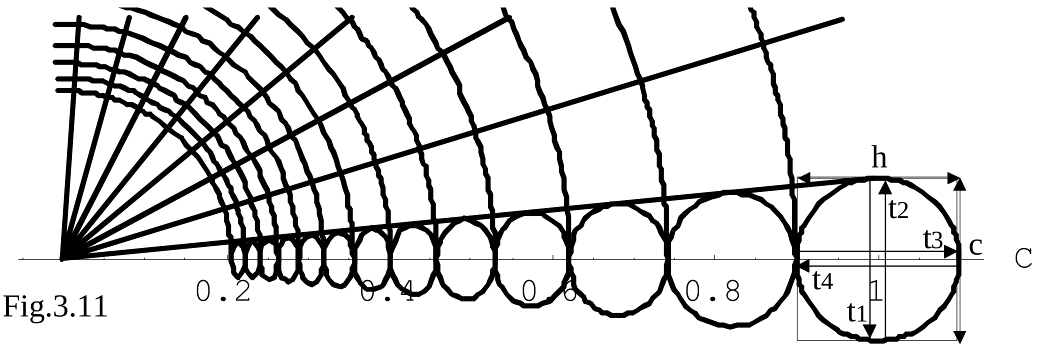


Fig.3.11

Calculation of the form dimensions is made with the assumption that the normalized round-trip times for light, t1 + t2 resp. t3 + t4, should be the same.
With; $c_{Down} = c^2/c_0$ and $c_{Up} = c_q$ (as calculated above for the down-path) and $c_0 = 1$ we get:
$T_{Hor} = t1 + t2 = c/c + c/c = 2$ $T_{Vert} = t3 + t4 = h/c_{Upp} + h/c_{Down} = h/c_q + h/c^2$
Equating T_{Hor} with T_{vert} gives the following form factor;

$$\frac{h}{c} = \frac{2c\sqrt{2-c^2}}{c+\sqrt{2-c^2}}$$

The amount of shrinkage could be a decisive factor at the outbreak of a supernova. The explanation given for this avalanche-like scenario is said to be that the star runs out of nuclear fuel. It seems a little bit strange thought that things could develop in the dramatic way they do. The course of events seem to be governed by positive feedback.
One hypothesis on Etherus is that the situation becomes instable if the mass surpasses a critical value. If the mass content of a body is doubled, this would normally result in a doubling of the volume (if the density remains constant). The expected volume-increase will be reduced though due to the influence of the greater gravitating mass on the local velocity of light c as indicated in Fig.3.11. If mass is increased to a critical value the expected volume-increase will not occur. If further mass is added the reverse phenomenon will occur. The volume shrinks, thus lowering the value of c, thus reducing the volume, and so on and on. The situation is now governed by positive feedback.

4 An analogy between electrical potential and the velocity of light

4.1 Introduction

According to the previous there is a connection between the notions; velocity of light, mass and gravitation. Many gravitational phenomena can surprisingly exact be described by electro-dynamical analogies. In the following an attempt is made to describe the interplay between mass and ether in electrical terms. The relations for electric resp. mechanic rest energy are;

$$E_{El} = q\,V \qquad E_{Mech} = m0\ c0\ c$$

The equations suggests that if charge q is seen on a par with mass the potential V must be seen on a par with the product c c0. The gravitational potential becomes;

$$\Phi = c_0 c = c_0^2\sqrt{1-\frac{2MG}{c_0^2 r}} \approx \boldsymbol{c_0^2} - \frac{\boldsymbol{MG}}{\boldsymbol{r}} \quad \text{(at weak gravitation)}$$

4.2 Potential and the velocity of light for the system Sun - Earth

The electrical potential from two charges $-q_1$ and $-q_2$ is;

$$V = V_0 - q_1/(4\pi\varepsilon_0 r_1) - q_2/(4\pi\varepsilon_0 r_2)$$

V_0 is an arbitrary constant and r_1, r_2 the distances from resp. charge to the field point.
With the analogy; $V = c_0c$ the gravitational potential should be written:

$$\Phi = V = c_0c = c_0c_0\sqrt{(1 - 2M_1G/(c_0^2r_1) - 2M_2G/(c_0^2r_2))}$$

If the mass of the Sun and Earth replaces M_1 resp. M_2 and the field point is given as a distance x (in the unit Au = distance Sun-Earth) from Au/2 towards Earth we get;

$$c = c_0\sqrt{1-\frac{2M_{Sun}G}{c_0^2(0{,}5+x)Au}-\frac{2M_{Earth}G}{c_0^2(0{,}5-x)Au}}$$

The value at the surface of Earth is obtained with $x_{Earth} = ½ - R_{Earth}/Au$.
According to NIST this value of c is; 299792458 m/s.
By putting in data for; C_{NIST}, M_{Sun}, M_{Earth}, x_{Earth}, G and Au, the value for c_0 can be solved.

$$\mathbf{c_0 = c_{Nist} + 3{,}16 \approx 299792461\ m/s}$$

If x is set to; $-1/2 + R_{Sun}/Au$ we get the light velocity at the surface of the Sun;

$$\mathbf{c_{SunSurface} = c_0 - 636\ m/s}$$

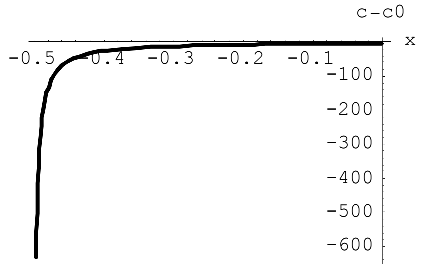


Fig 4.1

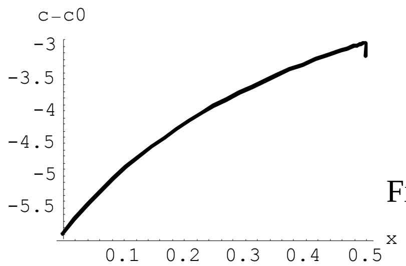


Fig.4.2

The plots above show; $c - c_0$ from the surface of the Sun to Au/2 resp. from Au/2 to the surface of Earth. As seen in Fig. 4.2 the influence of the Sun is dominating even in the vicinity of Earth.

In appendix 2 a calculation is made showing that the velocity of light at the center of the Sun becomes; $c_0 - 3487$ m/s.

5 A link between Newton and Einstein

5.1 Gravitational field from a moving mass

How does the gravitational field from a moving mass look like? A simple reasoning can be made referring to the figures below. Fig.5.1 shows two masses in parallel motion with a velocity v. Fig.5.2 shows a rotating binary system where the velocities are in opposite directions.

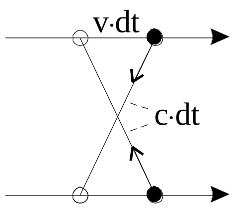


Fig.5.1

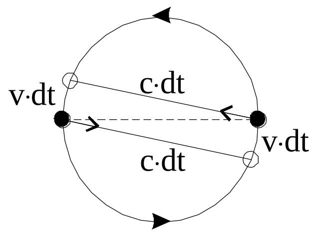


Fig.5.2

The unfilled circles show the positions at time t. The filled circles show corresponding positions at time t + dt. The time dt represents the propagation time for the field. Due to the limited propagation speed, the forces (shown as arrows) have a component along the direction of movement. In Fig. 5.1 it looks like the masses generate a braking force on each other.
In Fig. 5.2 where the velocities are in opposite directions it looks like the masses generate an accelerating force on each other. None of the figures can of course show the true direction of the forces. If energy is to be preserved nor acceleration or retardation in the direction of movement can be tolerated. In the following a possible explanation is given.

5.2 Mass - Energy – Frequency

Mass is associated with the energy content; $E = M c^2$. When it comes to electromagnetic radiation the energy is written; $E = h\nu$. If the energy specification for radiation is applied to mass the following relations can be obtained.

$$M c^2 = h\, \boldsymbol{\nu_M} \quad \text{or} \quad M = h\, \boldsymbol{\nu_M} / c^2 = \text{const.} \times \boldsymbol{\nu_M}$$

The frequency $\boldsymbol{\nu_M}$ can be interpreted as the rate at which mass M radiates gravitational quanta. According to part 4.1 the gravitational potential at distance S from a mass M is;

$$\Phi = c_0^2 - MG/S \quad \text{with; M as above we get;} \quad \Phi = c_0^2 - \text{const.} \times \boldsymbol{\nu_M} / S$$

The force of gravity on a test mass m at rest becomes; $F = m \times d\Phi/dS = m \times \text{konst.} \times \boldsymbol{\nu_M} / S^2$

5.3 Gravitational potential and doppler effect

Fig.5.3 below shows a "snap shot" of the field from a mass moving with velocity v = c/2, continuously emitting gravity fronts. When calculating the force of gravity in this dynamical situation the frequency ν_M from above must be replaced with the frequency ν_F perceived at the field point. This frequency differs from ν_M at the source due to doppler effect, which is clearly visible in the figure. A short derivation of the doppler effect is done below with reference to Fig. 5.4. The figure shows a source mass moving with a constant velocity v. The position at t = 0 is shown with an unfilled circle. The position at time t is shown with a filled circle. The field point is a fixed point on the circle where to the field has reached at time t with a propagating speed of c.

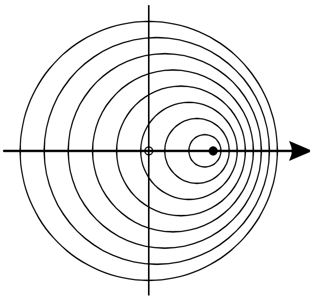


Fig.5.3

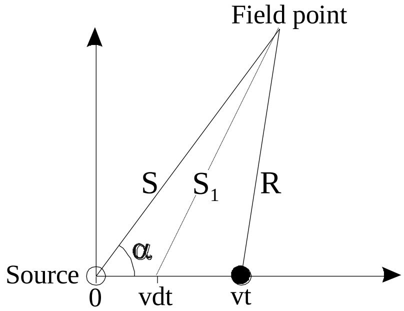


Fig.5.4

The doppler effect is a consequence of time differences between signals (here called 1 and 2,) not being the same at the source and field points.

	Signal 1	Signal 2	Time diff. sign. 2-1
Transmitting time	0	dt	dt
Receiving time	0 + S/c	dt + S_1/c	dt + (S_1 -S)/c

The cosine theorem gives; $S_1^2 = S^2 + v^2dt^2 - 2Svdt\,Cos\alpha$

If dt goes toward zero; $S_1^2 \Rightarrow S^2 - 2Svdt\,Cos\alpha$

Series expansion gives; $S_1 = S - vdt\,Cos\alpha$

With ; v/c = β, the time difference at the field point can be written; $dt_F = dt\,(1-\beta\,Cos\alpha)$

Time differences corresponds to frequencies as 1/Timediff..

Thus : $\nu_M = 1/dt$ och $\nu_F = 1/dt_F = \nu_M\,/\,(1-\beta\,Cos\alpha)$

The gravitational potential at the field point can now be written;

$$\Phi = c_0^2 - \text{const.}\times\nu_M\,/S(1\text{-}\beta\cos\alpha) = c_0^2 - \Delta\Phi$$

Normalization with; const.×ν_M = 1 gives; $\Delta\Phi = \frac{1}{S(1-\beta\,Cos\alpha)}$

5.4 A snap shot of the gravitational potential

According to the previous the expression for the gravitational potential along the circle in Fig. 5.5 below will be;

$\Phi = c_0^2 - \frac{1}{(S+dS)(1-\beta\,Cos(\alpha+d\alpha))} = c_0^2 - \Delta\Phi_0 \times \Gamma$ where; $\Delta\Phi_0 = -\frac{1}{S(1-\beta\,Cos\alpha)}$

relates to the field point and; $\Gamma = \frac{1}{\left(1+\frac{dS}{S}\right)(1+\frac{\beta\,d\alpha\,Sin\alpha}{1-\beta\,Cos\alpha})}$ describes the variation around the field point.

Sin(α+dα) ≈ Sinα + dα Cosα
Cos(α+dα) ≈ Cosα−dα Sinα

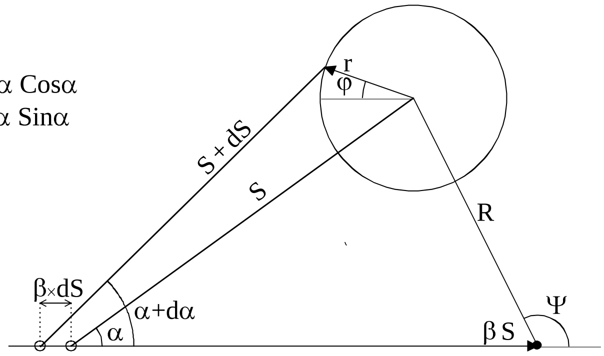


Fig.5.5

Dist. rel. in height: (S + δS) sin(α +δα) = S sinα + r sin φ gives: $dS = \frac{r\, Sin\varphi - S\, d\alpha\, Cos\alpha}{Sin\alpha}$

and side ward: (S + δS) cos(α +δα) = β δS + S cosα - r cosφ gives $d\alpha = \frac{r\, Cos\varphi + dS(Cos\alpha - \beta)}{S\, Sin\alpha}$

Separation of dS and dα gives:

$$dS = r\frac{Sin\alpha\, Sin\varphi - Cos\alpha\, Cos\varphi}{1-\beta\, Cos\alpha} \quad \text{and} \quad d\alpha = \frac{r}{S} \times \frac{(Cos\alpha-\beta)Sin\varphi + Sin\alpha\, Cos\varphi}{1-\beta\, Cos\alpha}$$

The expr. for Γ has the form $\frac{1}{(1+\delta 1)(1+\delta 2)}$, where the δ terms are much smaller than one.

Γ can therefore be written in the form; 1 – (δ1 +δ2).

$$\Gamma = 1 - \frac{r}{S}\left(\frac{Sin\alpha\, Sin\varphi - Cos\alpha\, Cos\varphi}{1-\beta\, Cos\alpha} + \frac{\beta\, Sin\alpha\, (Cos\alpha - \beta)Sin\varphi + \beta Sin\alpha^2 Cos\varphi}{(1-\beta\, Cos\alpha)^2}\right)$$

Simplification gives; $\Gamma = 1 - \frac{r}{S(1-\beta\, Cos\alpha)^2} \times (Sin\varphi\, Sin\alpha\, (1-\beta^2) + Cos\varphi\, (\beta - Cos\alpha))$

The angle for the maximum value of the potential is obtained by solving: dΓ/ dφ = 0;

The result can be expressed in the form of the tangent of φ. $Tan\varphi = \frac{(1-\beta^2)Sin\alpha}{\beta - Cos\alpha}$

φ (earlier a free variable) will in the following mean the angle of the force direction.

From the equation for Tanφ, expressions for Sinφ and Cosφ can be derived.

$$Sin\varphi = \frac{(1-\beta^2)\, Sin\alpha}{\beta - Cos\alpha} \times Cos\varphi \quad \text{and} \quad Cos\varphi = \frac{\pm(\beta - Cos\alpha)}{\sqrt{(1-\beta^2)^2 Sin\alpha^2 + (\beta - Cos\alpha)^2}}$$

The result can be expressed by means of the angle Ψ in Fig.5.5.

$$Tan\Psi = -\frac{Sin\alpha}{\beta - Cos\alpha} \quad \text{and thus;} \quad Tan\varphi = -(1-\beta^2)Tan\Psi$$

5.5 Strength and direction for the force of gravity

Putting the relations for Sinφ and Cosφ into the equation for ΔΦ gives after simplification;

$$\Delta\Phi = \frac{1}{S(1-\beta\, Cos\alpha)} \times (1 - \frac{r}{S\,(1-\beta\, Cos\alpha)^2}\sqrt{(1-\beta^2)^2 Sin\alpha^2 + (\beta - Cos\alpha)^2}$$

Derivation of ΔΦ wrt. r gives the normalized force as a function of S and α.

$$F[S,\alpha] = \frac{1}{S^2(1-\beta\, Cos\alpha)^3}\sqrt{(1-\beta^2)^2 Sin\alpha^2 + (\beta - Cos\alpha)^2}$$

The position of the field point (S cosα, S sinα) can be written as (R cosψ, R sinψ) relating it to the “now position” of the mass. The following relations apply.

$$S\cos\alpha - R\cos\psi = \beta S \qquad S\sin\alpha = R\sin\psi$$

Solving the equations for cosα and S gives;

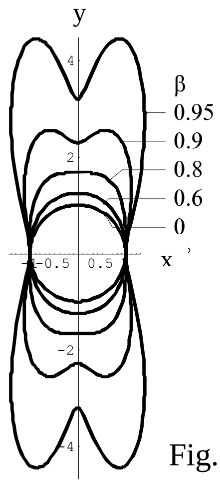
$$Cos\alpha = \beta\, Sin\Psi^2 + Cos\Psi\sqrt{1-\beta^2 Sin\Psi^2} \qquad S = R\,\frac{\beta\, Cos\Psi + \sqrt{1-\beta^2 Sin\Psi^2}}{1-\beta^2}$$

Putting this result into the equation for F[S,α] gives after a (tricky) simplification process:

$$F_{[R,\Psi]} = \frac{1}{R^2}\sqrt{\frac{1-\beta^2(2-\beta^2)Sin\Psi^2}{(1-\beta^2 Sin\Psi^2)^3}}$$

The polar diagram below shows the result with R normalized to 1 for a number of β values**.** **Surprisingly the force appears to be the same and independent of the velocity at the angles ψ = 0 and 180°.**

The magnitude of the force at ψ = 90° is enhanced with the γ-factor (1/ √(1 - β^2)).
An explanation for the strange form with “mouse ears” at velocities approaching the speed of light is given in the next part.



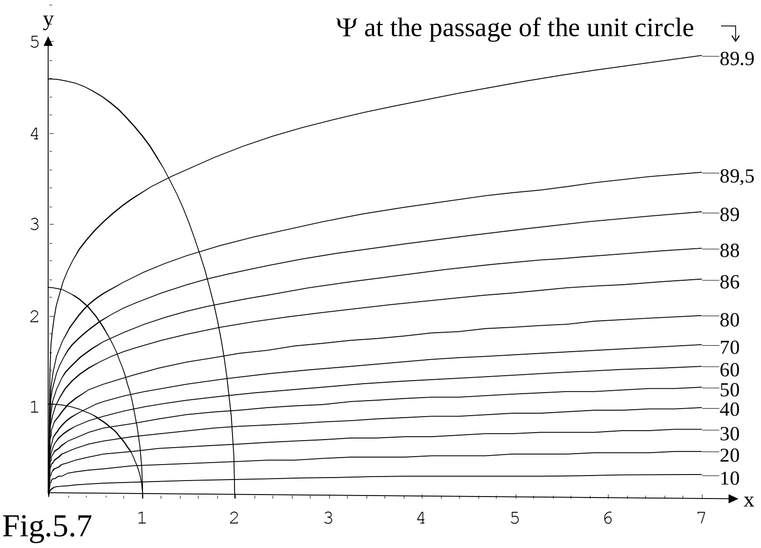


Fig.5.6 Fig.5.7

The field pattern can be generated with the help of the equation Tanφ = - (1 – β^2) Tanψ

Implying; $$\frac{dy[x]}{dx} = (1-\beta^2)\frac{y\{x\}}{x}$$

The solution to this diff. equation is; $y = x^{1-\beta^2} \times const.$ The constant can be derived from a point on the unit circle, where for an angle ψ_1, we have: y [cos ψ_1] = sin ψ_1.

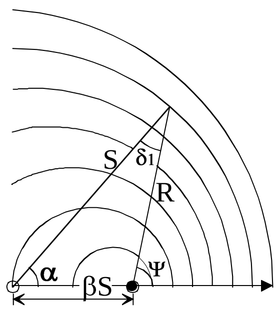
The final result becomes; $y = x^{1-\beta^2} Cos\Psi_1{}^{-1+\beta^2} \times Sin\Psi_1$

A curve chart for field lines with β = 0.9 with a series of ψ_1- values is shown in Fig.5.7.
I additions to the field lines a series of elliptic arcs with the relativistic contraction form and a unit circle are shown. Do observe that the elliptic arcs crosses the field lines at 90°.

5.6 An alternative method of calculation

The form of the force from the earlier is somewhat difficult to digest. In order to verify that result new calculations are made in two steps. References are made to the figures 5.8 and 5.9 which are somewhat modified versions of the earlier figures 5.3 and 5.4.

Fig. 5.8



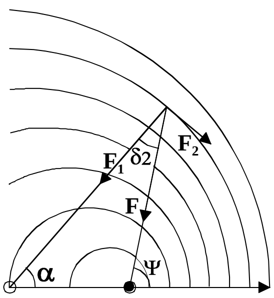


Fig. 5.9

From above we have the normalized gravitational potential in the field point;

$$\Phi = c_0^2 - \frac{1}{S(1-\beta\ Cos\alpha)}$$

The force (per kg test mass) is the gradient of the potential, which has two orthogonal components; $F_1 = -\frac{d\Phi}{dS} = \frac{1}{S^2(1-\beta\ Cos\alpha)}$ and $F_2 = -\frac{d\Phi}{S\ d\alpha} = \frac{\beta\ Sin\alpha}{S^2(1-\beta\ Cos\alpha)^2}$

The vector sum becomes: $F = F_1\sqrt{1+(\frac{\beta\ Sin\alpha}{1-\beta\ Cos\alpha})^2} = F_1\frac{\sqrt{1+\beta^2-2\beta\ Cos\alpha}}{1-\beta\ Cos\alpha}$

With the help of the cosine theorem applied to the triangle in Fig.5.8 we get;

$\beta^2 S^2 = S^2 + R^2 - 2RS\ Cos\delta_1$ and $R^2 = S^2 + (\beta\ S)^2 - 2\beta\ S^2\ Cos\alpha$

From these equations we get: $Cos\delta_1 = \frac{1-\beta\ Cos\alpha}{\sqrt{1+\beta^2-2\beta\ Cos\alpha}}$

For the angle δ_2 in fig. 5.9 applies; $Cos\delta_2 = \frac{F_1}{F} = \frac{1-\beta\ Cos\alpha}{\sqrt{1+\beta^2-2\beta\ Cos\alpha}}$

The angles are as seen identical. According to this analysis the sum of the vectors F_1 and F_2 always points to the “now position” of the gravitating mass. Even if this vector sum not always represents a maximum value for the force it is none the less interesting.
By applying earlier derived relations for α and S to $\Phi_{[\alpha,S]}$ we get:

$\Phi_{[\Psi,R]} = c_0^2 - \frac{1}{R\sqrt{1-\beta^2\ Sin\Psi^2}}$ Derivation wrt. R gives; $F_R = \frac{1}{R^2\sqrt{1-\beta^2 Sin\Psi^2}}$

The result is shown in the figure below.

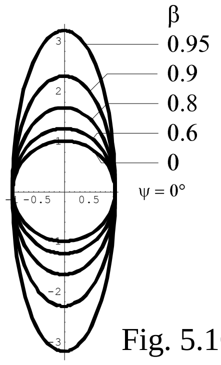


Fig. 5.10

At speeds close to the velocity of light the dependence of the potential on ψ results in a gradient and thus a force perpendicular to R

$$F_\Psi = \frac{d\Phi}{R\ d\Psi} = -\frac{\beta^2 Sin\Psi\ Cos\Psi}{R^2(1-\beta^2\ Sin\Psi^2)^{3/2}}$$

The total force F is the vector sum of F_R and F_ψ.

$$F = \frac{1}{R^2}\sqrt{\frac{1-\beta^2(2-\beta^2)Sin\Psi^2}{(1-\beta^2 Sin\Psi^2)^3}}$$

The result is identical to the earlier version. The explanation for the ”mouse ears” is shown to be the dependence of the “main force” F_R (according to Fig.5.10) on ψ.

6. *Gravitational radiation*

6.1 Introduction

A search for the physics behind gravitational radiation gives a rather meager result.
Apart from descriptions limited to analogies with electromagnetic radiation there are some extraordinarily difficult to understand “recipes”.
EM-radiation appears in a number of modes in connection with the accelerated motion of electrical charges. These modes are named electric resp. magnetic (dipole, quadrupole, oktopole) radiation with gradually diminishing strength. My hypothesis is that gravitational radiation can be written;

$$P_{Grav} = \frac{G}{c^3}\left(k_2 + k_4\left(\frac{v}{c}\right)^2 + \cdots.\right) \times F_{acc}^2$$

F_{acc} is the force at right angle to the velocity vector v. **With the motivation that momentum and angular momentum are preserved entities the dipole constant is considered to be zero.**
The notion gravitational radiation normally means the quadrupole term with in my case the constant k_4.

6.2 An analogy between electromagnetism and gravity

In the following the relations between electricity and gravity are illustrated under the assumption that mass can be placed on par with electrical charge. Relevant notions are listed in the table below.

Notion	Electricity	Gravitation
Source, test object	- q, q	m, m
Field potential	$-\frac{q}{4\pi\varepsilon_0 r}$	$-\frac{mG}{r}$
Field strength = acc.	$\frac{q}{4\pi\varepsilon_0 r^2}$	$\frac{mG}{r^2}$
Facc.	$q\frac{q}{4\pi\varepsilon_0 r^2}$	$m\frac{mG}{r^2}$
p (dipole moment)	q×distance	m×distance
p´´	q×acc. = $\frac{q^2}{4\pi\varepsilon_0 r^2}$	m×acc. = $\frac{m^2 G}{r^2}$ = Facc.

The form of the electrical relations becomes identical to the gravitational relations if

$$q \rightarrow m \qquad G \rightarrow \frac{1}{4\pi\varepsilon_0}$$

According to Erik Hallén:s Elektricitetslära (ekv. 31,66) the momentary value of the radiated power from an electrical dipole is;

$$P_{Rad\ El\ Dipol} = \frac{\mu_0}{6\pi c}p''^2 = \frac{2}{3}\frac{1}{4\pi\varepsilon_0 c^3}p''^2$$

Corresponding expression for gravitational radiation becomes;

$$P_{Rad\ Grav\ Dipol} = \frac{2}{3}\frac{G}{c^3}Facc^2$$

If the radiated power is separated equally for the two masses m, m, half this value can be attributed to m.
This means that if gravitational dipole radiation exists it should be written;

$$\boldsymbol{P_{Rad\ Grav\ Dipol} = \frac{G}{3\ c^3}Facc^2}$$

6.3 Gravitational radiation from a binary system

With the general theory of relativity as basis Peters and Matthews have described the influence of gravitational radiation on the period T for a system with masses m_1, m_2 and eccentricity e. The derivative of T wrt. time is according to P & M;

$$\frac{dT}{dt} = -\frac{192\,\pi\,G^{5/3}}{5\,c^5}\left(\frac{T}{2\pi}\right)^{-5/3} m_1 m_2 (m_1+m_2)^{-1/3} f_e$$

The influence of eccentricity is described by; $f_e = \left(1+\frac{73}{24}e^2+\frac{37}{96}e^4\right)(1-e^2)^{-7/2}$

Corresponding time derivative for a system without eccentricity with $m_1 = m_2 = m$ becomes;

$$\frac{dT}{dt} = -\frac{384\times 2^{1/3}\pi^{8/3}}{5\,c^5}\left(\frac{Gm}{T}\right)^{5/3}$$

Force balance demands that; $F_{acc} = F_{grav}$, where ; $F_{acc} = m\times v^2/r$ and; $F_{grav} = m^2\times G/4r^2$

The relations give; $v^2 = m\times G/4r$ and thus; $T = 2Pi\times r/v$

The energy is written; $E = \gamma\, m\, c_0\, c$ with; $c = c_0\sqrt{1-\frac{2\,mG}{{c_0}^2 2\,r}}$ and $\gamma = \frac{1}{\sqrt{1-(\frac{v}{c_0})^2}}$

The radiated power can be written; $\frac{dE}{dt} = \frac{dE}{dr}\,\frac{dr}{dT}\,\frac{dT}{dt}$

With relations from above we get; $\frac{dE}{dt} = -\frac{24\,G^4\,m^5}{5\,c_0^3\sqrt{1-\frac{m\,G}{c_0^2\,r}}\;2\sqrt{1-\frac{m\,G}{4\,c_0^2\,r}}\;r^5\;4\,c_0^2\,(1-\frac{m\,G}{4\,c_0^2\,r})}$

With; $\frac{v^2}{c_0^2} = \frac{m\,G}{4\,c_0^2\,r} = \beta^2$ we get; $\frac{dE}{dt} = -\frac{3\,G^4\,m^5}{5\,c_0^5\,r^5\sqrt{1-4\,\beta^2}\,(1-\beta^2)^{3/2}}$

A series expansion in powers of β gives; $\frac{dE}{dt} = -\frac{3\,G^4\,m^5}{5\,c_0^5\,r^5}\left(1+\frac{7}{2}\beta^2\right)$

Corresponding series expansion of my preliminary radiation hypothesis from above gives;

$$P_{Quad} = k_4\frac{G}{c_0^3}\left(\frac{v}{c}\right)^2 {F_{acc}}^2 = k_4\frac{G^4\,m^5}{c_0^5\,64\,r^5}\left(1+4\beta^2\right)$$

If the β^2 – terms are neglected the equation; $P_{Quad} = -\frac{dE}{dt}$ gives the result**; k_4 = 192/5**

7 A test of the theory with an unexpected result

7.1 Introduction

The results from part 5 have been applied to a somewhat simplified version of the famous double pulsar PSR 1913 +16. The expectations were that the calculations should reveal a braking force on the two masses on a par with data for the gravitational radiation. The disappointment was great when the predictions of the theory pointed at a force of acceleration amounting to a value of approximately 16000 times the expected braking force.

An analyses of the result showed, that the positive effect interpreted as the product of velocity times the force component along the velocity vector, with astonishing accuracy could be written;

$$P = \frac{G}{3\,c^3}Facc^2$$

This result is identical to the hypothesis for dipole radiation according to part 6.2
On Etherus the conclusion is drawn, that gravitational dipole radiation exists and that it (close to 100%) outbalances the positive effect from above.

7.2 Calculations

According to part 5 the force of gravity on a mass M_2 from a mass M_1 in linear motion (with v << c) points at the position of M_1 at the time when the field arrives at M_2.
With this as a basis a symmetrical binary system is analyzed. The terminology is defined with the help of the figures below.

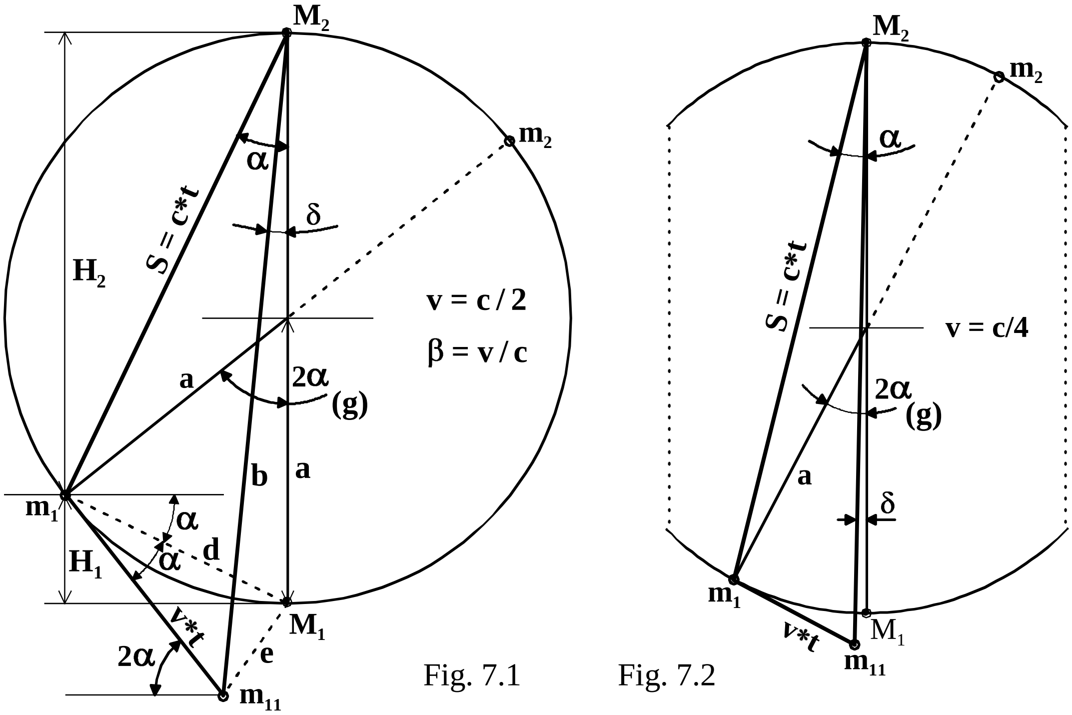


Fig. 7.1 Fig. 7.2

Fig. 7.1 with the extreme velocity c/2 only serves as a demonstration example to clarify the definitions. m_{11} shows the position m_1 would have at time t if it continued with linear velocity in the direction of the tangent.
The distances S and d can directly be calculated as; $S = 2\,a\,\mathrm{Cos}[\alpha]$ $d = 2\,a\,\mathrm{Sin}[\alpha]$
The arc $m_1 - M_1$ is; $v\,t = \beta\,S = a\,2\,\alpha$ which gives; $\beta = a\,2\,\alpha / S$
A series expansion gives; $\beta = \alpha + \alpha^3/2$ From this relation α can be solved as a function of β.
A series expansion of the result gives; $\alpha = \beta - 0{,}5\,\beta^3$
With the cosine theorem applied on the three triangles;

$m_1\ m_{11}\ M_2$ $m_1\ m_{11}\ M_1$ $m_{11}\ M_1\ M_2$

the angle δ can be solved; $Sin[\delta] = \frac{4\,\beta^3}{3} - \frac{469\,\beta^5}{120} \ldots)$

Force balance demands that;

$$\text{Facc} = \frac{Mv^2}{a} = \text{Fgrav} \cong \frac{MMG}{4a^2} \quad \text{This gives;} \quad M = \frac{4av^2}{G}$$

The force in the direction of v becomes; $F_V = \mathrm{Sin}[\delta] \times \text{Facc}$

with the matching power; $P_V = v \times F_V = \frac{v\,Sin[\delta]}{Facc} \times \text{Facc}^2 = \textbf{Term} \times \text{Facc}^2$

with Term = $\frac{v\,Sin[\delta]}{Mv^2/a} = \frac{G\,Sin[\delta]}{c^3\beta^3 4}$ the final result becomes;

$$\text{Term} = = \frac{G}{c^3}\left(\frac{1}{3} - \frac{469}{480}\ \frac{v^2}{c^2} + \cdots\right)$$

A more accurate (and more complicated) calculation according to the pattern in Parts 5.4 and 5.5 with derivation of the field potential at M2, where consideration is taken to the accelerated movement of m_1 gives the result:

$$\textbf{Term} = \boldsymbol{\frac{G}{c^3}\left(\frac{1}{3} - \frac{17\beta^2}{15} \ldots\right) \approx \frac{G}{3c^3}\left(1 - 3\beta^2\right)}$$

The value of c in this expression could be interpreted as; $(c\,c_0)^{1/2}$ where;

$c = c_0\sqrt{1 - \frac{2MG}{c_0^2 2a}} = c_0\sqrt{1 - 4\beta^2}$ describes the velocity of light at the position of M_2.

A series expansion of $(c\,c_0)^{3/2}$ gives the result; $c_0^3(1 - 3\beta^2)$

With this move the final result becomes that to M_1 (and M_2) is added a power;

$\mathbf{P} = \boldsymbol{\frac{G}{3c_0^3}\ Facc^2}$.

The continuing existence of the system demands that corresponding power is radiated away in the form of dipole radiation. This balanced exchange of energy between mass and ether must clearly be the explanation for the gravitational force.
Angular momentum is preserved thanks to the existence of a dipole radiation.

The reason why the quadrupole content disappears must be a consequence of the masses being treated as point masses

8 Gravitons, dark matter and dark energy

According to scientific journals there is a transformation going on between different forms of the neutrinos emanating from the Sun. The generated dipole radiation (according to the previous) could show to have similar properties. A suitable notation for this radiation would be graviton radiation.
For the universe not to be completely filled with these gravitons one have to conceive a disintegration process where the energy of these gravitons is returned back to the ether
If energy is added to the ether this will show up as an increase of the speed of light.

Expansion of the Universe is expressed by means of the Hubble constant ~ 72 km/s/Mpc (velocity/distance). The distance to the remote object can be replaced by the elapsed time as Mpc/c. The Doppler frequency could be explained if the velocity of light is seen to be increasing with time.
As shown earlier in this document, the velocity of light is influenced by the presence of matter. If amounts of diluted matter is trapped into heavy stars and galaxies the overall influence on c could result in an increase of the velocity of light over time.
The remote information generated with an old value of c, is on Earth analyzed with c of today and falsely interpreted as revealing a Doppler shift caused by dark energy.

An explanation of the dark matter phenomenon can be made if consideration is taken to a frame drag effect. If a body is floating around a gravitational center M with the same velocity as a rotating ether V_{frame} that body can not experience any acceleration force. Force balance demands that the velocity of the body amounts to; $V_{frame} + V_{Newton}$ (Sqrt[MG/r])

9 Electrical phenomena on Etherus

On Etherus the force of gravity is seen as consequence of an exchange of energy between ether and matter. If a corresponding view is applied to electrical forces one ends up with great problems. The relation between electrical and gravitational forces is in the order of 10^{40}.
If one further have the opinion that the electron is a point particle (according to scattering experiments) the problem is further accentuated. The latter problem can be avoided if the electron is seen as a specific pattern in rotational motion and that a direct hit demands that the pattern of the colliding electron fully matches the target electron. To solve the problem with the enormous difference between el. and grav. forces a new way of thinking is needed. An idea that has become rooted on Etherus is that the electron behaves like a very potent particle with inherent force resources. This electron could be steered by remote control via the electrical field which in itself has a reasonable value.
One imaginable picture of the electron is a vortex string in the ether twisted close to 180 degrees into a propeller form. For the ground state of Hydrogen the twisting angle is taken to be 180*(1-alfa) ~178,69 degrees. If the rotational velocity for this "electron propeller" (round an axis parallel to the electron orbit) is related to the velocity of light c , the orbit velocity would become alfa*c.
The behavior of a free electron could be visualized with a picture of a (close to) weightless helicopter with force recourses of it´s own. The height rudder is seen to be steered by the electrical field and the “side rudder” at a motion forwards by a magnetic “angular momentum signal”. In the latter case it is not a force in an ordinary sense. Ongoing studies (not finished) show rather unambiguously that the net force on a moving electron in the vicinity of a current carrying conductor (with stationary positive charges) is zero. The angular momentum signal though, causes a change of the electron´s direction of motion. It is this effect which is interpreted as a magnetic force.
Below follows a short description of an example where the current generating electrons and a negative test charge (at height = 1 above the conductor) all have the same velocity c/2.

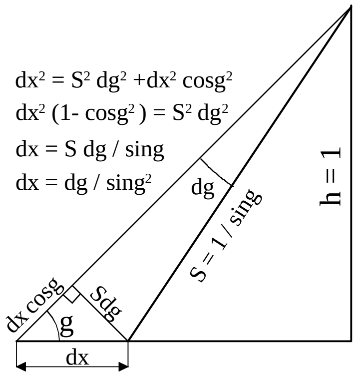


Fig. 9.2

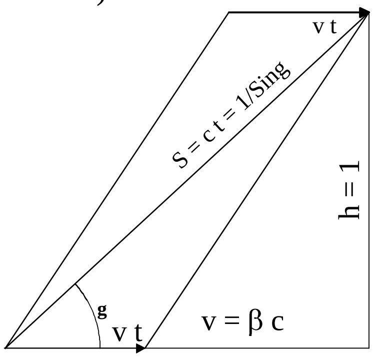


Fig. 9.3

The flowing negative electrons and the positive charges at rest in the conductor all give their contribution to the potential Φ at the test charge. The partial contribution at the angle g becomes;

$$d\phi = \left(\frac{1}{S} - \frac{1}{S(1-\beta\ Cosg)}\right)(1-\beta\ Cosg)$$

The force differential is a quadratic sum of; $dF_S = d\Phi/dS$ and $dFg = (d\Phi/dg)/S$
Separation of the forces in x- and y-components gives;

$$dFx = dF_S\ Cosg - dFg\ Sing \qquad dFy = dF_S\ Sing + dFg\ Cosg$$

Fig. 9.2 shows that the angular differential dg gives the contribution $dg/Sing^2$.

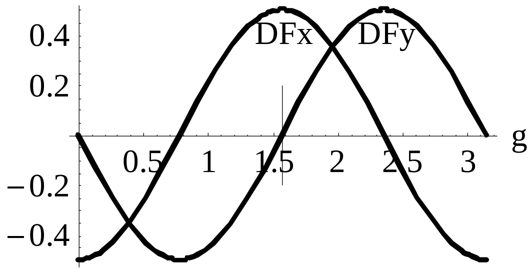
With; $DFx = dFx/Sing^2$ och $DFy = dFy/Sing^2$ we get;

$$Fx = \int_0^{\pi} DFx\, dg = 0 \qquad Fy = \int_0^{\pi} DFy\, dg = 0$$

The result becomes surprisingly zero for both force components

The explanation for the missing magnetic force must be found in the forms of DFx and DFy as a function of g. A plot of these functions is shown in the figure below.

Fig. 9.4



The figure shows that the force on the “front side” of the test charge is attractive while the “backside” is subjected to a repulsive force. It is therefore anticipated that the test charge will change its direction of motion towards the current carrying conductor.

The force between currents is as known attractive if the currents have the same directions. This fits in in the reasoning above.

10 Appendices

10.1 Mirror frame

The phenomenon of relativistic contraction is demonstrated with help of the figure below.

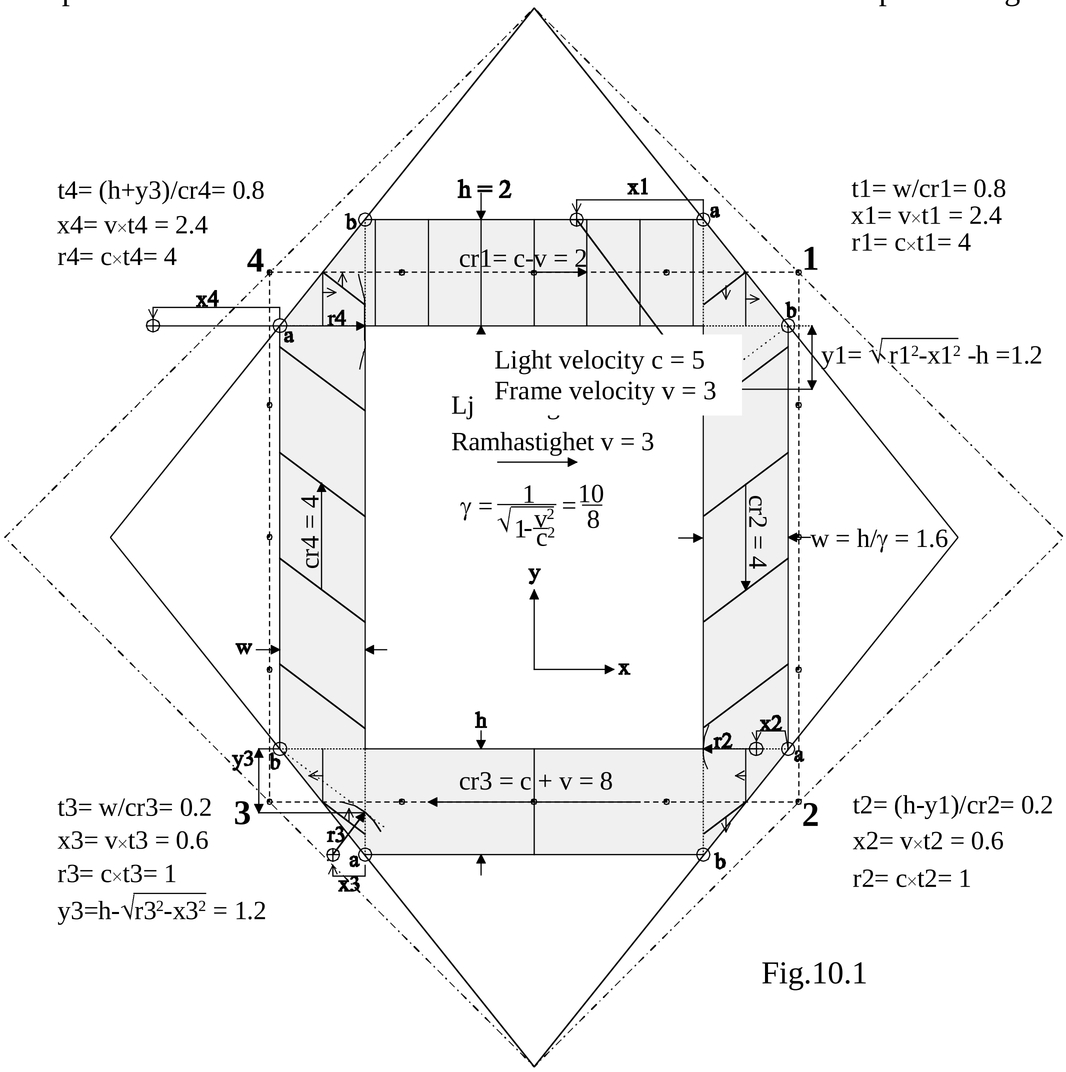


Fig.10.1

A light beam is trapped inside a perfect square mirror frame. The light beam is hitting the mid points of the frame sides, reflected 90 degrees thus taking the form of an inner square pattern. With the frame at rest (outer square) the light beam with width h is depict as a dashed line in the center of the beam. The phase fronts (perpendicular to the propagating direction) are shown as a dot per cycle. If the frame is set in motion with the velocity 0.6 c, a relativistic contraction is shown to distort the frame in the direction of motion to 80 % of is original value. The beam direction after reflection is calculated as follows. The light beam hits the mirror with it´s outermost side first at a point a_n. After a certain delay the innermost side of the beam hits a point b_n. The time difference between these events t_n (n = 1,2,3,4) times the velocity of the frame gives a distance to the left behind “a” event (shown with the symbol ⊕) at the time of the ”b” event. The new phase front after reflection is constructed according to Huygens principal with a line from b_n as tangent to a circle sector with radius c t_n from the point ⊕. By means of triangle congruence it can be shown that the tangent´s point of contact with the circle sector always lies on the innermost boundary of the light beam. The speed of light relative to the frame is denoted cr. The phase fronts are shown as a line per phase cycle.

For the vertical beam paths the quotients x1/r1 and x3/r3 both are equal to v/c. This means that the x-component of the beam velocity is the same as the frame velocity v.
The number of periods and the round trip time are both increased by the γ factor.

10.2 Velocity of light in the interior of the Sun

A picture of the gravitational potential can be created with help of an electrical analogy according to the figures below. Fig.10.2 shows a sphere with mass M (alt. charge -Q) in the centre of a great spherical shell. The space between sphere and shell is filled with a medium with resistivity ρ. With the help of a voltage source with one pole connected to the shell and the other via a current generator to the sphere in the center a "gravitational current" is made to flow in the equivalent circuit according to Fig.10.3.

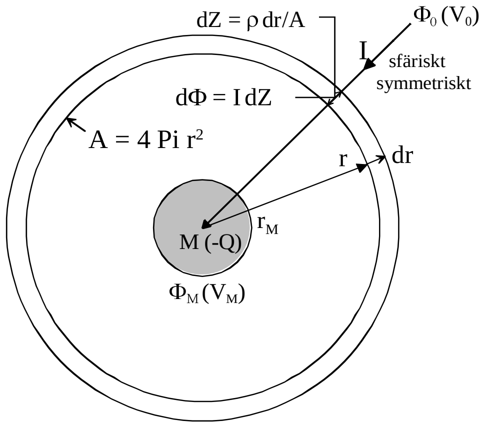


Fig.10.2

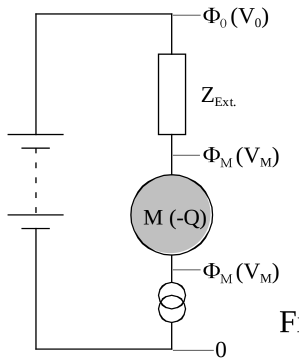


Fig.10.3

In order to analyze potential and current in the interior of the sphere the equivalent circuit (Fig. 10.3) has been varied according to Fig. 10.4. The sphere is here divided into 16 shells, each with a volume $Vol_n = 4Pi\, r_n^2\, dr$ and mass $dM_n = Vol_n\, \rho_M$. Each shell contributes with a partial current di.

Integration of $dZ = \rho\, dr/(4Pi\, r^2)$ from r_M to infinity gives; $Z_{Ext} = \rho/(4Pi\, r_M)$

With $(V_0\, , V_M) = (c_0^2\, , c_0^2 - MG/r_M)$ the total current becomes; $I = (V_0 - V_M)/Z_{Ext} = 4Pi\, MG/\rho$

A partial mass dM consequently contributes with a partial current $dI = 4Pi\, dM\, G / \rho$.

The potential increment at radius r_n becomes; $dV_n = dZ_n\, (I_n - dI_n/2)$

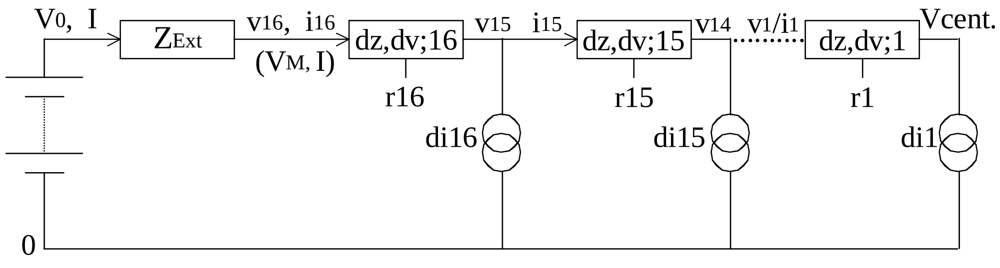


Fig.10.4

The density of the Sun ρ_M as a function of radius is listed in a document; "Standard Solar Model". Below a considerably reduced list of the data (r, ρ_M) is shown, with the Sun divided into 16 zones. The radius is given as $32\times radius/R_{Sun}$ and the density as ton/m^3 (kg/dm^3).

{31, 0.003254}, {29, 0.02191}, {27, 0.05329}, {25, 0.1008}, {23, 0.1684}, {21, 0.29}, {19, 0.5231}, {17, 0.9441},{15, 1.85},{13, 3.598},{11, 7.533},{9, 14.68},{7, 29.48},{5, 53.57},{3, 91.74},{1, 140.4}

The calculations can be made by means of a partial summation procedure according to the pattern below.

$V_{16} = c_0^2 - MG / r_M$	$I_{16} = 4Pi\, MG /\rho$	$dI_{16} = 4Pi\, dM_{16} G/\rho$	$dV_{16} = dZ_{16}(I_{16} - dI_{16}/2)$

$V_{15} = V_{16} - dV_{16}$	$I_{15} = I_{16} - dI_{16}$	$dI_{15} = 4Pi\ dM_{15}G/\rho$	$dV_{15} = dZ_{15}(I_{15} - dI_{15}/2)$
$V_{14} = V_{15} - dV_{15}$	$I_{14} = I_{15} - dI_{15}$	$dI_{14} = 4Pi\ dM_{14}G/\rho$	$dV_{14} = dZ_{14}(I_{14} - dI_{14}/2)$
And so on	And so on	And so on	And so on

With data according to:
$M_{Sun}= 1{,}99\times10^{30}$ kg, $R_{Sun}= 6{,}96\times10^{8}$ m, $c_0 = 299792461$ m/s, $G = 6{,}6726\ 10^{-11}$,
$V_{16} = V_M$ at the surface of the Sun becomes; $V_M = c_0\,(c_0 - 636{,}216)$
Repeated calculations according to pattern above gives the result shown in Fig.10.5 below.
Do observe that the value of $c - c_0$ is given as; $V_n / c_0 - c_0$.

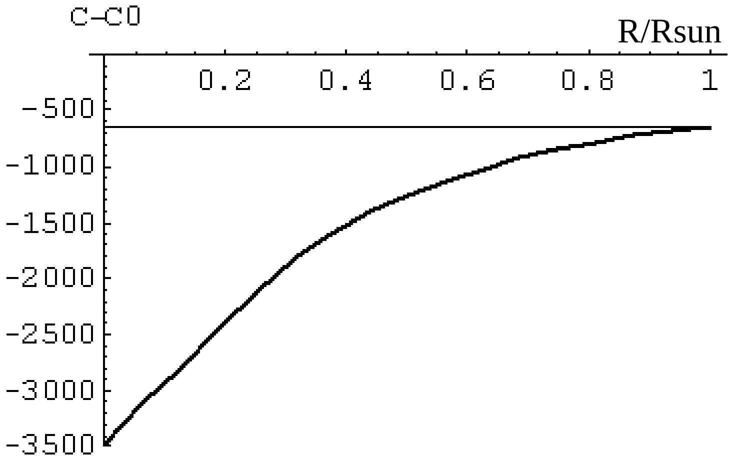


Fig.10.5

The velocity of light in the centre of the Sun becomes; c_0 – 3487 m/s.