$$\frac{f_0}{f_S} = \gamma.(1 - \beta.\cos(\theta_S))$$

Doppler Effect on the frequency of the variable component (radiation). f_0 denotes the observed frequency if the observer and the source were in relative motion with a velocity of v and f_S denotes the observed frequency if the observer and the source were at rest.

Consider a source of an electromagnetic wave that is moving with respect to an observer at rest. The diagram above shows the waves that the observer sees as a function of the sight angle θ_S. Due to Doppler Effect, if $\theta_S = \pi$ then $\cos(\theta_S) = -1$, the radiation emitted by the source when moving towards the observer is ***squeezed (compressed));*** its frequency appears to increase and is therefore said to be **blue shifted**. In contrast, if $\theta_S = 0$ then $\cos(\theta_S) = 1$, the radiation emitted by the source when moving away from the observer is ***stretched (diluted)*** or **red shifted**. If the source moves away from the observer at the speed of light then the observed frequency of the radiation is equal to zero, there is no longer energy exchange between the source and the observer, this implies that there is no longer any interaction between the source and the observer since the electromagnetic radiation interaction is ***diluted*** down to zero.

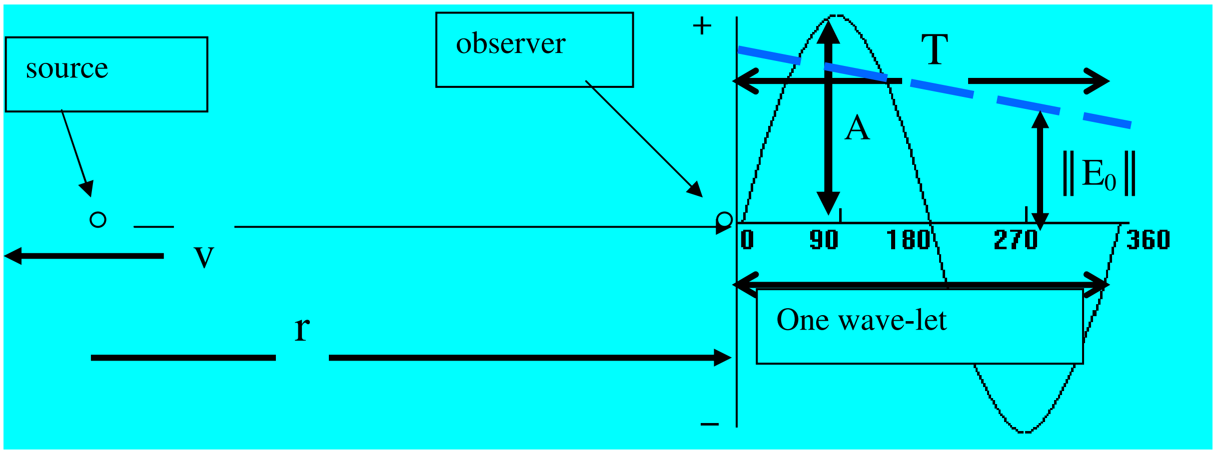
Considerations: Assume that the radiation is generated by a vibrating electron; this electron radiates two components; the ***variable (radiation) A*** and the ***constant component*** $\|E_0\|$ (electric field modulus). The two components propagate at the speed of light and are governed by the inverse square law. The charge of the electron is denoted by q (positive charge) and $k = 1/4\pi\varepsilon$, ε being the vacuum permittivity of the electric field and A_S is the amplitude of the radiation if the source was at rest and A_0 is the amplitude of the electric field if matter was moving at a velocity of v relative to the observer, in both cases the distance r between the observer and the source is maintained constant during the consideration. The vector representation will be added later because at this stage we are just considering the modulus (intensity) of the electric field $\|E_0\|$.

Then;

$$\text{radiation} = \frac{A.\cos(\omega t)}{r^2}$$

$$\|E_0\| = \frac{k.q}{r^2}$$

This means that the amplitude of the radiation A will vary in the same proportion as the electric field modulus $\|E_0\|$, it is important to put this in mind. At a given distance r, the energy carried by one wave-let is constant but the wave is not sinusoidal because of the r^2 attenuation factor. But if the frequency of the source (emitter) is high enough we can consider the wave-let to be quasi sinusoidal. Mathematically we can increase the frequency as much as we wish. Lets us calculate the energy of the radiation of a wave-let at a given distance r as shown in the diagram below.



Energy $= A^2.\int \cos^2(\omega t).dt$, we integrate from 0 to T, T being the period T = 1/f, where A is the amplitude of any sine wave.

Energy $= \frac{A^2}{2f}$ f being the frequency.

As we can see, for a given amount of energy of a wave-let, the radiation amplitude A is proportional to the square root of the radiation frequency.

Thus;

A = constant × √(f)

We find that;

$\mathbf{A_0 = A_S. \sqrt{(f_0/f_S)}.}$

After substituting (f_0/ f_S) in the equation above, we get;

$\mathbf{A_0 = A_S . \sqrt{[\gamma(1 - \beta.\cos(\theta_S))]}}$

Then the observed radiation is given by;

$$\text{Observed radiation} = \frac{A_S.\cos(\omega t)\ \sqrt{[\gamma(\ 1 - \beta.\cos(\theta_S))]}}{r^2}$$

Doppler Effect on the amplitude of the variable component (radiation). A_S denotes the observed amplitude if the source was at rest.

As we said earlier, the amplitude of the radiation will vary in the same proportion as the electric field E due to the attenuating factor r^2 because we well know that the inverse square law governs all radiations. ***This is logical since all radiation are spread out on the surface of a sphere whose area is given by 4πr²*, *this area is achieved by deriving the volume ((4/3)πr³) with respect to the radius r .*** The relativistic expansion event contours escape from the source in perfectly spherical form at the speed of light independently to the speed of the source. In other words, the speed of propagation of information between two ***co-elements*** is independent to their relative speed. Definition: two ***co-elements exist*** by their mutual interaction; this interaction propagates at a finite speed irrespective to their relative speed of motion.

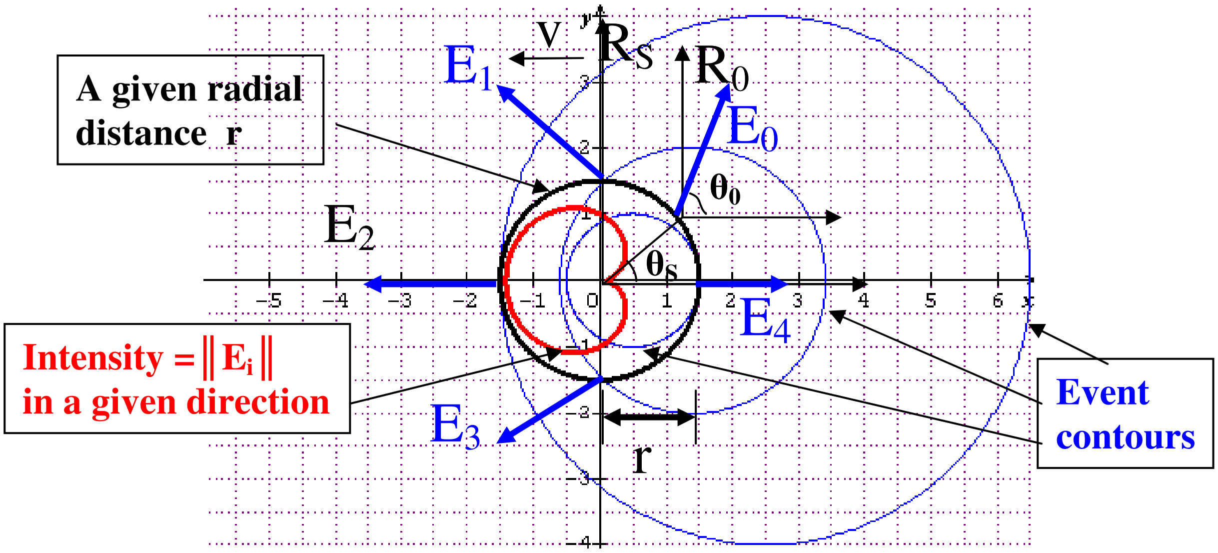
We can then deduce that;

$$\|E_0\| = \frac{k.\|q\|\ \sqrt{[\gamma(\ 1 - \beta.\cos(\theta_S))]}}{r^2}$$

Doppler Effect on the intensity (modulus) of the non-ondulated component (electric field). E_0 denotes the observed intensity of electric field if the observer and the source were in relative motion with a velocity of v.

The $\sqrt{[\gamma(\ 1 - \beta.\cos(\theta_S))]}$ factor describes the dependency at which information of two ***co-elements*** is seen by one of the co-elements.

Vector representation of the electric field



The diagram above shows;

1) Reference frame R_S (source) moving away from reference frame R_0 (observer), the velocity of separation is equal to v along the x axis.

2) The event contours that are propagated at perfectly spherical events when the source moves at a velocity of v away from the observer. The event contours give the angle at which the electric field is seen by the observer (E_0 , E_1 , E_2 and E_3 give the direction of the electric field from the point of view of the observer, example = θ_0 is the angle at which the electric field E_0 is seen by the observer when the electric field is generate by the source at an angle of θ_S).
3) The directivity of the electric seen by the observer at a given radial distance r (the electric field intensity at a given direction from the observer's point of view).
4) A given ***radial distance r*** from the origin of the source at time t = 0 (present time).

By using the relativity the relationship between θ_0 and θ_S is given by;

In accordance with the relativity;

$$\cos(\theta_0) = \frac{(\cos(\theta_S) - \beta)}{(1 - \beta\cos(\theta_S))}$$

$$\sin(\theta_0) = \frac{\sin(\theta_S)}{\gamma.(1 - \beta\cos(\theta_S))}$$

$$\tan(\theta_0) = \frac{\sin(\theta_S)}{\gamma.(\cos(\theta_S) - \beta)}$$

Since we know the cosine and the sine of angle θ_i, where i Є [0, 1, 2, 3], we can determine the x and y components of the electric field in the observer's frame reference R_0 from the modulus of the electric field $\|E_i\|$ such that;

$E_{ix} = \|E_i\|.\cos(\theta_0)$

$E_{iy} = \|E_i\|.\sin(\theta_0)$

After substitution, we get;

Here are the x and y components of the electric field;

$$E_{ix} = \frac{k.q\sqrt{[\gamma(1 - \beta.\cos(\theta_S))]}}{r^2}.\frac{(\cos(\theta_S) - \beta)}{(1 - \beta\cos(\theta_S))}$$

$$E_{iy} = \frac{k.q\sqrt{[\gamma(1 - \beta.\cos(\theta_S))]}}{r^2}.\frac{\sin(\theta_S)}{\gamma(1 - \beta\cos(\theta_S))}$$

We are going to determine 3 significant values of the electric field;

1) When $\theta_S = 0 \rightarrow \cos(\theta_S) = 1$ and $\sin(\theta_S) = 0 \rightarrow \theta_0 = 0$,

$$E_{0x} = \frac{k.q.[(1-\beta)/(1+\beta)]^{1/4}}{r^2}$$

$$E_{0y} = 0$$

v → c ==> $\beta \rightarrow 1$ ==> $E_{ix} \rightarrow 0$, the electric field is ***stretched, diluted*** down to zero. This is very important in gravity because we will use it to show how matter can escape from a black hole at speeds less that the speed of light.

2) When $\theta_S = \pi/2 \rightarrow \cos(\theta_S) = 0$ and $\sin(\theta_S) = 1 \rightarrow \theta_0 > \pi/2$, as we can see the propagation direction is tilted to the direction of movement of the source.

$$E_{1x} = -\frac{k.q.\beta[\gamma]^{1/2}}{r^2}$$

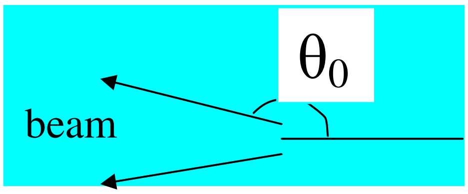
$$E_{1y} = \frac{k.q.\ \ 1}{r^2\ [\gamma]^{1/2}}$$

This is very important in a **synchrotron** because as the speed of the electron increases, the electric field lines tend to point forwards; this tends to narrow the beam of radiation of the synchrotron as shown in the diagram below. ***This is our first experimental proof that our Doppler Effect approach for the electric field is valid.***

Consider θ_0 as shown in the diagram below;

$$\mathrm{Cos}(\theta_0) = \frac{(\cos(\theta_S) - \beta\ )}{(\ 1-\beta\cos(\theta_S)\ )}$$

$$\sin(\theta_0) = \frac{\sin(\theta_S)}{\gamma.(\ 1-\beta\cos(\theta_S)\ )}$$



When v → c ==> $\beta \rightarrow 1$ ==> $\cos(\theta_0) \rightarrow -1$ and $\sin(\theta_0) \rightarrow 0$ ==> $\theta_0 \rightarrow \pi$, this implies that as the speed of an electron increases, the synchrotron radiation beam becomes narrow. We shall later see this phenomenon is a more detailed way.

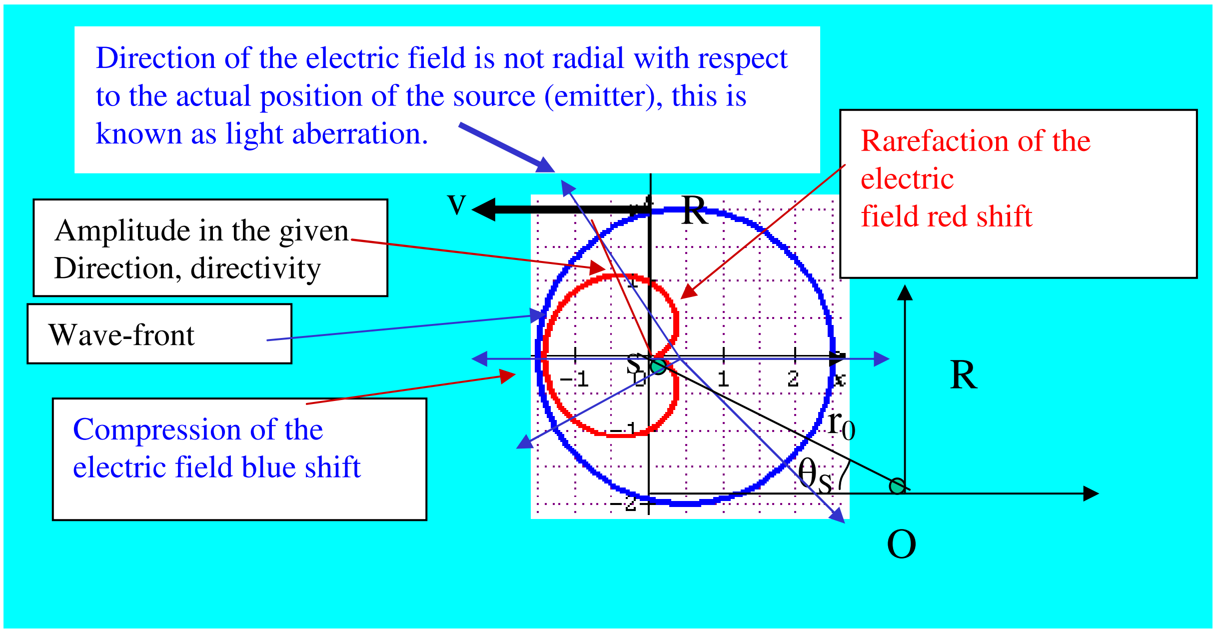
3) When $\theta_S = \pi \rightarrow \cos(\theta_S) = -1$ and $\sin(\theta_S) = 0 \rightarrow \theta_0 = \pi$,

$$E_{0x} = -\frac{k.q.[(1+\beta)/(1-\beta)]^{1/4}}{r^2}$$

$$E_{0y} = 0$$

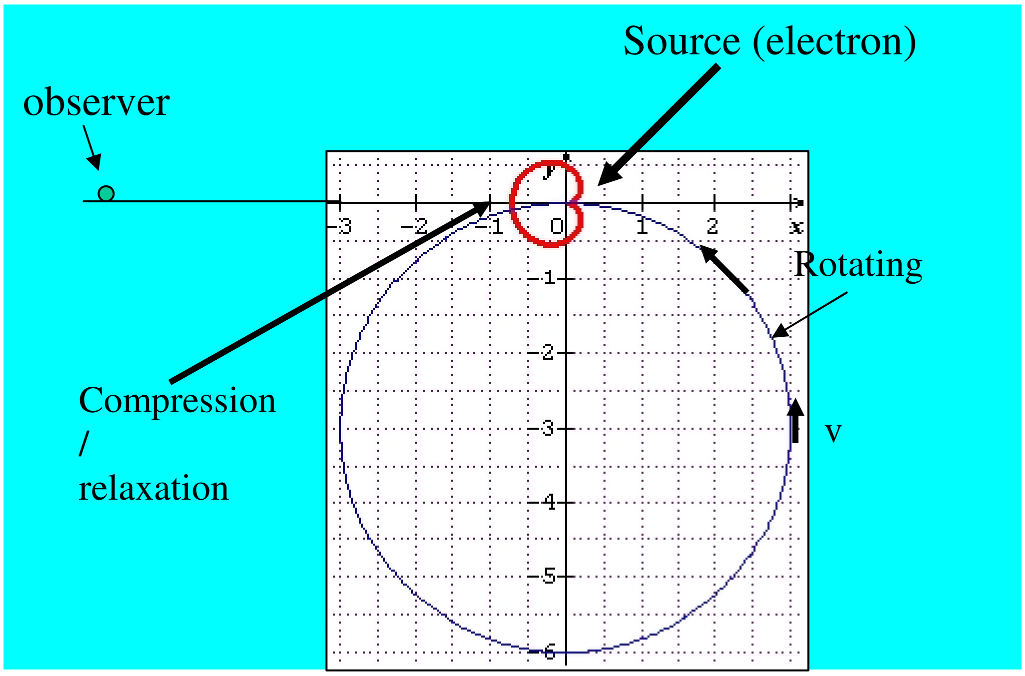
v → c ==> $\beta \rightarrow 1$ ==> $E_{ix} \rightarrow \infty$, the electric field is ***squeezed, compressed*** up to infinity. As we shall later see, the synchrotron radiation occurs at the leading edge of the electron, energy is compressed at the leading edge and light is emitted during the **compression/relaxation** process. ***This is our second experimental proof that our Doppler Effect approach for the electric field is valid.***

The diagram below shows, in polar coordinates, the intensity (directivity) of the electric field as a function of the sight angle at a given radial distance r of a source moving at a speed of v = 0.99c with respect to an observer. The blue diagram shows the wave-front (event contour), as we can see the electric field lines are not radial, they tend to incline frontward. Along with the motion of the charge, each electric field front (event contour) propagates out ward with the speed of light as a spherical wave-front, the shape of the wave-front is always a perfect sphere, and continuously expands with the speed of light, only the origin (source) differs for each event but the intensity of the electric field at a given radial distance varies with the sight angle θ_S. We have to emphasize that the electric field lines are not radial; they tend to point forward in contrast with the today's representation, which suggest that the electric field lines tend to point backwards. The electric field is ***compressed*** at leading edge of movement (left lobe) of the source and it is ***diluted (rarefaction)*** at lagging edge (right lobe).

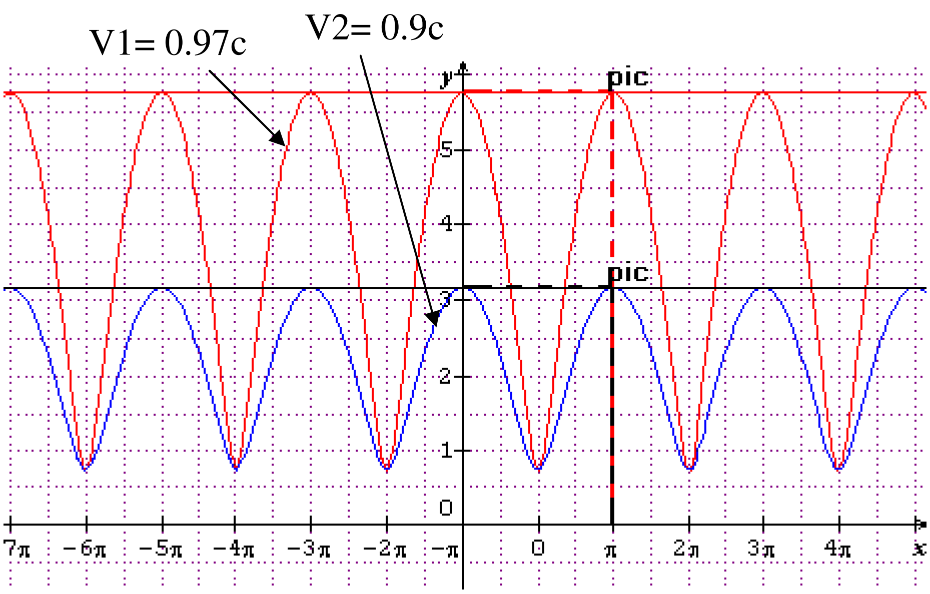


Synchrotron cone shape radiation

The diagram below shows an electron in orbit, as shown above the electric field is ***compressed*** at the leading edge of the electron, as it passes in front of the observer, the observer receives a ***compressed*** electric field that ***relaxes*** as the electron passes by, due to the ***compression/relaxation*** process, the electric field produces modulated electric wave (carrier wave) and this wave is composed of high frequency harmonic waves between infrared and X-rays. The faster the electrons moves the more the electric field is compressed, the more the energy is store in the leading edge, the more abrupt the compression/relaxation process occurs, the more the spectrum tilts towards the high frequency harmonics (X-rays). The faster the electron moves the more the electric field lines tend to point in direction of movement, the narrower the radiation beam (as we saw earlier), when the electron approaches the speed of light the electric field directivity approaches a plane form with the electric field lines pointed towards the direction of movement ($\theta_0 = \pi$). ***The question is; is light a transversal or a longitudinal wave? The answer is, light could be transversal or longitudinal wave depending on the mode of emission. Since the synchrotron light is emitted as result of an abrupt varying radial (longitudinal) electric field lines, in this case we can affirm that the light emitted by the synchrotron is longitudinal but not transversal*** in contrast to the hertz antenna radiation that is longitudinal (used in telecommunication).



The diagram below, in Cartesian coordinates, shows the intensity of the electric field as a function of the angle of sight θ_S for two different velocities ($v_1 = 0.97c$, $v_2 = 0.9c$) of a moving source (electron) with respect to an observer. The higher the compression/relaxation process rate (second derivative of the function below when $\theta_S = \pi$), the more the spectrum shifts towards the high frequencies (X-ray) and the higher the radiated energy



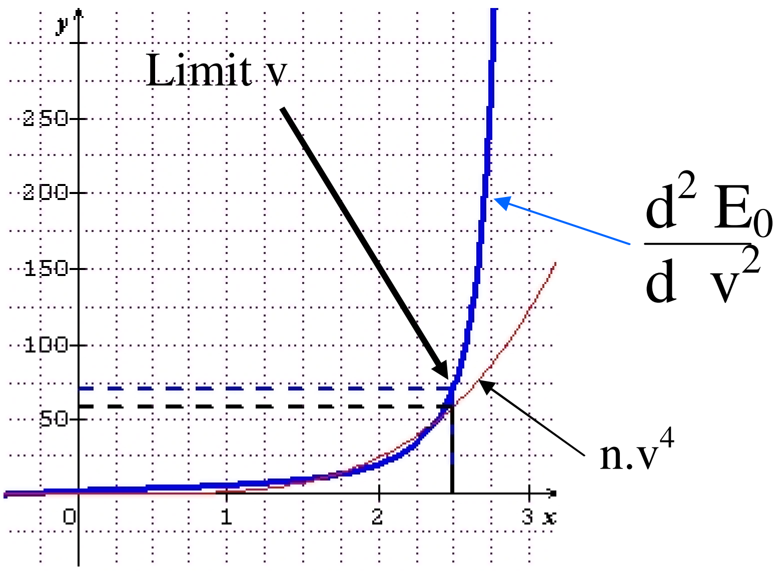
If $\theta_S = \pi$, this gives the peak intensity of the electric field lines of the leading edge as a function of the speed of the electron.

$$E_0 = \frac{k.q\,(1 + v/c)^{1/4}}{r^2\,(1 - v/c)^{1/4}}$$

$$\frac{d^2E_0}{dv^2} = \frac{B}{cr^2}\left[\frac{5}{(1 - v/c)^2\,(1 + v/c)^{3/2}} - \frac{3}{(1 - v/c)\,(1 + v/c)^4}\right]$$

The formula above gives the second derivative of the electric field that is proportional to the compression/relaxation process rate which is proportion to the radiation energy and which is roughly proportional to fourth power of the speed. The fact that the energy radiated is proportional to the fourth power of the speed of the electron has been observed experimentally in synchrotron.

The diagram below shows the second derivative (d^2E/dv^2) against the speed fourth power (v^4) when $\theta_S = \pi$, as we can see the second derivative (compression/relaxation process) is roughly proportional to the speed to the power of four, it has been shown experimentally that the energy emitted by a synchrotron is proportional to the fourth power of the speed of the electron. ***This is our third experimental proof that our Doppler Effect approach for the electric field is valid.***



Synchrotron far area low frequency radiation

When the observer is very far away from the synchrotron, the motion of the electron is quasi sinusoidal in the same way as a piston in a car explosion engine executes a simple harmonic motion. The fundamental frequency is the frequency of revolution of the electron around its orbit. One can use the Fourier transformation to calculate the far area low frequency radiation. In the same way when charged matter accretes the black hole it produces quasi-periodic oscillations (QPOs) of X-ray. The QPOs refer to the way the X-ray light seems to flicker. We will apply the same approach in B-flat "***sound waves***", very low pitch signals said to be emitted by black hole.

Doppler Effect on gravitational field

We have shown that our electric field Doppler Effect approach (v ≈ c) is in accordance with the experimental results for a synchrotron radiation for three reasons.

1) We have shown that as the speed of an electron increases the radiation beam becomes ***narrow***; this has been proved by experiments in synchrotron.
2) We have shown that the ***compression/relaxation*** process is responsible of synchrotron radiation since the radiation never occurs at the lagging edge of the electron. This has been proved by experiments in synchrotron.
3) We have shown that the ***radiation power*** in a synchrotron is proportional to the ***fourth power*** of the speed (v^4) of the electron (compression/relaxation rate, the second derivative of E with respect to the speed v). This has been proved by experiments in synchrotron.

We have shown that our electric field Lorentz force transformation (v << c) is in accordance with astronomical observations for three reasons.

1) We were capable of explaining the shape of galaxies by using this approach
2) We were capable of explaining the trajectory of accretion discs matter aspiration known as ***frame dragging*** by using this approach. We can affirm that there is no frame dragging, this is due to observation wrong interpretation.
3) We were capable of explaining the trajectory of the black hole bipolar jets by using this approach. But some authors say that nothing can escape from the black hole ***but how do bipolar jets escape from the black hole?***

Some authors say;

1) That even light cannot escape from a black how but how does the hawking radiation escape from the black holes?
2) That there exists an event horizon due to the density of the black hole, in that case no matter can escape from the nucleus of an atom since the density is also very high and comparable to that of a black hole.
3) That the iron spectrum emitted by iron gas near the black hole is broader because the light looses energy when escaping from a black hole, in that case the reflected microwaves received by an on board radar could be due to microwaves losing energy when escaping from air molecules!!!!
4) That there are sound waves in space B-flat because matter vibrates around the black holes in that case the instability of stars having planets orbiting around them is due to sound waves in space!!!

We shall refute all these conclusions one by one using the Doppler Effect and Lorentz force transformation approach.

Since the electric field and the gravitational field propagate at the same speed, and are governed by the same geometrical laws, in particular the inverse square law. And since we have seen by transposing the electromagnetism laws to gravitomagnetism laws we were capable of explaining astronomical observations, then we can also safely transpose the electric field Doppler Effect to gravity. We then deduce;

$$\|g_0\| = \frac{Gm\sqrt{[\gamma(1-\beta.\cos(\theta_S))]}}{r^2}$$

Doppler Effect on the intensity of the gravitational field. g_0 denotes the observed intensity of gravitational field if the observer and the source were in relative motion with a velocity of v.

Here are the x and y components of the gravity field;

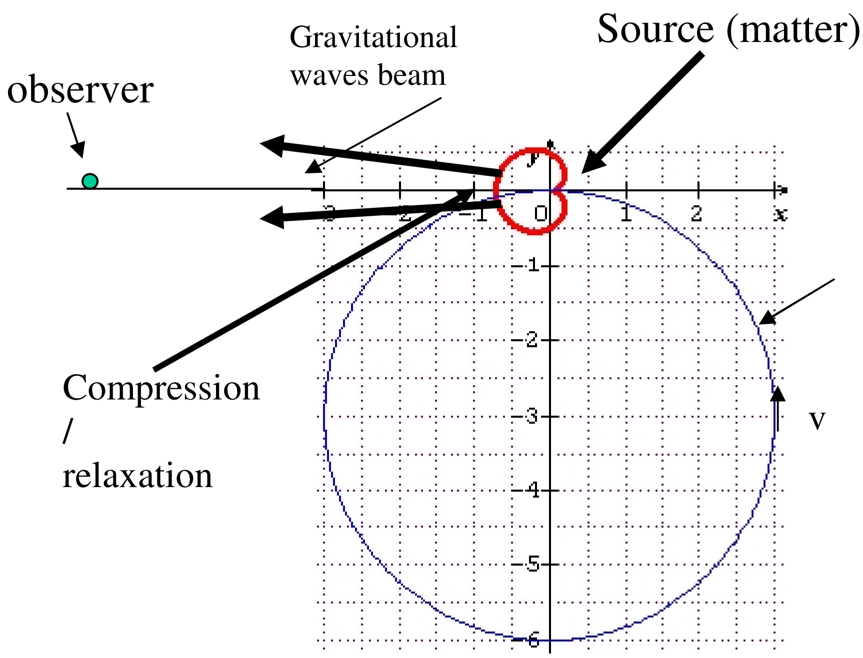
$$g_{ix} = -\frac{G.m\sqrt{[\gamma(1-\beta.\cos(\theta_S))]}}{r^2}.\frac{(\cos(\theta_S)-\beta)}{(1-\beta\cos(\theta_S))}$$

$$g_{iy} = -\frac{G.m\sqrt{[\gamma(1-\beta.\cos(\theta_S))]}}{r^2}.\frac{\sin(\theta_S)}{\gamma(1-\beta\cos(\theta_S))}$$

If c → ∞ we get back the Newton's equation of gravity.

Gravitational synchrotron radiation and B-flat "sound waves"

When matter falls on the black hole, it generates gravitational radiation just in the same way an electron generates light when it falls on matter. When matter accretes the black hole or when binary stars orbit around their common centre of mass (barycentre), they generate gravitational radiations just in the same way a charged particle generates light when it "accretes" a synchrotron. See the diagram below. The detectable gravitational waves are not transversal waves but are longitudinal waves because they are generated by variable gravitational field, abrupt variation (compression/relaxation process). This type of gravitational wave is the only one we could hope to measure in the near future because the transversal gravitational waves coupled to electromagnetic wave are minuscule.



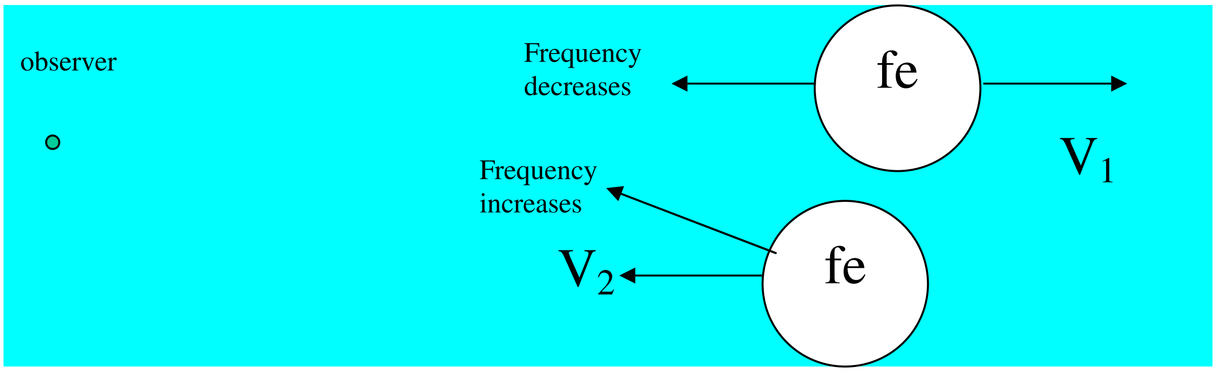
The B-flat "sound waves" are the fundament frequencies of gravitational radiation of matter that accretes the black hole. If gas cluster around the black hole moves back and forth, ***it is not due to sound waves from the black hole***, it is in fact due to these low frequency gravitational waves. There are no sound waves in space as most authors tend to suggest. The gravitational waves act directly on matter, they put in vibration the gas particles in the gas cluster around the black hole, and this tends to heat up the gas cluster. That is why the gas around the black hole is hot and does not cool down.

Iron broad band radiation near the black hole (Iron is produced by endothermic nuclear reactions)

The formula below gives the observed frequency of a moving emitter with respect to a source. When the source moves away from us v_1 the observed frequency decreases and when the source moves towards us v_2 the observed frequency increases. See the diagram below. This is exactly what happens with the iron gas (heated by the gravitational waves from the black hole) near the black hole, as the iron particles move away from us the observed frequency decreases and when they move towards us the observed frequency increases. That explains why the received frequency band is broader, some authors tend to suggest that the radiation looses energy as it escapes from the black hole; these are exotic ideas that are based on no scientific explanation, we should avoid exaggerated science speculation, we should try to be close to the reality as much as possible.

$$\underline{f_0} = f_S\, \gamma.(1 - \beta.\cos(\theta_S))$$

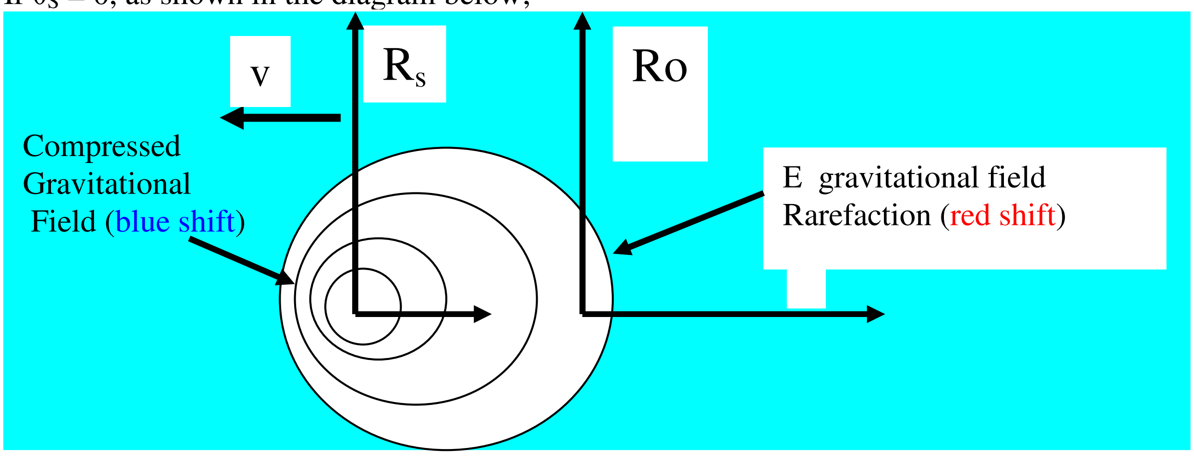
The Doppler Effect on the frequency of the variable component (radiation). f_0 denotes the observed frequency if the observer and the source were in relative motion with a velocity of v and f_S denotes the observed frequency if the observer and the source were at rest.



This phenomenon is well known in radars. Radar micro waves with a very thin frequency band in military and civil aviation are used to measure air turbulence using **klystron** coherent amplifies; a klystron is a specialized vacuum tube (evacuated electron tube) called a linear-beam tube, It has the advantage (over the magnetron used in micro wave oven) of coherently amplifying a reference signal and so its output may be precisely controlled in amplitude, frequency and phase. When the waves are reflected by the air molecules due to the Doppler Effect, waves having higher and lower frequencies than the reference frequency are reflected depending on the direction of movement of the each molecule. The frequency band of the reflected signal is broader than transmitted signal; the broadness of the frequency band is used as a measure of the turbulence. In the same way when the iron gas particles near the black holes emit light the frequency band broadens, when the move away from us the frequency decreases and when they move towards us the frequency increases. Some authors say the iron spectrum emitted by iron gas near the black hole is broader because the light looses energy when escaping from a black hole, such an approach is ridiculous!

How can matter escape from a black whole?

If $\theta_S = 0$, as shown in the diagram below;



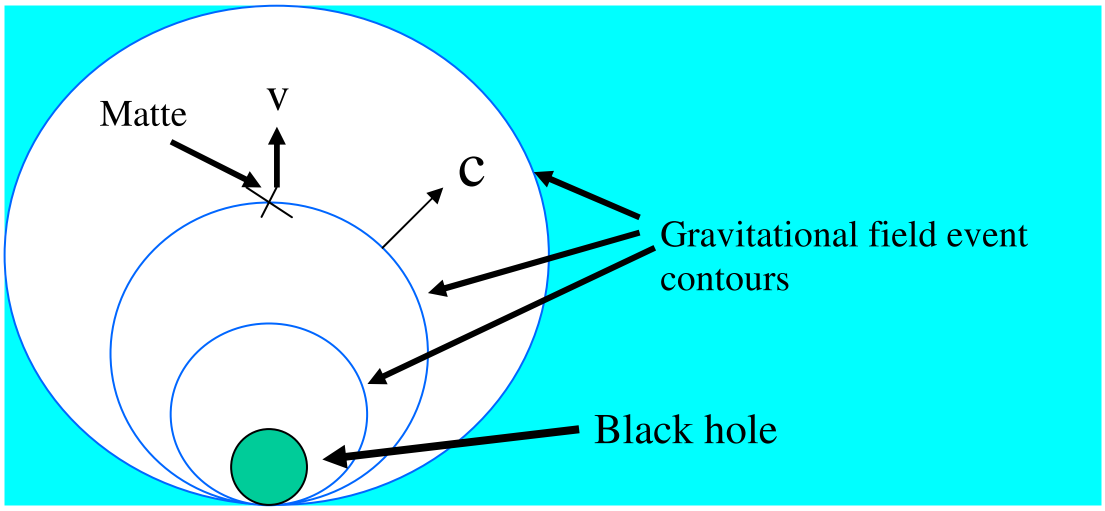
Then the observed gravitational field is given by;

$$g_0 = - \frac{Gm\,(1 - v/c)^{1/4}}{r^2\,(1 + v/c)^{1/4}}$$

Doppler Effect on the intensity of the gravitational field when $\theta_S = 0$. g_0 denotes the observed intensity of gravitational field if the observer and the source were in relative motion with a velocity of v.

If c → ∞ we get back the Newton's equation.

As we can see from the equation above, the higher the speed of separation, the less the interaction between the source and the observer is. Consider the gravitational field of a black hole having an interaction speed equal to the speed of light. Lets us replace the source with a black hole and the observer with the escaping matter in the vertical direction as shown in the diagram below.



If the speed of separation (escape) between matter and the black hole is equal to the speed of light, thus the matter is moving at the speed of light and the gravity is moving at the speed of light, the gravity has no effect on matter. $g_0 = 0$. In reality matter cannot attain the speed of light relatively to a source (black hole) but when it approaches the speed of light the gravitational field of the black whole that is experienced by the matter is very much ***diluted*** almost down to zero, ***as seen in the equation above***, this enables the matter to escape from the black hole with a velocity of escape less than the speed of light. This is due to the Doppler Effect on the black hole gravitational field. This is the matter ***quantum tunnel*** from the black hole. Our equation is in conformity with the observations since bipolar matter jets have been observed escaping from the black holes. There is no ***event horizon*** (point of no return) as long as matter could approach the speed of light. Laws of physics still hold in the black hole.

Why are black holes black?

The (temperature) is just a measure of the internal energy of motion and vibration of particles, and recall that whenever a body with vibrating charged particles, it radiates energy as electromagnetic waves but since in a black hole the matter is compressed in a very small volume, the electrons, neutrons, protons, e.t.c. are packed together almost side by side, these particles can hardly vibrate because there is almost no space in which to vibrate. Since the can hardly vibrate then the temperature of a black hole is near to zero Kelvin. If ever the black body radiates, it would be consisted of fiercely energetic particles (***Harking radiation***), X-rays for example. It is named after British physicist Stephen Hawking who worked out the theoretical argument for its existence in 1974. The power in the Hawking radiation from a solar mass black hole turns out to be a minuscule. It is indeed an extremely good approximation to call such an object 'black'.

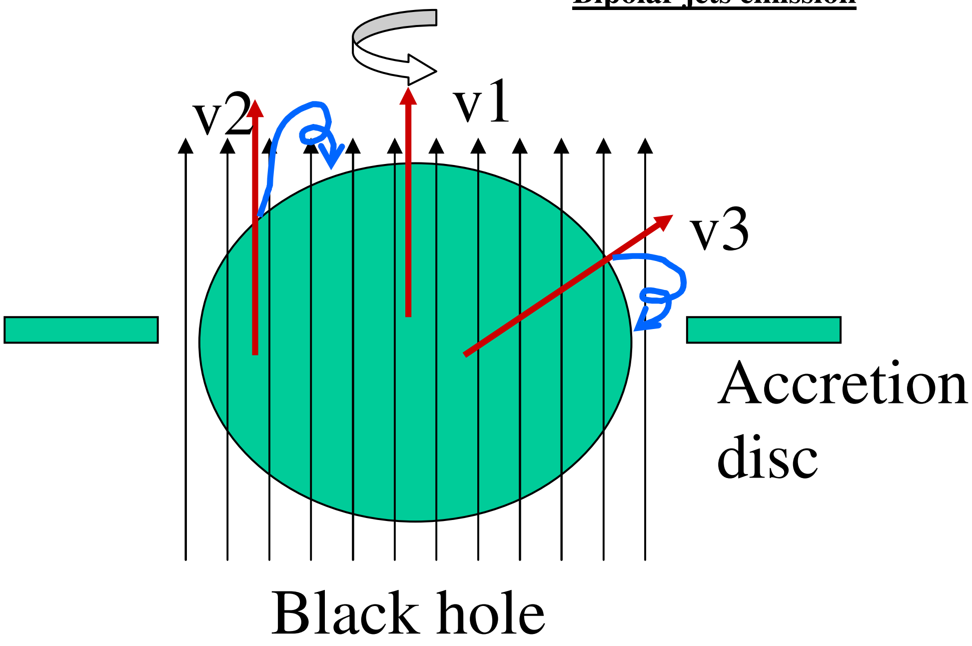
All interactions between light photons and matter are described as a series of absorption and emission of photons. If one examines a single molecule at the surface of a material, an arriving photon will be absorbed and almost immediately reemitted. The 'new' photon may be emitted in any direction, thus causing diffuse reflection. The emission of a light photon is because of electron vibration (back and forth). In a black hole the matter is compressed in a very small volume, the electrons, neuron, proton, e.t.c. are packed together almost side by side. In this case, the electron has no space in which they could vibrate (movement back and forth) in order to reemit light photons. In addition, when the light photons arrive on the surface of the black hole, they are absorbed, the energy is converted to masse ($E = mc^2$) and never reemitted since the electrons have no space in which they could vibrate in order to reemit light photons. It means the black hole reflected and emitted power is minuscule. That is why black holes are black.

Comparison between the Sun and and a black hole

Before getting a head, it would be interesting to compare the Sun and a black hole in the table below.

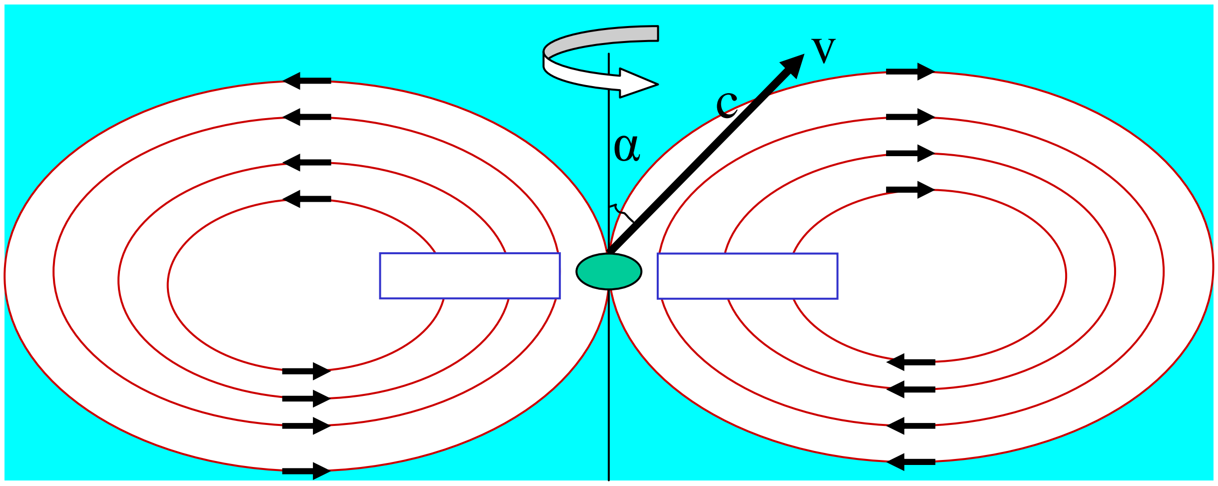
Sun	Black hole
bright	black
Very hot	Very cold ≈ 0 kelvin
mainly gaseous (hydrogen 74% and helium 25%)	mainly solid iron and nickel
small gravity	huge gravity
pressure waves	seismic waves
nuclear forces predominates	gravity force predominates
Masse → energy converter exothermic nuclear reactions, produces more energy than required to ignite the reaction (hydrogen → helium)	Energer → masse converter endothermic, produces less energy than required to ignite the reaction (X → iron and nickel)
Heats the surrounding bodies with the electromagnetic waves	heats the surrounding bodies with the gravitational waves
will one day implode into a white daft	***will one day explode, small local bang***

Bipolar jets emission

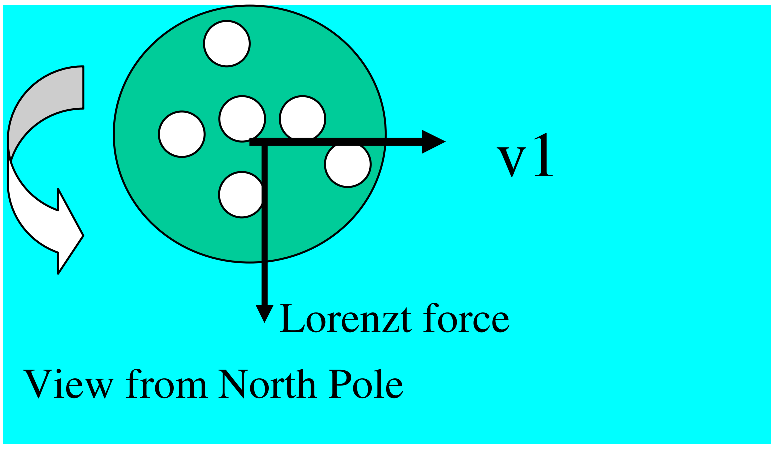


The figure above shows a schematic diagram of a rotating black hole, the series of vertical thin lines represent the gravitomagnetic field lines due to the rotation of the black hole. As matter is compressed by the huge gravity in a black hole; endothermic nuclear reactions (endothermic, produces less energy than required to ignite the reaction). The energy released produces seismic waves that enable matter to attain speeds near the speed of light. Since the black is very massive, the escape velocity of matter is close to the speed of light. Consider three directions; V_1, V_2 and V_3. When matter takes direction 3 with an escape velocity of V_3 it cuts the gravitomagnetic field lines, its trajectory is curved by the Lorenz force. Due to the huge gravitational field, it falls back to the black hole by making loops. When matter takes direction 2 with an escape velocity of V_2, its trajectory is curve by the radial huge gravitational field, it starts cutting the gravitomagnetic field lines; its trajectory is curved by the Lorenz force. Due to the huge gravitational field, it falls back to the black hole by making loops. When matter takes direction 1 with an escape velocity of V_1, $\alpha = 0$, the gravitational field is almost diluted to zero, very low potential energy change occurs and therefore very low lost of kinetic energy, it does not cut the gravitomagnetic field lines, it does not experience the Lorenz force, ***it spends less time near the black hole***, and it escapes straight away in space as a North Pole polar jet, a South Pole polar jet is produced in the same way. In that case, the only way that matter can escape from a rotating black hole is only through the ***bipolar jets tunnels***. They are the only ***escape tunnels to space***; all the other ***tunnels are prohibited*** by the gravitomagnetic field.

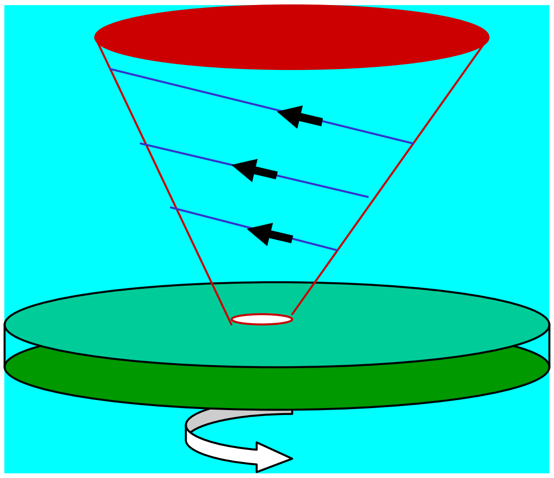
Bipolar jets trajectory



The series of oval lines show the gravitomagnetic field lines, the black whole is at the middle of the diagram and the two rectangular like blocks represent the accretion disc. In reality matter can escape away from the black hole at a certain angle α with respect to axis of rotation of the black hole and accretion disc system. The maximum angle α_e at which matter can escape from a given rotating black hole is known as the ***escape angle***. When matter escape from the black with a velocity of V_1, it cuts the gravitomagnetic field lines, at the beginning it experiences a horizontal Lorenz force a shown in the diagram below (view from North Pole, the holes represents the gravitomagnetic field lines section).



The trajectory is curved in the opposite direction of the rotation of the black hole, it gains angular momentum, thereby following a spiral trajectory, at a certain point where the gravitomagnetic field lines are slightly curved horizontally, it cuts the gravitomagnetic field lines at a skew angle, the matter experiences a vertical Lorentz force (North Pole direction). The matter is then accelerated vertically (North Pole direction) with an increasing radius. The matter then escapes in space following a helicoidally trajectory; the set of trajectories has almost the form of a cone as shown in the diagram below.



The three arrowed lines show the stream line of the North Pole bipolar jets.

Black hole, energy to masse converter

When matter falls in the black hole its kinetic energy is converted to masse and seismic waves. The matters temperature drops nearly to 0 Kelvin. Electromagnetic radiation (***Hawking radiation***) in minuscule because the black hole is so compact that charged particles have nearly no space in which to vibrate. Seismic waves are generated by endothermic nuclear reactions (produces less energy that the ignition energy i.e. with ***iron and nickel*** production) and produced by matter falling in the black hole. When these waves interfere in a constructive way, matter may be knocked out of the black at speeds close to the speed of light, if matter falls back in the black hole in a looping trajectory (gravitomagnetic Lorenz force), due to the synchrotron type of radiation, gravitational waves are radiated in space, very minuscule electromagnetic waves are radiated for two reasons; one, the body is still very cold nearly at zero Kelvin, the charged particles do not vibrate and two, the matter is still very compact in a very confined space, charged particles have to space in which the could vibrate. The bipolar matter jets act as a black hole valve just in the same way we have valves in pressure cookers otherwise the black hole could explode. In the overall case, the black hole receives more masse and energy that it reemits in the space, this process cannot last forever, and one day the black hole might make a ***small local bang***. Some scientists have been looking for time zero but why should there be the beginning of time and the end of time. Why should we assimilate birth and death to the Universe? Maybe the Universe has always existed. Maybe ***small local bangs*** are quasi periodic.

Transversal and longitudinal waves

Depending of the mode of propagation as we showed in our exposé, we can affirm that light and gravitational waves could be either be transversal or longitudinal, and these waves could be coupled depending on the nature of the source.

Propagation of gravitomagnetic transversal waves

To determine the gravitomagnetic wave, we will be obliged to distinguish three areas of radiation:

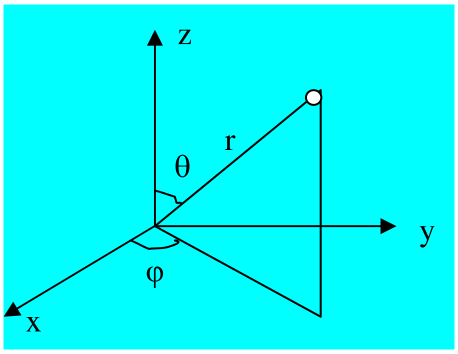
- the close radiation area, quasi stationary field ($r << \lambda$) ;
- the intermediate radiation area ($r \approx \lambda$) ;
- the far radiation area ($r>>\lambda$) ;

We will confine ourselves to the last area of radiation.

Coupling transversal electromagnetism and gravitomagnetism

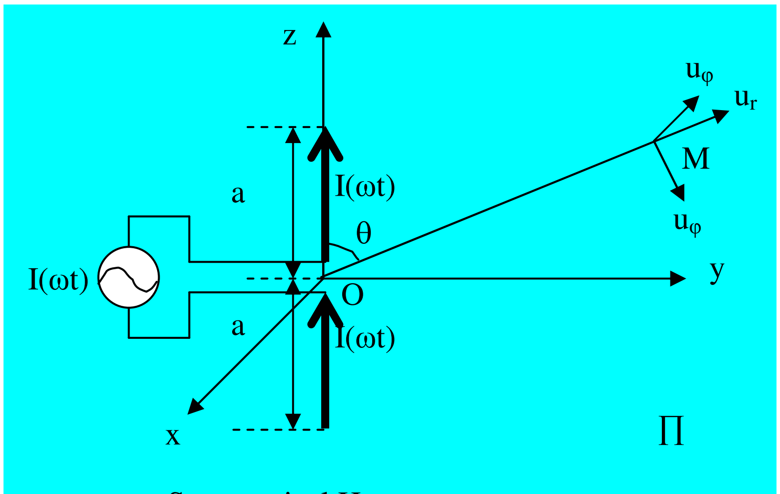
Electromagnetic wave, far radiation area:

We will use the spherical coordinates as shown in the diagram below:



Let us consider a Hertz antenna, we assume the electric current is uniform (amplitude and phase independent). Let the antenna have a length of 2a. The retarded vector potential A(M,t) build by an elementary electric current at a point M, that is very far away, as shown in the diagram below, is given by :

With $i = I_0 \cos(\omega t)$



Symmetrical Hertz antenna

$$A(M,t) = \frac{\mu_0}{4\pi}\int_0^{2a} \frac{dl}{r}\, i(t-r/c)$$

$$i(t-r/c) = I_0 e^{j\omega(t-r/c)} = e^{\,j\omega t} e^{-ikr}\, u_z$$

With $k = \frac{\omega}{C} u_r$ et $j = \sqrt{(-1)}$

We get:

$$A(M, t) = \frac{\mu_0\, 2a\, I_0}{4\pi r}\; e^{\,j\omega t} e^{\,jkr}\; u_z$$

Let the real part of the vector be:

$$A(M, t) = \frac{\mu_0\, a\, I_0}{4\pi r}\; \cos(\omega t\text{-}kr)\, u_z$$

If B is magnetic field, using the approximation of a plain wave, we get:

$$B = rot(A) = -jk \times A$$
$$= -j\|k\|\, u_r \times \|A\|\, u_z = j\, \|k\|\, \|A\|\, \sin(\theta)\, u_\varphi$$

Let:

$$B = jk\mu_0 \frac{2aI_0}{4\pi r} \sin(\theta)\, e^{j\omega t} e^{jkr}\, u_\varphi$$

But $B = \frac{k \times E}{\omega}$, we deduce:

$$E = jk\mu_0\omega \frac{2aI_0}{4\pi r} \sin(\theta)\, e^{j\omega t} e^{jkr}\, u_\theta$$

The real parts of the fields are:

$$B = -\mu_0 \frac{kaI_0}{2\pi r} \sin(\theta) \sin(\omega t - kr)\, u_\varphi$$

$$E = -\mu_0 \frac{\omega aI_0}{2\pi r} \sin(\theta) \sin(\omega t - kr)\, u_\theta$$

The average Poynting vector is written as:

$$S = \frac{1}{2\mu_0} R\,[E \times B^*] = \frac{\mu_0 a^2 (I_0)^2 \omega^2}{8\pi^2 r^2 c} \sin^2(\theta)\, u_r$$

B^* = the conjugate of B $(a + jb)^* = (a - jb)$ with $(a,b) \in \Re^2$ **and** $\mathbf{j = \sqrt{(-1)}}$.

If B_g is the gravitomagnetic field and B the magnetic field, we have already shown that:

$$\mathbf{B_g = \frac{m_e \mu_g}{q_e \mu_0} . B . u_b},$$ u_b being a unit vector.

After substituting B in the equation relating B and B_g, B_g is given by:

$$B_g = -\mu_0 \frac{ka\, \mathbf{m_e \mu_g}\, I_0}{2\pi r\, \mathbf{q_e \mu_0}} \sin(\theta) \sin(\omega t - kr)\, u_\varphi$$

The set of Maxwell and Faraday equations constitute a linear application. In mathematics, a **linear application** (also know as linear operator) is an application between two vector spaces which respect addition of vectors and the scalar multiplication defined in those spaces, or, in other terms, that « preserve linear combination ».

Definition

Let

f : E → F from E towards F

An application where *E* and *F* are two $\mathbb{K}$ vector spaces.

f is a **linear application if**:

- $\forall x \in E, \forall y \in E, f(x+y) = f(x) + f(y)$
- $\forall \lambda \in \mathbb{K}, \forall x \in E, f(\lambda \cdot x) = \lambda \cdot f(x)$

An application that posses the first property is said to be additive, and, for the second, **homogenous**.

Let

$$\text{Scalar (S)} = \frac{\mathbf{m_e\,\mu_g}}{\mathbf{q_e\,\mu_0}}$$

S is a multiplying scalar corresponding to λ in the linear application, not to mistake with the wave length.

*Since the set of Maxwell and Faraday equations constitute a linear application that is additive and **homogenous**. Since the gravitomagnetic field is proportional to the magnetic field and since this application (set of Maxwell and Faraday equations) is invariant with respect to proportionality (multiplying scalar,).*

Knowing that in electromagnetism that the magnetic field is derived from:

$B = \frac{k \times E}{\omega}$, Where E is the electric field build by the charge

We can affirm that there exists a field g from which the the gravitomagnetic field is derived, such that:

$B_g = \frac{k \times g}{\omega}$, Where g is a field build by the masse:

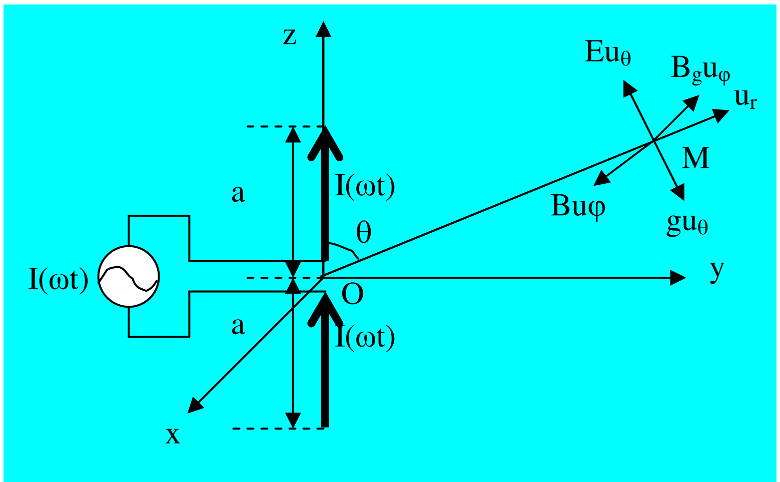
$$g = -\ \mu_0 \frac{\omega a\, \mathbf{m_e\,\mu_g}}{2\pi r \mathbf{q_e\,\mu_0}} I_0 \sin(\theta)\sin(\omega t - kr)\ u_\theta$$

The field g is the gravitational field, thereby:

$$B_g = -\ \mu_0 \frac{ka\ \mathbf{m_e\,\mu_g}}{2\pi r\ \mathbf{q_e\,\mu_0}} I_0 \sin(\theta)\sin(\omega t - kr)\ u_\varphi$$

$$g = -\mu_0 \frac{\omega a\, \mathbf{m_e} \boldsymbol{\mu_g} I_0}{2\pi r \mathbf{q_e} \boldsymbol{\mu}} \sin(\theta) \sin(\omega t - kr)\, u_\theta$$

The charge q_e is a negative quantity; we have to take care about the orientation of these fields. The following diagram shows the electromagnetic and the gravitomagnetic fields.



Symmetrical Hertz antenna

We can compare the magnitude of the electromagnetic and the magnitude of the gravitomagnetic waves, by dividing B_g by B and g by E, from the following equations;

Electromagnetic wave is given by;

$$B = -\mu_0 \frac{kaI_0}{2\pi r} \sin(\theta) \sin(\omega t - kr)\, u_\varphi$$

$$E = -\mu_0 \frac{\omega aI_0}{2\pi r} \sin(\theta) \sin(\omega t - kr)\, u_\theta$$

The gravitomagnetic wave is given by;

$$B_g = -\mu_0 \frac{ka\, \mathbf{m_e} \boldsymbol{\mu_g} I_0}{2\pi r\, \mathbf{q_e} \boldsymbol{\mu_0}} \sin(\theta) \sin(\omega t - kr)\, u_\varphi$$

$$g = -\mu_0 \frac{\omega a\, \mathbf{m_e} \boldsymbol{\mu_g} I_0}{2\pi r \mathbf{q_e} \boldsymbol{\mu_0}} \sin(\theta) \sin(\omega t - kr)\, u_\theta$$

After division, we find:

$$\mathbf{B_g = \left(\frac{m_e}{q_e} \cdot \frac{\mu_g}{\mu_0}\right) \cdot B}$$

$$\mathbf{g = \left(\frac{m_e}{q_e} \cdot \frac{\mu_g}{\mu_0}\right) \cdot E}$$

Remainder: Since the set of Maxwell and Faraday equations constitute a linear application that is ***additive and*** **homogenous**. *Since the gravitomagnetic wave is proportional to the magnetic wave and since this application (set of Maxwell and Faraday equations) is invariant with respect to proportionality (multiplying scalar,). We can affirm that the gravitomagnetic waves are also governed by the set of Maxwell and Faraday equations in vacuum, such that:*

Local equations

$\text{div } g = -\rho/\varepsilon_g$, ρ = masse volume density

$\text{div } B_g = 0$

$$\text{rot } g = -\frac{\partial B_g}{\partial t}$$

$\text{rot } B_g = \mu_g\left(j_m + \varepsilon_g \frac{\partial g}{\partial t}\right)$,j_m being the masse current intensity.

With

$$\Delta g - \varepsilon_g \mu_g \frac{\partial^2 g}{\partial t^2} = 0$$

$$\Delta B_g - \varepsilon_g \mu_g \frac{\partial^2 B_g}{\partial t^2} = 0$$

The gravitomagnetic waves are propagated at a speed of c in vacuum such that;

$c^2 \varepsilon_g \mu_g = 1$

The gravitomagnetic waves transport energy. The energy local density U is given by:

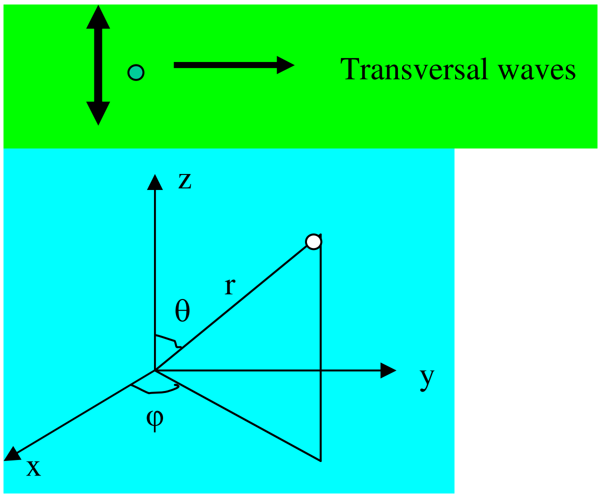
$$U = \varepsilon_g \frac{\|g\|^2}{2} + \frac{\|B_g\|^2}{2\mu_g} \quad , (\ kg/m^1s^2\ )$$

The energy current is given by the vector of Poynting $\prod$;

$$\prod = \frac{g \times B_g}{\mu_g} \quad , (\ kg/s^4\ )$$

Gravitational waves radiation

When matter vibrates it radiates transversal gravitational waves.



Let $z = a.\sin(\omega t)$, where z is the distance of matter masse m from the mean point, a is the amplitude, $\omega = 2\pi f$ and t the time. The velocity v is given by; $v = a.\omega.co(\omega t)$ ($v << c$ ➔ $a.\omega. << c$). The masse current ig(t)g is given by;

$$ig(t) = \frac{dm}{dt} = \frac{dm}{dz} \cdot \frac{dz}{dt} = \frac{m \cdot v}{2a} = \frac{m \cdot a.\omega.co(\omega t)}{2a} = \frac{m.\omega.co(\omega t)}{2}$$

If Ig is the maximum current then $Ig = \frac{m.\omega.}{2}$

The average Poynting vector is written as:

$$S = \frac{1}{2\mu_g} R\,[g \times B_g^{*}] = \frac{\mu_g\, a^2 (I_g)^2\, \omega^2}{8\pi^2\, r^2\, c} \sin^2(\theta)\; u_r$$

Since $Ig = \frac{m.\omega.}{2}$

Then S is given by;

$$S = \frac{\mu_g\, m^2\, a^2\, \omega^4 \sin^2(\theta)}{32\pi^2\, r^2\, c}\; u_r$$

The average total power radiated P is given by;

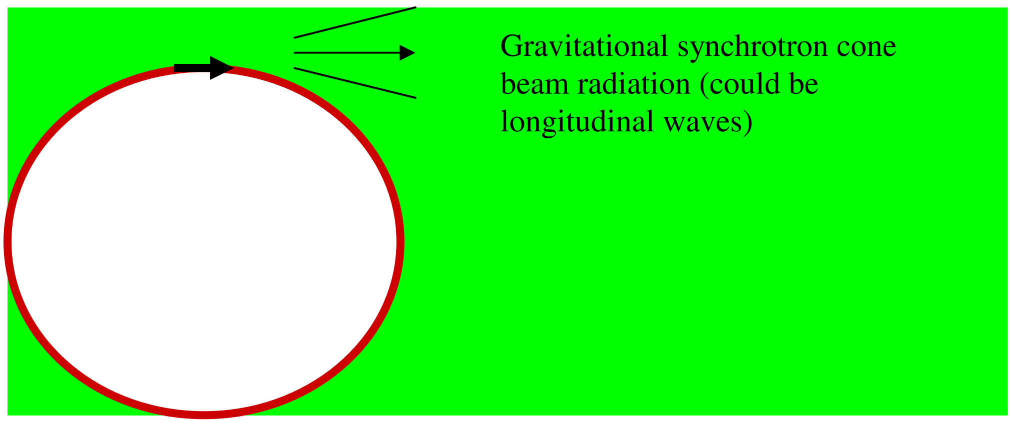
$$\mathbf{P} = \int ds.d\Sigma \text{ , where } d\Sigma = r^2 \sin(\theta)d\varphi\, u_r$$

With $0 < \varphi < 2\pi$ and $0 < \theta < \pi$

$$P = \frac{\mu_g m^2 a^2 \omega^4}{12\pi c}$$

This is the gravitational radiation power lost in space by a vibrating masse particle par cycle, thus par period of time T.

When matter of masse m goes around a curve or accretes a black hole in generates synchrotron gravitational radiation (at relativistic speeds it could generate "infra red to X rays" gravitational waves, at low speeds the frequency could vary from a fraction of a cycle/second up to giga cycles/second). This leads to loss of energy thru gravitational radiation.



If the speed of matter $v \ll c$ (speed of light), then we can ignore the gravitational synchrotron radiation and just consider the far area dipole radiation (hertz antenna).

The position of a masse particle m around a circular orbit of radius a is given by;

$y = a.\sin(\omega t)$
$x = a.\cos(\omega t)$

This is equivalent to 2 masse particles that execute simple harmonic motions in orthogonal directions x and y.

The average total power radiated P is equal to twice the power of a masse particle that executes a linear simple harmonic motion seen above; thus

$$P = \frac{\mu_g m^2 a^2 \omega^4}{6\pi c}$$

or

$$P = \frac{\mu_g m^2 v^4}{6\pi c a^2}$$

This is the gravitational radiation power lost in space by a masse particle going around a circular orbit par cycle, thus par period of time T.

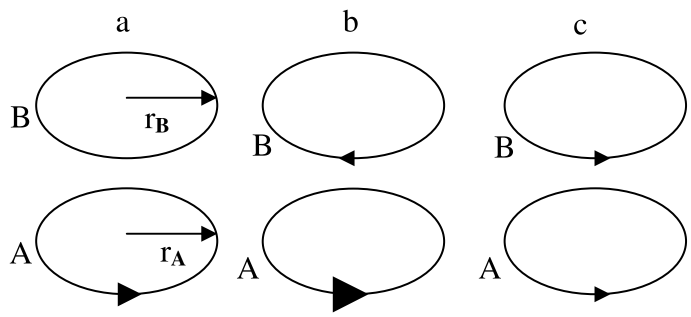
Gravitomagnetic induction

The gravitomagnetic induction leads to the production of a potential difference between ends of a masse conductor which is exposed to a variable gravitomagnetic field. We will call this potential difference, the gravitomotive force.

- The law of Maxwell-Faraday gives the relationship between the induced g.m.f (gravitomotive force) e_g and the gravitomagnetic field B_g flux φ that traverses a masse circuit, it is given by;

$$e_g = -\frac{d\varphi}{dt} \quad \text{Or} \quad \Phi = \iint_S (B_g ds)$$

The following diagram shows the principle of induction



The phenomena of induction between two masse currents (c, b and c): when the ring A is passed by a stationary current, no current is induced in the ring B (a). If, in the contrary, the current in the ring A increases, it induces a current in the opposite sense in the ring B(b), and if it decreases (c) it induces a current in the same sense B(c). This is in accordance with the model published by Maxwell in 1891, in his third edition of Treatise on Electricity and Magnetism.

Let:

- m_A is the masse of the ring A
- m_B is the masse of the ring B
- v_A is the rotating speed of the ring A
- v_B is the rotating speed of the ring B
- I_A is the moment of inertia of the ring A
- I_B is the moment of inertia of the ring B
- $\omega = 2\pi\times$frequency of rotation
- P le power input.

In accordance with the principle of conservation of energy;

$$P = m_A \,.\, v_A \frac{d\, v_A}{dt} + m_A \,.\, v_A \frac{d\, v_A}{dt} + \text{waste (radiation)}$$

Or

$$P = I_A \,.\, \omega_A \frac{d\, \omega_A}{dt} + I_A \,.\, \omega_A \frac{d\, \omega_A}{dt} + \text{waste (radiation)}$$

Remark 4: An accelerating masse induces masse currents in space by exciting the nearby masses. In that case we have to take into account the masses near the accelerating masse in order to determine its acceleration. This is because the nearby masses tend to break the accelerating masse by absorbing its kinetic energy by induction effect. When considering any element, we have to take into account the contents of its environment.

Remark 5: The electromagnetic waves generation implies the generation of gravitomagnetic waves because the charges (electrons or protons) that generate these waves have a masse but on the contrary the gravitomagnetic waves can be generated by neutral vibrating masses without the generation of electromagnetic waves.

Electrogravitomagnetic wave energy

Accord the remark 5, the light is not only composed of electromagnetic waves, it is also composed of gravitomagnetic waves; we shall call this wave, electrogravitomagnetic wave.

The electrogravitomagnetic wave transports energy. The energy local density U of the electrogravitomagnetic wave is given by:

$$U = \frac{\varepsilon_0 \|E\|^2}{2} + \frac{\|B\|^2}{2\mu_0} + \frac{\varepsilon_g \|g\|^2}{2} + \frac{\|B_g\|^2}{2\mu_g} \quad , (\ kg/m^1 s^2\ )$$

With;

$$\mathbf{B_g} = \left(\frac{m_e}{q_e} \cdot \frac{\mu_g}{\mu_0}\right) \cdot \mathbf{B}$$

$$\mathbf{g} = \left(\frac{m_e}{q_e} \cdot \frac{\mu_g}{\mu_0}\right) \cdot \mathbf{E}$$

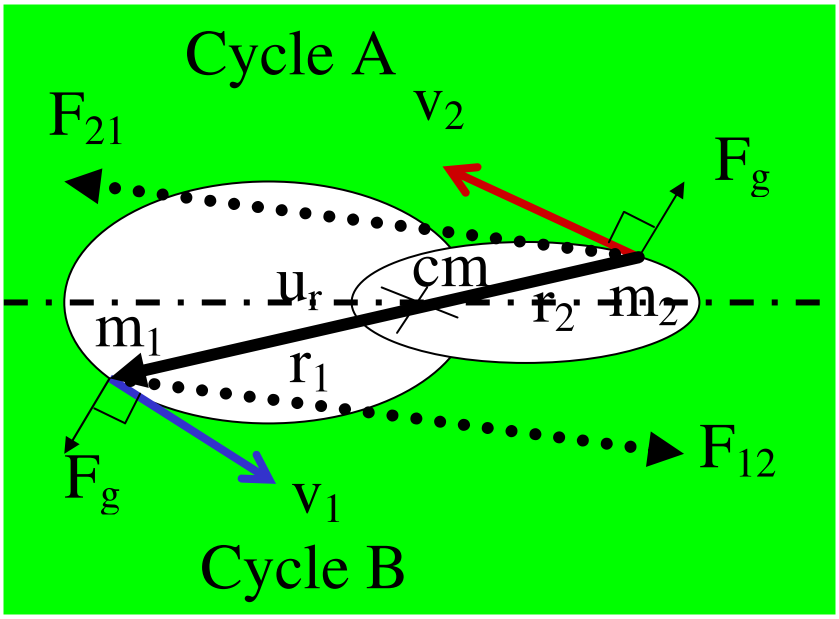
After substitution, we get:

<u>Electrogravitomagnetic wave equation of energy</u>

$$U = \frac{\left(\varepsilon_0 + \varepsilon_g \left(\frac{m_e \mu_g}{q_e \mu_0}\right)^2\right) \|E\|^2}{2} + \frac{\left(\frac{1}{\mu_0} + \frac{1}{\mu_g}\left(\frac{m_e \mu_g}{q_e \mu_0}\right)^2\right) \|B\|^2}{2}$$

9 cosmological blunders of the last 85 years solved

1) Two-body problem



F_{21} is the force exerted on masse particle m_2 by m_1
F_{12} is the force exerted on masse particle m_1 by m_2
The forces between the two masse particles are not radial as describe by the Newton's law.
C_m is the center of masse and r is the distance between m_1 and m_2
r_1 is the distance of m_1 frrom the center of masse Cm and r_2 is the distance of m_2 frrom the center of masse C_m
Fg is the gravitomagnetic force exerted on m_1 and m_2

1) $F_{21} + F_{12} = 0$
2) $m_1r_1 = m_2r_2$, $r = r_1 + r_2$
3) $m_1V_1 + m_2V_2 = 0$
4) $\mathbf{F_g = \{ \mu_g m_1 m_2 V_1 \times (V_2 \times u_r) \} / r^2}$

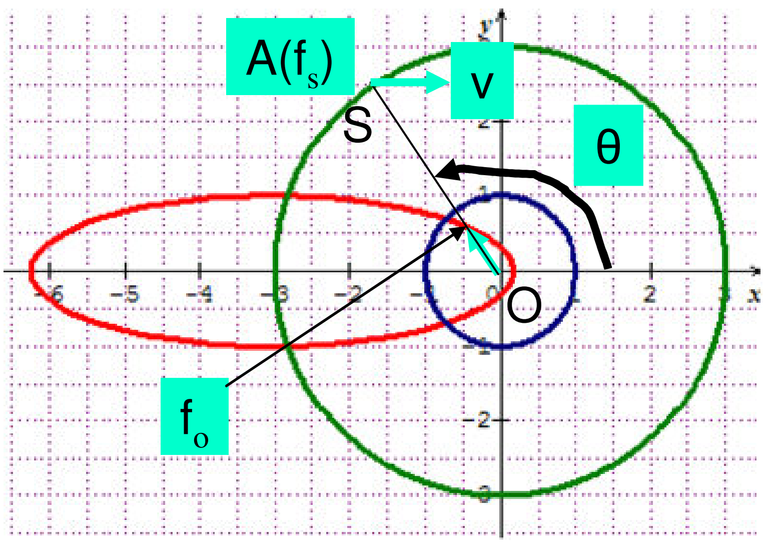
- The velocities V_1 and V_2 are always in opposite directions.
- The Lorentz gravitomagnetic force $\mathbf{F_g}$ is always perpendicular to the velocities V_1 and V_2

Since the Newton's component of gravitational force is radial, it does not exert a moment of force on the two-body system. But since the gravitomagnetic force component Fg is not radial, it exerts a moment of force on the two-body system. This moment of force is negative during half cycle A **with respect to the orbit on the left part of the diagram above** and positive during half cycle B. This moment of force induces a negative rate of angular change of momentum known as torque during half cycle A and positive one during half cycle B. Thus an alternating torque, hence an alternating rate of change of angular momentum of the two-body system. There is no conservation of angular momentum as stated by the Newton's law.

As the masse particles move around their orbits, they continuously loose energy through gravitational waves radiation but the loss of energy through gravitational waves radiation is not equal in both half cycles A and B. There is no conservation of energy in the two-body system as stated by the Newton's law due to gravitational waves radiation. During half cycle B the masse particles' velocities increase (acceleration) along the path of their orbits. Masse particles acceleration implies increased energy loss through gravitational waves radiation. **A two-body system is not a closed system, it is an open system that looses energy thru gravitational waves radiation, in that case there is no energy conservation and no angular momentum conservation as stated by the Newton's law, this is also true for an n-body system.** During half cycle A the masse particles' velocities decrease (deceleration) along the path of their orbits. Masse particles deceleration implies decreased energy loss through gravitational waves radiation. Hence the energy loss through gravitational waves radiation of the two-body system in half cycle B is always greater than energy loss in cycle A. The torque in cycle B is always greater than the torque in cycle A. As a result the two-body system spins (perihelion advance) very slowly in the counter clockwise direction (positive direction). The more the orbits are eccentric the more imbalanced is the energy loss through gravitational waves radiation between cycle A and B. **This explains why the mercury perihelion advance is greater than the Earth perihelion advance because the mercury orbit is more eccentric than the orbit of the Earth. Frontier Physics Evidence, a central concept in science and the scientific method is that all evidence must be empirical, or empirically based, that is, dependent on evidence that is observable by the senses**. ➔ The planets perihelion advance is measured in radians par second and the gravitomagnetic field is also measured in radians par second. Then there should be a direct relationship between the planets perihelion advance and the gravitomagnetic field. **This is part of the frontier physics evidence, which could help us to calculate the perihelion advance for any planet!**

2) Big Bang theory the 9th cosmological blunder?

The relativistic Doppler Effect is the change in frequency of light, caused by the relative motion of the source and the observer (like in the regular Doppler Effect), when taking into account effects of the special theory of relativity (Lorentz transformation). The relativistic Doppler Effect is different from the non-relativistic Doppler Effect as the equations includes the time dilation effect of special relativity. They describe the total difference in observed frequencies and possess the required Lorentz symmetry. If the reference frames of the observer O and the source S are moving away with velocity υ along the ox axis. The angle θ relative to the direction from the observer to the source as shown in the diagram below;



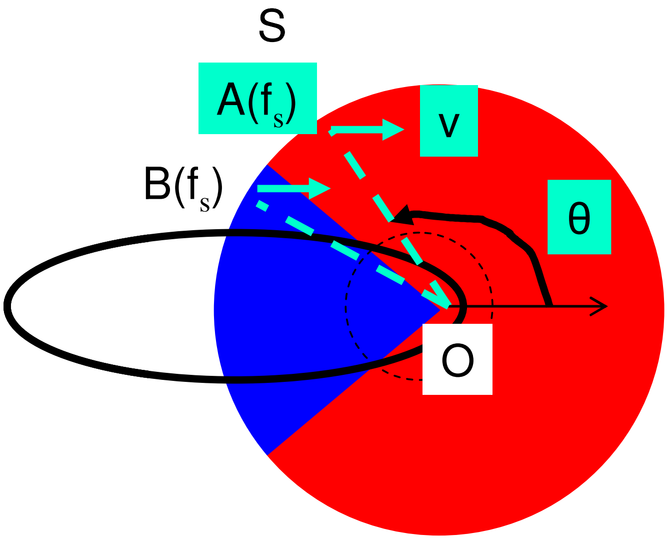
f_s = frequency of the at which the electromagnetic wave is radiated by the source.
f_o = frequency of the at which the electromagnetic wave is received by the observer.

The equation below gives fo as a function of fs;

$$f_o = \frac{f_s}{\gamma\left(1 + \frac{v\cos\theta_o}{c}\right)} \quad \textbf{(1)}$$

The diagram above shows the frequency change as a function of the angle of sight θ, the distance between the oval red "cycle" and the origin O gives the ration f_o/f_s at a given angle θ with respect to the origin O, The two intersection points between the blue cycle of radius one and the red oval "cycle" indicate the points where $f_o = f_s$ ➔ $f_o/f_s = 1$. υ = 95% the speed of light c.

The diagram below shows the area in the left side in which the source S frequency is blue shifted and in the right side in which the source S frequency is red shifted with respect to the observer O.

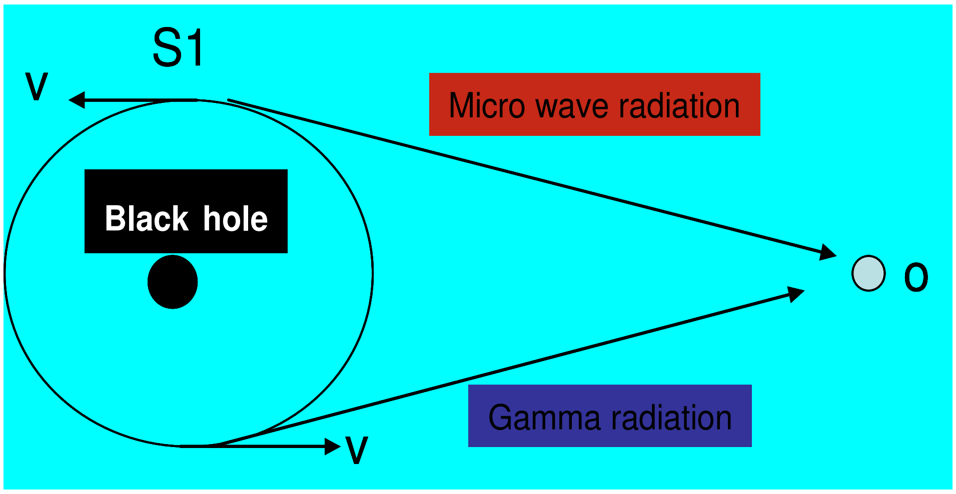


1) Consider point A, the frequency is red shifted but as the source A move along the ox direction at a velocity of υ, the distance between the source A and observer O decreases up to θ = ½π but at the same time it becomes more and more red shifted! The observer interprets that the source is moving away from her or him. As the source moves to the right the angle θ decrease, the source frequency becomes more and more red shifted and the observer interprets that the source is accelerating, and thereby the Universe expansion is accelerating due to negative pressure. The Big Bang theory tells us that red shift due to the fact that the source is moving away from the observer, that this is a proof of Universe expansion which is the bases of Big Bang theory. But in the case above there is red shift and the source is approaching the observer. In this particular case the Big Bang theory is incoherent. One can change the direction of υ to - υ but for Lorentz symmetrical reasons the spectrum and the areas are just inverted. The result is the same as above.

2) Consider point B, the frequency is blue shifted but as the source A move along the ox direction at a velocity of υ the distance between the source B and observer O decreases up to blue/red boundary but at the same time it becomes less and less blue shifted! The observer interprets that the source is deceleration and one time it will have a zero velocity, when the source B reaches the blue/red boundary the observer observers that fo = fo, he interprets that the source is immobile, when the source traverses the blue/red boundary it starts to be more and more red shifted, like in case (1) the observer interprets that the source has started to move away from her or him. But as we can see in the diagram above, the source is still moving nearer to the observer. This is another incoherency of the Big Bang theory.

At υ = 95% the speed of light the probability of detecting red shift is more that 70% and for very low speeds above zero (υ > 0), the probability is more than 50% due to transverse Doppler Effect. The red shift is necessary but not sufficient to support the Big Bang theory.

3) Consider a source S1 (star) spiraling around a black at a speed of υ near the speed of light with respect to an observer O. As shown in the diagram below;



When the source it is moving away from the observer O, on the top side of the diagram, the observers receivers micro wave radiation due to red shift. The observer interprets that her or him is receiving Big Bang comic micro wave background radiation and this is a proof of Universe expansion! The Big Bang invented dark energy (70%) to explain the cosmic micro wave in order to hide its incoherency. In the spectrum diagram we notice that a 90% the speed of light the probability to detect comic micro waves is 70% and for lower speeds > zero the probability is more that 50% due to transverse Doppler Effect.This is the third incoherency of the Big Bang theory.

4) When the source is moving towards toward the observer, the observer receives gamma rays busts due to blue shift at a very narrow angle and obviously followed by lower frequency radiations (pseudo synchrotron radiation). The observer interprets that a star is collapsing some in the Universe. This is the fourth incoherency in cosmology.

5) Local black hole explosions could be a common event in the Universe, the occurrence of these event is random in the Universe, they could compared to the heavy nucleus of the uranium atom, to form a uranium atom, energy is converted to masse endothermic reaction, when it receives extra energy by collision with a very energetic masse particle or by compression in order to ignite the nuclear reaction, the energy/masse equilibrium in ruptured, the atom explodes by releasing a huge amount of energy by masse/ energy conversion exothermic reaction. In the same way the black is formed by a process of energy to masse conversion endothermic reaction, that is why the black hole is black because it hardly emits light since the masse particles are so much confined by the huge gravitational field that the can hardly vibrate to produce thermo radiation, there is hardly no thermo agitation, since the temperature is a measure of thermo agitation, the temperature of a black hole is nearly zero Kelvin. The black cannot receive energy and matter forever, at a certain point the energy/masse equilibrium is ruptured and the black hole explode as a local small bang, At the start of the explosion and due to Doppler Effect the light is very highly blue shifted to gamma rays. These gamma rays burst are observed on the Earth as very powerful radiation at a very narrow angle and the followed by lower frequency radiation that are produced when explosion slows down, when particles reach the group maximum speeds.

6) Last but not least, "Two of the greatest successes of the Big Bang theory are its prediction of its almost perfect black body spectrum and its detailed prediction of the anisotropies in the cosmic microwave background."

Since there is no privileged direction in the Universe, the gamma rays bursts due to explosion of black holes (local small bang) are received on the Earth from all directions, image that the galaxies were moving at random speeds and in random directs governed by the Gauss law of probability? They would then produce a black body radiation spectrum in all directions corresponding to a certain temperature. This is in the same way that a perfect black body radiates electromagnetic waves by thermal agitation that is governed by the Gauss law of probability. Due to relativistic Doppler Effect, when molecules move away from us the light is red shifted and when they move toward us the light is blue shifted producing what is known as black body spectrum. The temperature is just a measure of thermal agitation; analogically the temperature of the Universe is just a measure of the Universe agitation.

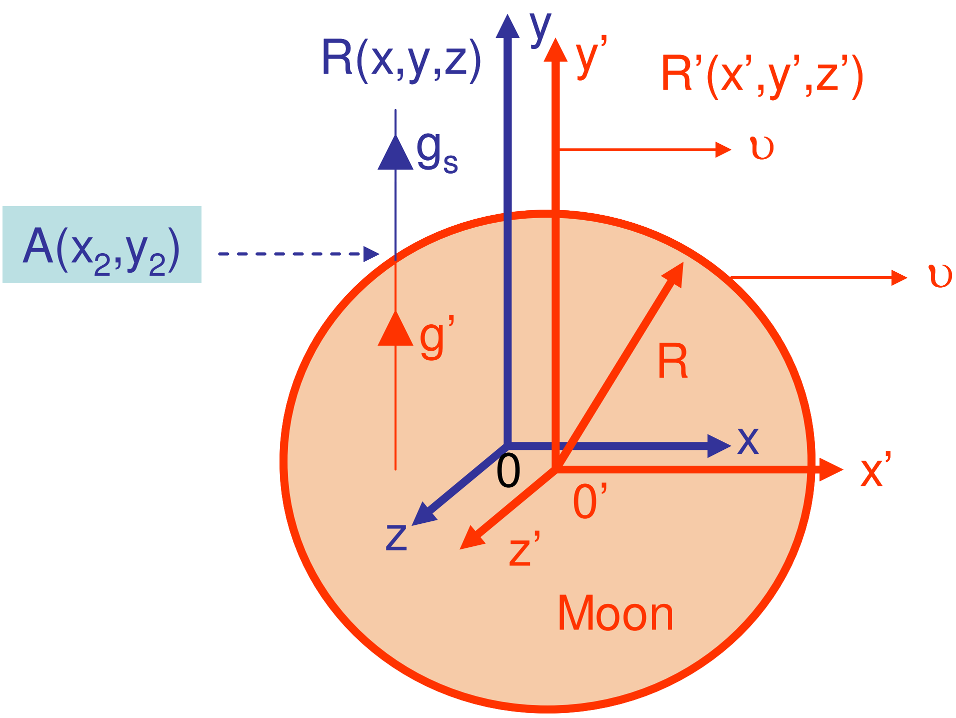
Why did the advocates of Big Bang theory = local small bang gather circumstantial evidence of the Universe expansion to the detriment of the Steady State theory? I'm neither an opponent of Big Bang theory nor I'm I an advocate of Steady State theory since the two theories are almost right. I'm just trying to test the stability of these theories.

May be the two theories are almost right ; the Big Bang theory describes a small local bang, that is a common invent in the Universe as a result of an explosion of black holes, the Steady State theory describes the global energy/masse dynamic equilibrium in the entire Universe but energy/masse dynamic instability at local level. If that is the case, can we talk about time zero that corresponds to our local small bang? The rest of the Universe existed before our time zero. Is the explosion/implosion of our local small bang periodic? The advocates of the Big Bang suggest that the Universe is flat, it is not the Universe that is flat, it is the nearby galaxies that revolve together and thereby compressed into a thin disk toward the equatorial orbit by the gravitomagnetic field. See 8 cosmological blunders. PDF. The Big Bang invented dark matter to hide its incoherency. The advocates of both theories should work together in order to elaborate a global coherent cosmology theory.

The gamma rays bursts and the cosmic microwave radiation are frontier physics evidences.
The facts are there, the facts remain the keystone in which the stability of a theory must be tested.

3) Allais Effect

In the 1950s Professor Allais Maurice undertook several marathon experimental series in Paris, which involved repeated determinations of the rate of precession of a Foucault pendulum. He detected various periodic anomalies in the motion of this pendulum by using elaborate statistical analysis. However he also observed a quite large scale effect which was absolutely unexpected. During two of these experimental series, solar eclipses partial at Paris occurred on 30 June 1954 and 2 October 1959. In both cases a well-defined anomaly was detected in the motion of the Foucault pendulum: its plane of oscillation shifted abruptly. Currently accepted physical theory offers no explanation whatsoever for this phenomenon. It is the only gross anomaly outstanding in the current scheme of physical knowledge.



Consider the Moon's reference frame R'(x',y',z',t') moving at a velocity of υ along the x axis with respect to the Earth's/Sun's reference frame R(x,y,z,t) such that at t = 0 (time in reference frame R(x,y,z,t)) the origin 0 of the Earth's/Sun's reference frame R(x,y,z,t) and the origin 0' of the Moon's reference frame R'(x',y',z',t') coincide in space. The coordinates of the two reference frames are given by;
R(0,0,0,0) and R'(0,0,0,t').

The Lorentz transformation gives us the link between the coordinates of the two reference frames; R(x,y,z,t) and R'(x',y',z',t').

Let us determine the distance between point A and the origin 0' simultaneously in the Moon's reference frame R'(x',y',z',t'), this means that we have to determine the coordinates of A and origin 0' simultaneously, the two coordinate determination can be considered as two events that occur simultaneously in the Moon's reference frame R'(x',y',z',t'), the coordinates of the two events are given below;

Coordinates(A) = R'(x'_2,y'_2,0,t') and Coordinates(0') = R'(0,0,0,t')

Let us determine the distance between the point A and origin 0' in the Earth's/Sun's reference frame R(x,y,z,t) at time t = 0, this means that we have to determine the coordinates of A and origin 0' simultaneously, the two coordinates determination can be considered as two events that occur simultaneously in the Earth's/sun's reference frame R(x,y,z,t), the coordinates of the two events are given below;

Coordinates(A) = R(x_2,y_2,0,0) and Coordinates(0') = R'(0,0,0,0)

Assume that the Moon is a perfect sphere, and it is isotope, homogeneous and linear medium where the speed of the gravitational interaction of any frequency (for simplicity purposes) is propagated at the speed of V.

With

$$\beta(\upsilon,V) = \upsilon/V \text{ and } \gamma = 1/\sqrt{(1-\beta^2(\upsilon,V))}$$

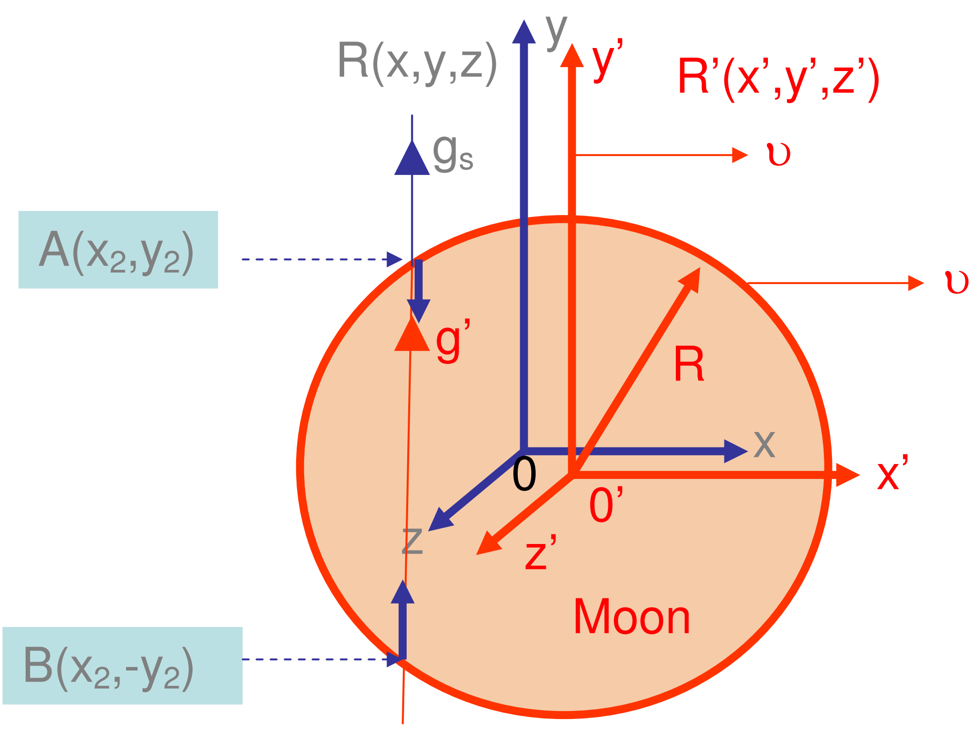
Consider two points A and B in the in the Earth's/Sun's reference frame R(x,y,z,t). Point A slides down and point B slides up as the Moon moves across the sky. Such that Vx = 0. The loci of A(x,y,z,t) and B(x,y,z,t) always belongs to the cross of the Moon as shown in the diagram below,

Vx = 0 ➔ V'x = υ with respect to the Earth/Sun's reference frame.

Due to x axis length contraction of the cross section of the Moon "viewed" in the Earth reference frame R(x,y,z,t), this is just a mathematical tool, there is no physical reality in length contraction, the equation of the cross section of the Moon is given by; $x^2/\gamma^2 + y^2 = R^2$, $-R \leq x \leq R$

$$\Rightarrow V_y = \frac{-x\upsilon}{\gamma^2\sqrt{(R^2 - x^2/\gamma^2)}}$$

If x = R ➔ $V_y = -(1-\upsilon^2/V^2).V$**, this means that the velocity of point A can never be greater than the speed of the gravitational interaction V in matter.**



Boundary conditions in gravitostatics

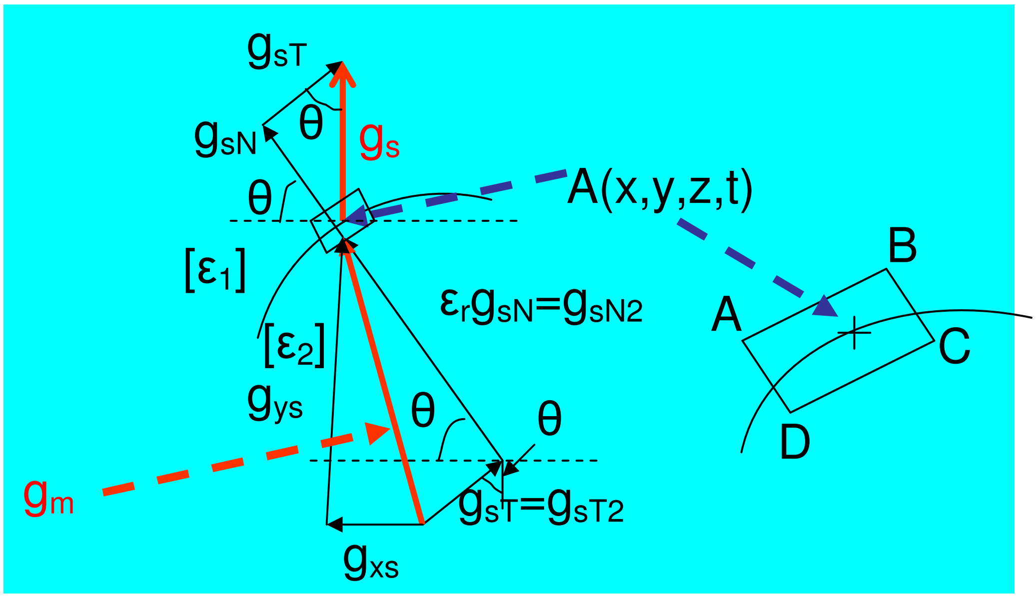
1) **$\varepsilon_g = 1$, denotes the vacuum permittivity of the gravitational field.**
2) **$\varepsilon_m > \varepsilon_g$ 1 , denotes matter permittivity of the gravitational field.**
3) **$\varepsilon_r = \varepsilon_{m/}\ \varepsilon_g > 1$, denotes matter relative permittivity of the gravitational field.**

We are going to determine the gravitational static components; in this case we shall assume that the Moon is immobile with respect to the Earth's/Sun's reference frame R(x,y,z,t)

If there are no mobile masses (masse currents) in the vacuum/matter boundary; and in accordance with the local theorem of Gauss, the circulation of the gravitational field g_s in an elementary closed contour ABCD is null. By tending BC and DC towards zero, we obtain;

$$g_{sT2} = g_{sT1} \quad \text{and } g_{sN2} = \varepsilon_r g_{sN1}$$

See the diagram below.



Consequently the static gravitational components are given by;

$$g_{xs} = \frac{g_s(\varepsilon_r - 1)x\sqrt{(R^2 - x^2)}}{R^2}$$

$$g_{ys} = \frac{g_s\{x^2 + \varepsilon_r(R^2 - x^2)\}}{R^2}$$

Gravitostatics ➔ Gravitodynamics

Let us now determine the y and x gravitational component field lines from the Moon's reference frame R'(x',y',z',t') to the Earth's/Sun's reference frame R(x,y,z,t), gravitodynamics.

R'(x',y',z',t') gravitodynamics ➔ R(x,y,z,t) Earth's/Sun's gravitodynamics

The Lorentz transformation gives us the transformation of the gravitational field from the Moon's reference frame R'(x',y',z',t') to the Earth's/Sun's reference frame R(x,y,z,t) by the following expressions;
g_{xd}, g_{xd} and g_{xd} denote the dynamic components in R(x,y,z,t) reference frame.

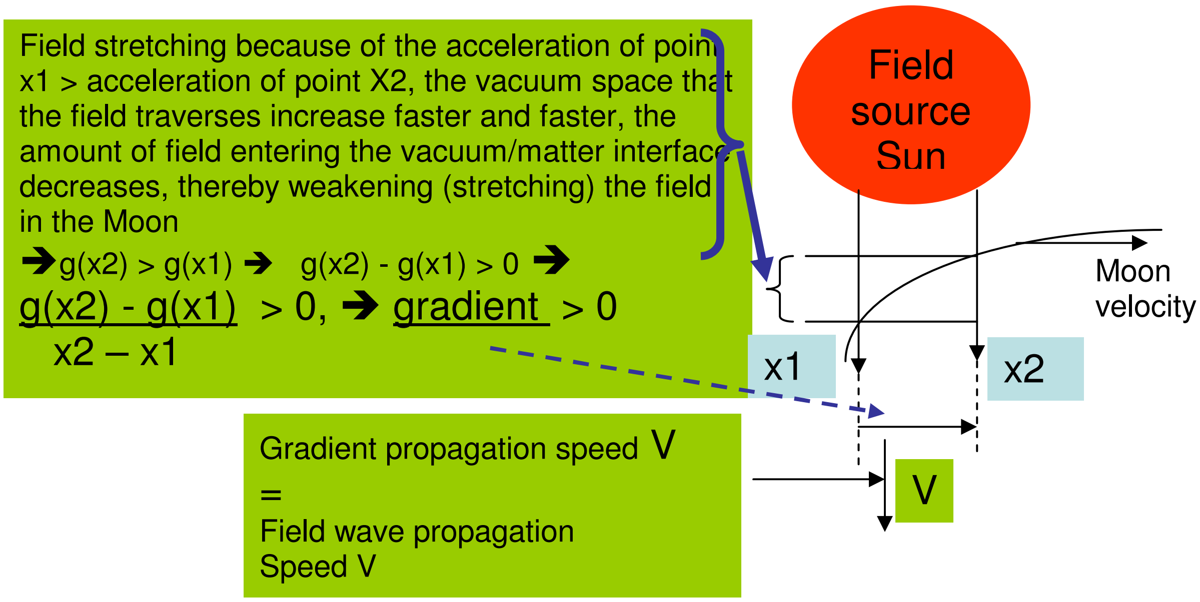
$$g_{xd} = g'_{xd} - \gamma\frac{\beta(g'_{yd}V_y + g'_{xd}V_z)}{V}$$

$$g_{yd} = \gamma g'_{yd} + \gamma\frac{\beta g'_{yd}V_x}{V}$$

➔ variable delay line, field stretching and compression, creates a field gradient along the x axis which is a

$$g_{zd} = \gamma g'_{zd} + \frac{\gamma\beta g'_{zd} V_x}{V}$$ **function of V_y**

IN PHYSICAL TERMS; since the speed of the gravitational interaction is more in vacuum than in matter, as the Moon moves across the sky, the field traverses a longer or less portion of the vacuum space, at point A the distance in the cross section of the vacuum space is increasing at an accelerated rate, then the field is said to be stretched (weakening), in the right side of the Moon, the distance in the vacuum space is decreasing at an accelerated rate, the field is said to be compressed (in both cases ➔ orthogonal Doppler Effect). This process creates a gravitational gradient (gravitational voltage, $g(x) = d(Vg_{(x)})/dx$) along the x axis between adjacent vertical field lines; this gravitational gradient is propagated at the speed of gravitational interaction V in the opposite side of the y axis because the field source (Sun) is on the top side as shown in the diagram below;



But

Vx = 0, Vz = 0 and $g'_z = 0$, then;

$$g_{xd} = g'_{xd} - \frac{\gamma\beta g'_{yd} V_y}{V}$$

$$g_{yd} = \gamma g'_{yd}$$

$$g_{zd} = 0$$

In the Earth's/Sun's reference frame R(x,y,z,t) the gravitostatics components are given by;

$$g_{xs} = \frac{g_s(\varepsilon_r-1)x\sqrt{(R^2-x^2)}}{R^2}$$

$$g_{ys} = \frac{g_s\{x^2+\varepsilon_r(R^2-x^2)\}}{R^2}$$

The Moon is moving at a velocity of υ with respect to the Earth's/Sun's reference frame R(x,y,z,t). We have to take into account the apparent distance contraction due to relative motion, the x axis length decreases by a factor of 1/γ. This is just a mathematical tool and there is no physical reality in length contraction. The Moon's gravitodynamics components g'_{xd} and g'_{yd} are thereby given by;

$$g'_{xd} = \frac{g_s(\varepsilon_r-1)(x/\gamma)\sqrt{(R^2-x^2/\gamma^2)}}{R^2}$$

$$g'_{yd} = \frac{g_s\{x^2/\gamma^2+\varepsilon_r(R^2-x^2/\gamma^2)\}}{R^2}$$

$$-R \le x \le R$$

➔

$$g'_{xd} = \frac{g_s(\varepsilon_r-1)x\sqrt{(\gamma^2R^2-x^2)}}{\gamma^2R^2}$$

$$g'_{yd} = \frac{g_s\{x^2+\varepsilon_r(\gamma^2R^2-x^2)\}}{\gamma^2R^2}$$

We recall that;

$$g_{xd} = g'_{xd} - \gamma\frac{\beta g'_{yd}V_y}{V}$$

$$g_{yd} = \gamma g'_{yd}$$

$$g_{zd} = 0$$

➔

$$g_{xd} = \frac{g_s(\varepsilon_r-1)x\sqrt{(\gamma^2R^2-x^2)}}{\gamma^2R^2} - \frac{\gamma\beta V_y}{V}\frac{g_s\{x^2+\varepsilon_r(\gamma^2R^2-x^2)\}}{\gamma^2R^2}$$

$$g_{yd} = \frac{\gamma\, g_s\{x^2+\varepsilon_r(\gamma^2R^2-x^2)\}}{\gamma^2R^2}$$

$$g_{zd} = 0$$

➔

$$g_{xd} = \frac{g_s(\varepsilon_r-1)x\sqrt{(\gamma^2R^2-x^2)}}{\gamma^2R^2} - \frac{\beta V_y\, g_s\{x^2+\varepsilon_r(\gamma^2R^2-x^2)\}}{V\gamma R^2}$$

$$g_{yd} = \frac{g_s\{x^2+\varepsilon_r(\gamma^2R^2-x^2)\}}{\gamma R^2}$$

$$g_{zd} = 0$$

But

$$V_y = -\frac{x\upsilon}{\gamma^2\sqrt{(R^2-x^2/\gamma^2)}}$$

Then;

$$g_{xd} = \frac{g_s(\varepsilon_r-1)x\sqrt{(\gamma^2R^2-x^2)}}{\gamma^2R^2} + \frac{\beta g_s\upsilon x\{x^2+\varepsilon_r(\gamma^2R^2-x^2)\}}{V\gamma R^2\,\gamma^2\sqrt{(R^2-x^2/\gamma^2)}}$$

$$g_{yd} = \frac{g_s\{x^2+\varepsilon_r(\gamma^2R^2-x^2)\}}{\gamma R^2}$$

$$g_{zd} = 0$$

But $(\upsilon/V) = \beta$

➔

$$g_{xd} = \frac{g_s(\varepsilon_r-1)x\sqrt{(\gamma^2R^2-x^2)}}{\gamma^2R^2} + \frac{\beta^2 g_s x\{x^2+\varepsilon_r(\gamma^2R^2-x^2)\}}{\gamma^3R^2\sqrt{(R^2-x^2/\gamma^2)}}$$

$$g_{yd} = \frac{g_s\{x^2+\varepsilon_r(\gamma^2R^2-x^2)\}}{\gamma R^2}$$

$$g_{zd} = 0$$

But $(1/\gamma) = (1-\beta^2)^{1/2}$, $\beta = \upsilon/V$, **V = gravity speed in matter**

➔

$$g_{xd} = (1-\beta^2)\frac{g_s(\varepsilon_r-1)x\sqrt{(\gamma^2R^2-x^2)}}{R^2} + \frac{(1-\beta^2)^{3/2}\beta^2 g_s x\{x^2+\varepsilon_r(R^2/(1-\beta^2)-x^2)\}}{R^2\sqrt{(R^2-(1-\beta^2)x^2)}}$$

$$g_{yd} = \frac{(1-\beta^2)^{1/2} g_s\{x^2+\varepsilon_r(R^2/(1-\beta^2)-x^2)\}}{R^2}$$ ➔ **Shield Effect**

$$g_{zd} = 0$$

We shall only consider the gravitational wave component, then;

$$g_x = \frac{(1-\beta^2)^{3/2}\,\beta^2 g_s x\{x^2 + \varepsilon_r(R^2/(1-\beta^2) - x^2)\}}{R^2\sqrt{(R^2 - (1-\beta^2)x^2)}} \cdot U_x, \quad -R \le x \le R$$

$$g_y = 0$$

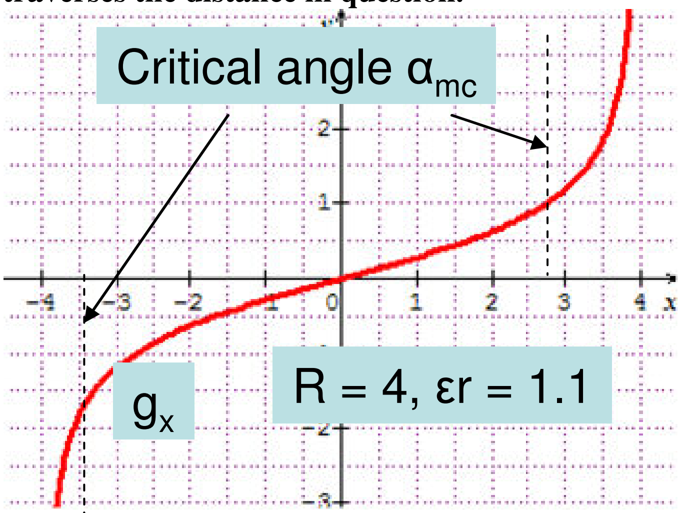
$$g_z = 0$$

$$x = -R,\; g_x(-R) = -\|g_{max}\| = -\frac{\upsilon(1-\upsilon^2/V^2)^{1/2}(1+\beta^2(\varepsilon_r - 1))\, g_s}{V}$$

$$x = R,\; g_x(+R) = +\|g_{max}\| = +\frac{\upsilon(1-\upsilon^2/V^2)^{1/2}(1+\beta^2(\varepsilon_r - 1))\, g_s}{V}$$

The speed of the Moon = υ = 1000m/s, assume the speed of gravity waves = c = 3×10^8 m/s in vacuum, then $g_{max} = 1/3 \times 10^{-5}$ solar gravity at the Earth's orbit. This value is a limit value, farther more at this value the wave is totally reflected in the Moon. In any case the wave attenuation must be taken into account before evaluating g_{max}.

The diagram below shows the gravitational wave intensity as a function of x. The gravitational voltage difference Vg between two points is the amount of energy change par unit masse when it traverses the distance in question.



In accordance with the Maxwell gravitodynamics equation in normal matter, the gravitomagnetic field Bg is given by,

$$rot\,(g) = -\frac{\partial Bg}{\partial t}$$

In the case above;

$$rot(g) = \left(\frac{\partial g_z}{\partial y} - \frac{\partial g_y}{\partial z}\right).U_x + \left(\frac{\partial g_x}{\partial z} - \frac{\partial g_z}{\partial x}\right).U_y + \left(\frac{\partial g_y}{\partial x} - \frac{\partial g_x}{\partial y}\right).U_z$$

Ux, Uy and Uz are orthogonal unit vectors of axis 0x, 0y and 0z.

$g_z = 0$, gy = 0, and at at z = 0 ➔ $\frac{\partial g_x}{\partial z} = 0$ (for symmetry reasons).

$$rot\,(g) = -\frac{\partial g_x}{\partial t} . \frac{\partial t}{\partial y} . U_z = \frac{\partial g_x}{V \partial t} U_z$$

since ∂t/∂y = 1/(speed of gravitational interaction = V)

Then

$$\frac{\partial Bg}{\partial t} = \frac{\partial g_x}{V \partial t} . U_z$$

$$Bg = \frac{g_x}{V} U_z + constant$$

Since Bg is a wave then the constant = 0, as a result;

$$Bg = \frac{g_x}{V} U_z$$

The gravity waves transport energy. The energy local density U is given by:

$$U = \varepsilon_g \frac{\|g\|^2}{2} + \frac{\|B_g\|^2}{2\mu_m} \quad , (\ kg/m^1s^2\ )$$

The energy current is given by the vector of Poynting ∏;

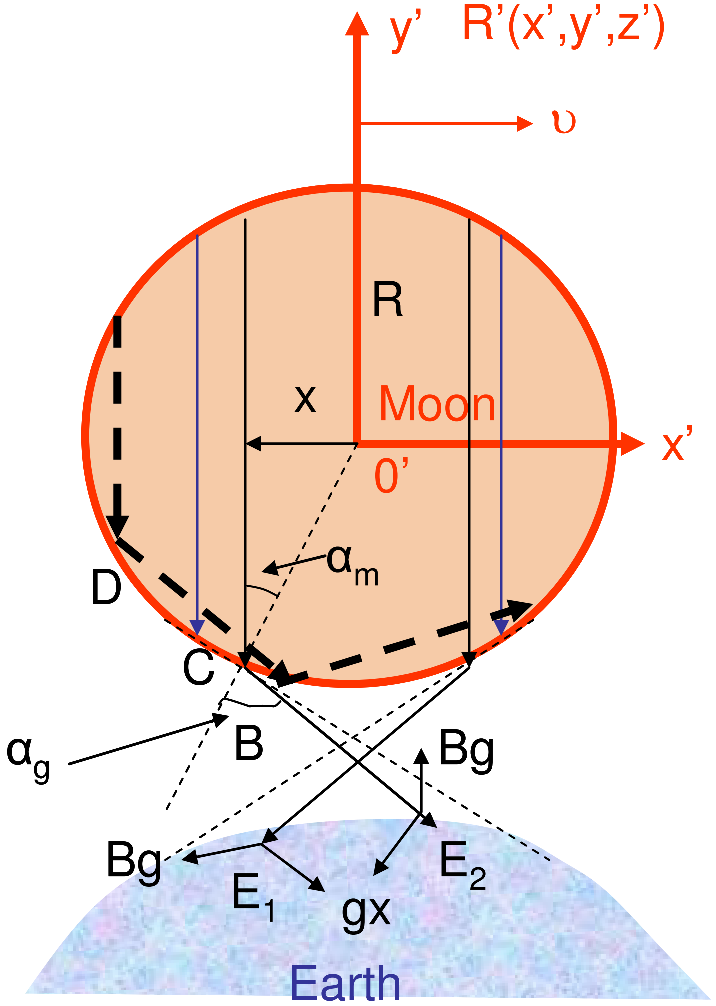
$$\prod = \frac{g \times B_g}{\mu_m} \quad , (\ kg/s^4\ )$$

$$\prod = -\frac{(g_x)^2}{\mu_m V} . U_y$$

We can affirm that due to the relativistic effect (field stretching and compression), at point A, thus distortion of the Sun's gravitational field line orthogonal to the movement of the Moon, a gravitational vector potential A is created in the x axis direction. By imposing the condition of Lorentz (In French = la gauge de Lorentz) and in the absence of masse currents, the vector potential A equation becomes the equation of Alembert, this constitutes the equation of propagation of A, this vector potential is propagated a the speed of gravitational interaction, a gravitational transversal wave is said to be generated in the surface of the Moon. The direction of propagation is given by the vector of Poynting, in this case the direction of the gravitational wave propagation is in the opposite direction of the y axis. This gravitational wave is propagated at the speed of $V < c$ in the Moon. The refractive indices n_m is given by;

$$n_m = c/V$$

The diagram below shows the path followed by the gravitational waves as a function of x, the trouble is that we do not know the V/c factor in order to determine the angle of refraction and the critical angle;



If α_m is the angle of incidence of the wave in matter, α_g the angle of refraction in vacuum at point B, in accordance with Descartes law of refraction;

$$n_m \sin(\alpha_m) = \sin(\alpha_g)$$

If $\alpha_m < \frac{1}{2}\pi$ ➔ refraction, point B
If $\alpha_m = \frac{1}{2}\pi$ ➔ critical angle α_{mc}, $\sin(\alpha_{mc}) = 1/n_m$, point C
If $\alpha_m > \frac{1}{2}\pi$ ➔ total reflection, point D
If x << R, thus near the centre of the Moon;
$g_x \approx 0$ and $Bg \approx 0$
If $x \approx R$ and $\alpha_m < \alpha_{mc}$ (critical angle), gx and Bg have very high values, these values could be greater than the values calculated using quasi stationary gravity shield theories.
If If $x \approx R$ and $\alpha_m > \alpha_{mc}$ (critical angle), gx and Bg is totally reflected and it is not transmitted directly to the Earth.

Consider point E1 on the surface of the Earth, x < 0 for then gravitational wave is generated on the left side of the Moon ➔ gx < 0, since gx varies, a variable masse current could be induced at point E1. In other words, as variable gravitomagnetic field leads to gravitomagnetic induction, gravitomagnetic induction leads to the production of a potential difference between ends of a masse conductor, which is exposed to a variable gravitomagnetic field. We will call this potential difference, the gravitomotive force.

- **The law of Maxwell-Faraday gives the relationship between the induced g.m.f (gravitomotive force) e_g and the gravitomagnetic field B_g flux Φ that traverses a masse circuit, it is given by;**
-

$$e_g = -\frac{d\Phi}{dt} \quad \text{Or} \quad \Phi = \iint_S (B_g ds), \qquad (m^2.s^{-2})$$

As we can see, a varying gravitomagnetic field induces Foucault masse currents (Eddy masse currents) on the surface of the Earth. Since Bg is in the z axis and if the Foucault pendulum oscillates in a plane parallel to the z axis, its axis of rotation could pivot clockwise or counter clockwise depending on the magnitude of the gravitomagnetic field Bg and its rate of variation.

In our approach we assumed that the Moon's is a perfect sphere, and it is isotope, homogeneous and linear medium but in reality the Moon's surface is irregular and it is not composed of homogeneous matter. Consequently;

a) **The refraction at point B is scattered.**
b) **The critical angle α_{gc} is not well defined.**
c) **The totally reflected gravitational wave at point D leak each time it is reflected in the surface of the Moon.**

As the Moon moves at a supersonic speed (1000 m/s), consequently the following process occurs at supersonic speed; the gravitational waves induce gravitomotive force g.m.f. in gases and liquids, thereby creating masse currents in the atmosphere that creates sound waves in the atmosphere; since electrons are masse particles, thus they have masse and thereby interact with gravity, the gravity waves put the electrons in drift, this drift induces electromotive force e.m.f. in electric conductors (plasma, metals and in semi-conductors) thereby creating electric currents in the ionosphere, theses electrics currents generate electromagnetic waves in the atmosphere. By applying the Fourier transformation on the g_x component, we could determine the spectrum of the gravity waves. This would enable us to tune gravity waves detectors.

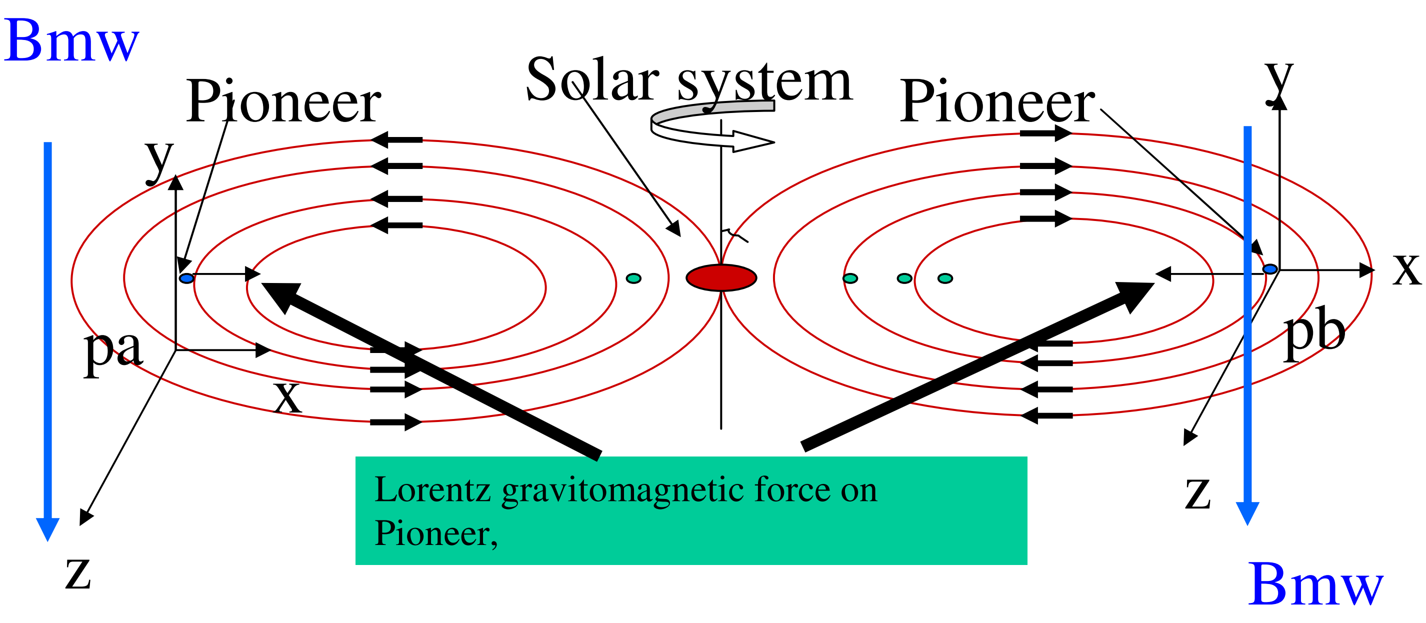
Since the quasi stationary orthodox gravity shield theories do not offer a global and coherent explanation concerning gravity perturbations, can there be a physical science work of more importance than obtaining an understanding of these perturbations and seeking interaction with the remote forces of gravity?

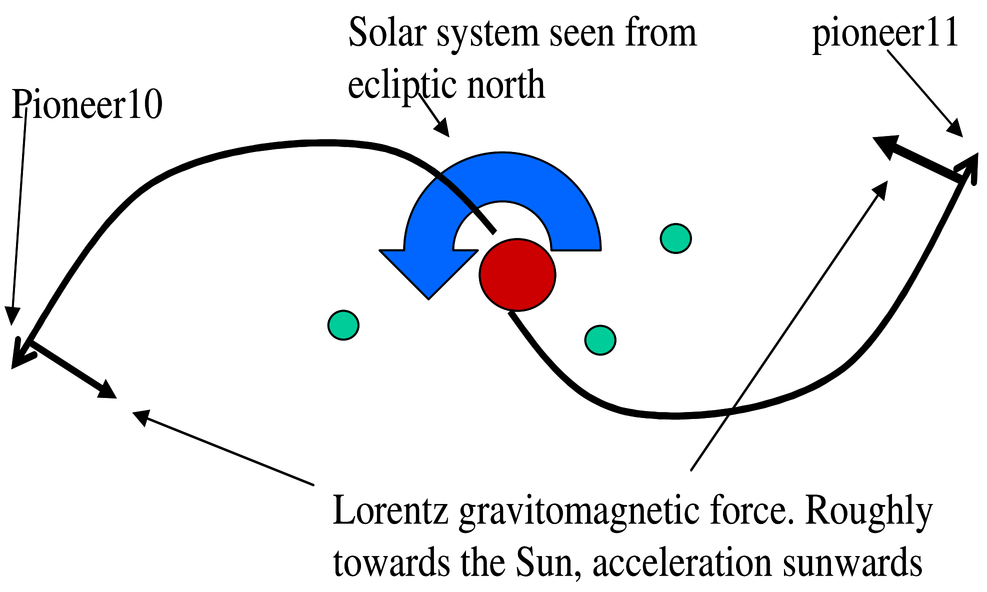
This is part of frontier physics evidence

The facts are there, the facts remain the keystone in which the stability of a theory must be tested (Allais Maurice, FRANCE).

4) Pioneer anomaly

As we can see in the 2 diagrams below the Sun rotation and the planets orbiting create a gravitomagnetic field, the red lines indicate the gravitomagnetic field lines. These field lines are not regular because the solar system masse distribution is not regular. The solar and Milky Way (Bmw) gravitomagnetic fields combine together to form a vertical resultant gravitomagnetic field. The Milky gravitomagnetic field predominates over the solar gravitomagnetic field. Since the solar system is very small compared to the Milky Way, its gravitomagnetic field (Bmw) is constant in the whole solar system.





This means that whatever the distance the pioneer is away from the solar system the gravitomagnetic field is roughly the same (Bmw). When pioneer 10/11 took hyperbolic orbits near the ecliptic plane, they cut the gravitomagnetic field lines (solar and Milky Way Bmw predominates), a Lorentz gravitomagnetic force was exerted on both spacecrafts perpendicular to their trajectories roughly towards the Sun, there was acceleration roughly in the direction of the Sun. This Lorentz gravitomagnetic acceleration is known as the **Pioneer anomaly.**

The Lorentz gravitomagnetic force is given by;

F = mVxB = mV * (Bmw + Bsolar-system) ≅ mV*Bmw

Where;
M = masse of the pioneer (kg)
V = velocity of pioneer (m/s)
Bmw = Milky Way gravitomagnetic field (radians/s)
F = Lorentz gravitomagnetic field (kg.m/ s^2)
- denotes vector product (normaly it is x)

Let us take point pa (see the diagram above the diagram above) and let us use the x, y and z coordinates as show in the diagram. To simplify the demonstration, let us assume that the pioneer is in a circular orbit and let us just take the signs of the physical quantities (m = 1kg, V = 1m/s and Bmw = 1 radian/s). The taking the above conventions of coordinates

V = (0.Ux, 0.Uy, +1.Uz).m/s = (0, 0, +1)m/s
M = 1.kg
Bmw = (0, -1, 0) radians/s

Let us do a vector product
F = mVxBmw =1.kg. (0, 0, +1)m/s * (0, -1, 0) radians/s

F = (+1, 0, 0).kg.m/s^2

We can see that the Lorentz gravitomagnetic force a point pa is towards the Sun.

Likewise at point pb

V = (0.Ux, 0.Uy, -1.Uz).m/s = (0, 0, -1)m/s
M = 1.kg

Bmw = (0, -1, 0) radians/s

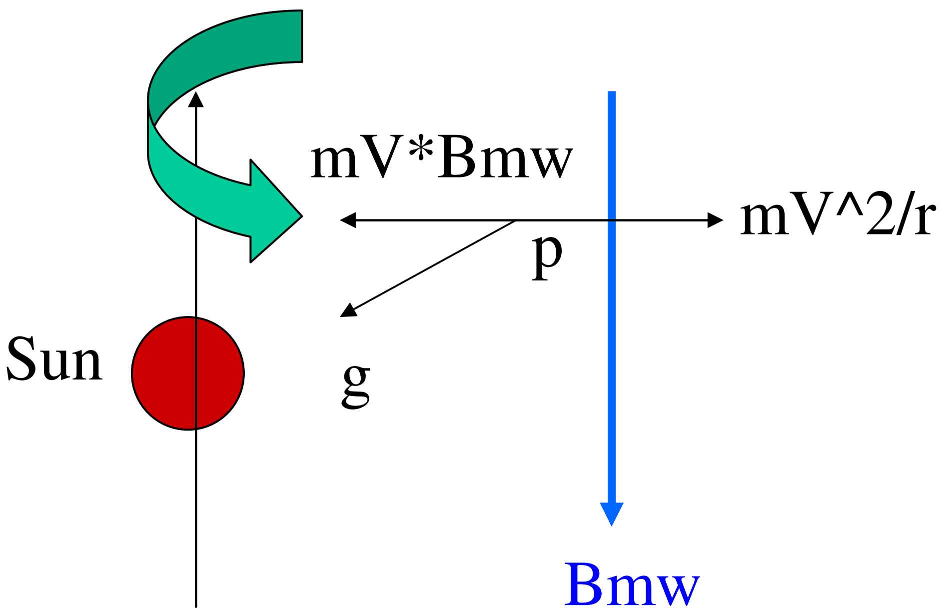
Let us do a vector product
F = mVxBmw =1.kg. (0, 0, -1)m/s * (0, -1, 0) radians/s

F = (-1, 0, 0).kg.m/s^2
We can see that the Lorentz gravitomagnetic force a point pa is towards the Sun.

There is no doubt that the Lorentz gravitomagnetic on the pioneer10/11 will be always be towards the Sun and **maybe the pioneer will never get out of the solar system because its** orbit is prograde. If the pioneer's orbit was retrograde the Lorentz gravitomagnetic force would be away from the Sun, this would help pioneer to get out of the solar system.

Why are the planets prograde in the solar system and in a flat disk?

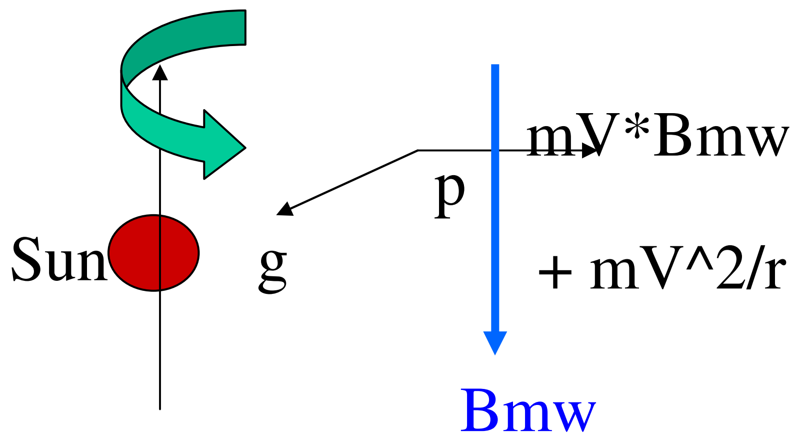
Consider a planet that is prograde at p as shown in the diagram below;



Prograde (direction in the screen)

The resultant force, Lorentz force mV*Bmw and the centrifugal force tend to balance as r varies since Bmw is constant in the solar system, the planet reaches a position of equiliblium, the Sun's gravitation field g will pull the planet towards the ecliptic plane of the Sun and if the planet was below it is then pulled up towards the ecliptic plane of the Sun. Then the plane of orbit will oscillate untill it is fixed in the ecliptic plane of the Sun.

Consider a planet that is retrograde at point p as shown in the diagram below;



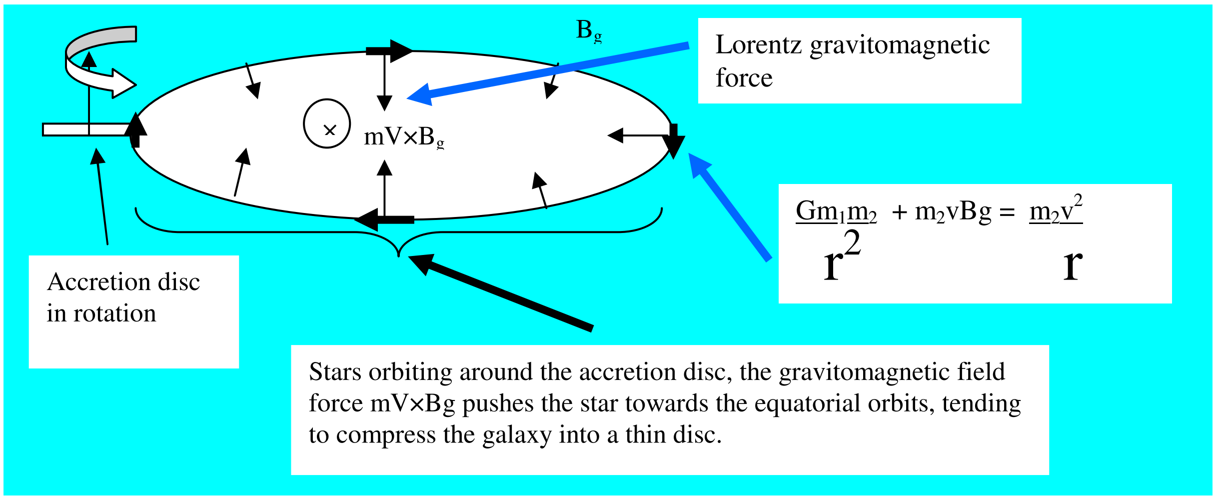
Retrograde (direction out of the screen)

The resultant force, Lorentz force mV*Bmw and the centrifugal force tend to throw away the planet from the Sun as r varies since Bmw is constant in the solar system, the planet does not reach a position of equiliblium, the planet is thrown away from the solar system. It is not a surprise that most of the planets in the solar system are prograde.

To calculate the Milky Way gravitomagnetic field we have to know the masse and the rotation speed of the black hole in the centre of the Milky Way, we have to know the distribution of the speed of the accretion disk and its masse. We have to know the distribution of the masse and speed of stars in theMilky Way. **We do not know whether the Universe has a common gravitomagnetic field.** We can use the Bessel integrals as a tool.

5) Gravitomagnetic effect on the shape of galaxies

When we observe the disc galaxies, they are incredibly flat. The rotation of the centre of galaxy builds a gravitomagnetic field (B_g) as shown in the diagram below:



The shape of the galaxies is not a surprise, the forced exerted on stars orbiting around the centre of the galaxy is given by:

$F = (- mg - mv \times B_g + mv^2 /r) u_r$

Where u_r is the unit radial vector, g is the gravitational field build by the centre of the galaxy and the masses in the inner part of the radius r, m is the masse of the studied object, $mr\omega^2$ is the centrifugal force, r is the radial distance, $\omega = 2\pi f$, f the frequency of rotation.

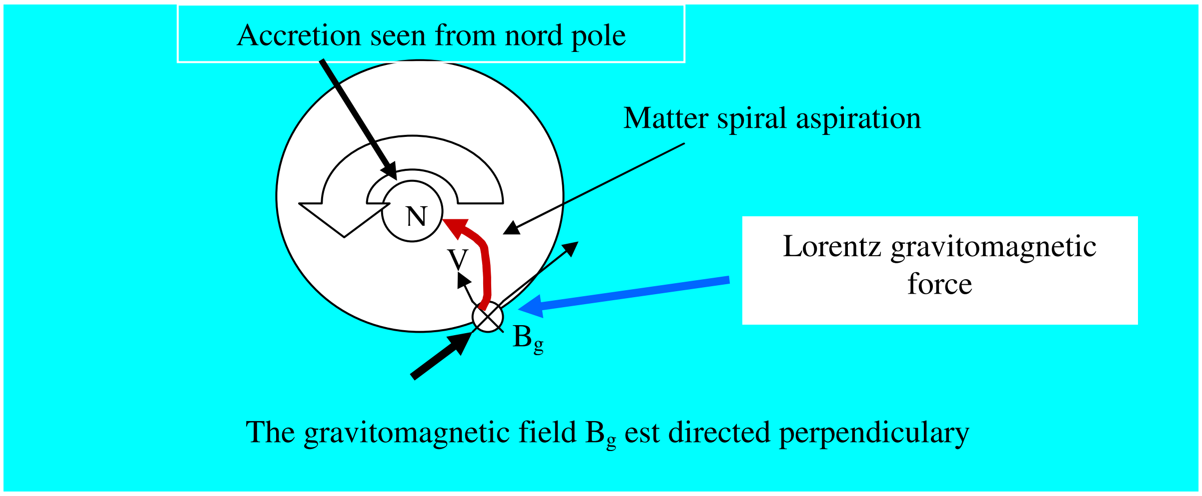
As we can see, the equatorial orbits are the only stable orbits, due to the gravitomagnetic field, the nearby orbits are pushed down if the are above the equator and are pushed up if the are below the equator. The retrograde orbits are prohibited, with time, the orbits become prograde, and move towards the equator of the rotating centre of galaxy. With time, even a spherical rotating galaxy becomes ellipsoidal and finally becomes a disc galaxy. If the force of gravity becomes too big, a spiral galaxy starts to be formed.

The flat form of Saturn rings and the fact that all planets, except that of Pluto, are almost in the same plane is due to the gravitomagnetic field. In general, revolution and rotation axis are prograde in the solar system.

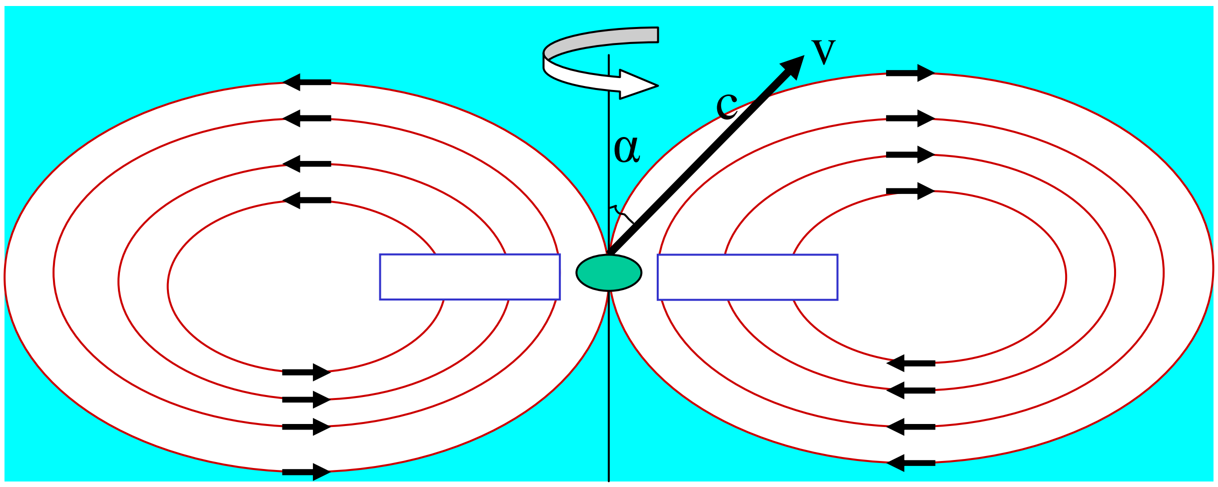
6) Spiral aspiration of matter

(Frame dragging!!!!!)

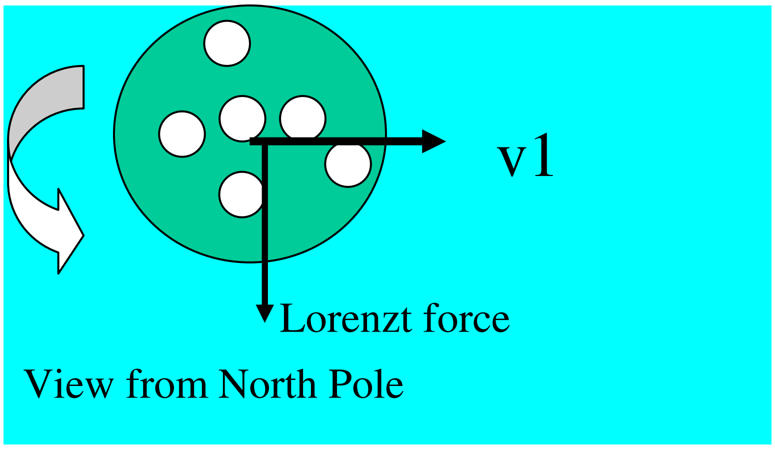
When the matter approaches the accretion disc at a velocity of V, a force F_b (Lorentz force) perpendicular to the velocity is exerted to the matter by the gravitomagnetic field B_b, that way the matter is sucked in a spiral form by the accretion disc as shown by the following diagram. Some authors suggest that the spiral aspiration of matter is a proof of frame dragging and others suggest that when light undergoes diffraction when it passes near the Sun is a proof that massive bodies attract the light. In both cases these conclusions are due to misinterpretation of scientific observations, ***we should avoid exotic conclusions in order not to get lost in virtual physics.***



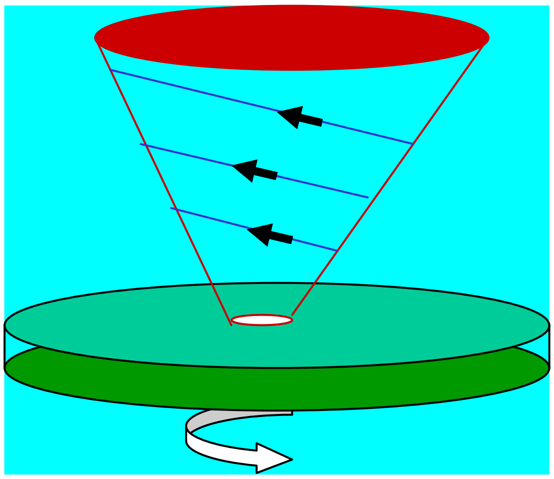
7) Bipolar jets trajectory



The series of oval lines show the gravitomagnetic field lines, the black whole is at the middle of the diagram and the two rectangular like blocks represent the accretion disc. In reality matter can escape away from the black hole at a certain angle α with respect to axis of rotation of the black hole and accretion disc system. The maximum angle α_e at which matter can escape from a given rotating black hole is known as the ***escape angle***. When matter escape from the black with a velocity of V_1, it cuts the gravitomagnetic field lines, at the beginning it experiences a horizontal Lorenz force as shown in the diagram below (view from North Pole, the holes represents the gravitomagnetic field lines section).



The trajectory is curved in the opposite direction of the rotation of the black hole, it gains angular momentum, thereby following a spiral trajectory, at a certain point where the gravitomagnetic field lines are slightly curved horizontally, it cuts the gravitomagnetic field lines at a skew angle, the matter experiences a vertical Lorentz force (North Pole direction). The matter is then accelerated vertically (North Pole direction) with an increasing radius. The matter then escapes in space following a helicoidally trajectory; the set of trajectories has almost the form of a cone as shown in the diagram below.



The three arrowed lines show the stream line of the North Pole bipolar jets.

8) Galaxy rotation curve flatness

(Dark matter!!!!)

In the beginning of the 1980s the first observational evidence was reported that spiral galaxies do not spin as expected according to Keplerian dynamics. Based on this model, matter (such as stars and gas) in the disk portion of a spiral should orbit the center of the galaxy similar to the way in which planets in the solar system orbit the sun, that is, according to Newtonian mechanics. This anomalie was attributed to dark matter but this is without taking into account the Lorentz gravitomagnetic force. Most authors use the equation written in red to calculate the orbital speed, **see the equation written in blue** for correct orbital speed;

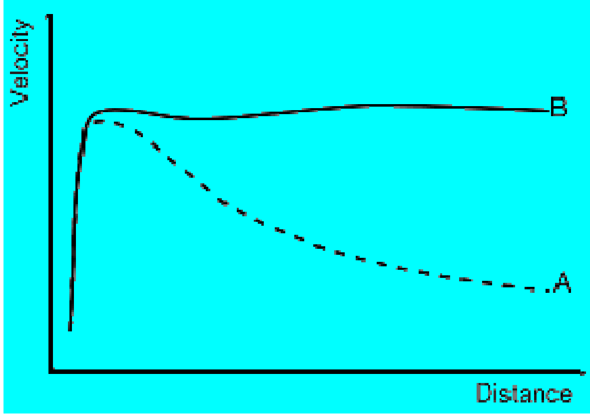
$$\frac{Gm_1m_2}{r^2} + m_2vB_g = \frac{m_2v^2}{r} \quad \text{and} \quad \frac{Gm_1m_2}{r^2} \neq \frac{m_2v^2}{r}$$

The rotation speed remains almost constant in order to compensate the **Lorentz gravitomagnetic force.**

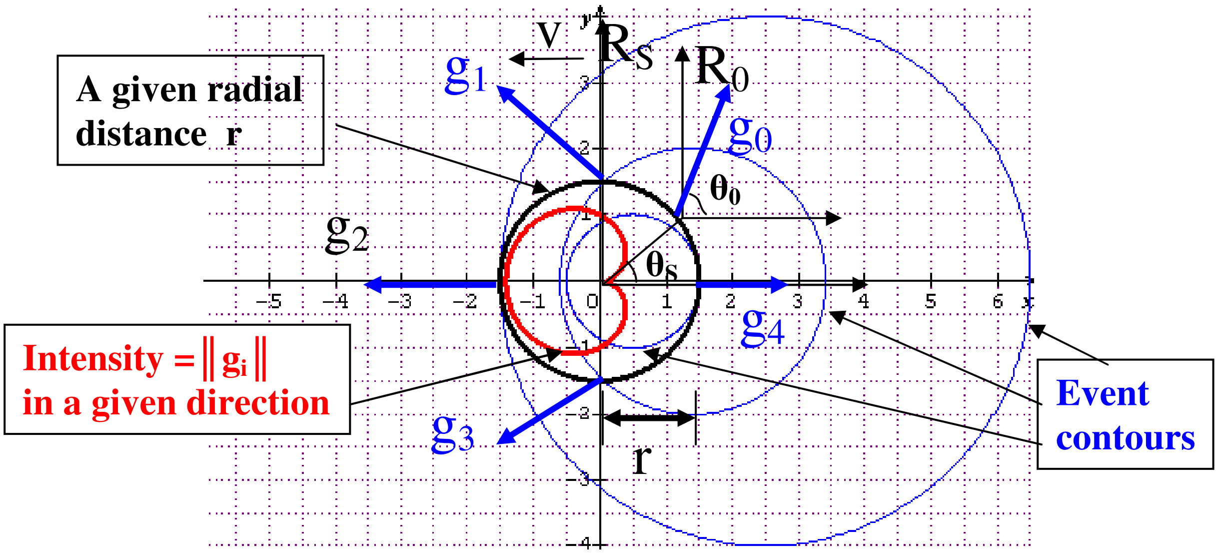
We take one of the quadratic solutions for $v \geq 0$ and where m_1 is the mass inside the radius r.

$$v = \frac{r.B_g}{2} + \frac{r.\sqrt{[\,B_g^2 + Gm_1/r^3]}}{2}$$

Rotation curve of a typical spiral galaxy: predicted (**A**) and observed (**B**).



Doppler Effect



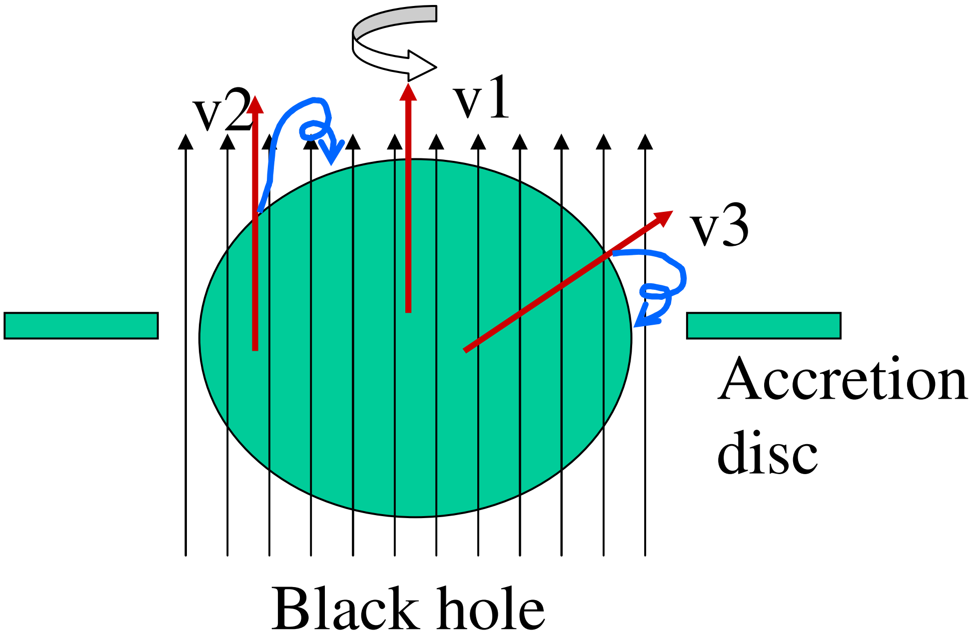
The diagram above shows;

5) Reference frame R_S (source) moving away from reference frame R_0 (observer), the velocity of separation is equal to v along the x axis.
6) The event contours that are propagated at perfectly spherical events when the source moves at a velocity of v away from the observer. The event contours give the angle at which the gravitational field is seen by the observer (g_0 , g_1 , g_2 and g_3 give the direction of the gravitational field from the point of view of the observer, example = θ_0 is the angle at which the gravitational field g_0 is seen by the observer when the gravitational field is generate by the source at an angle of θ_S).
7) The directivity of the gravitational field seen by the observer at a given radial distance r (the gravitational field intensity at a given direction from the observer's point of view).
8) A given ***radial distance r*** from the origin of the source at time t = 0 (present time).

9) Bipolar matter escape tunnel

The bipolar jets are powered by gravity and collimated by the gravitomagnetic field. The figure below shows a schematic diagram of a rotating black hole, the series of vertical thin lines represent the gravitomagnetic field lines due to the rotation of the black hole. As matter is compressed by the huge gravity in a black hole; endothermic nuclear reactions (endothermic, produces less energy than required to ignite the reaction). The energy released produces seismic waves that enable matter to attain speeds near the speed of light. Since the black is very massive, the escape velocity of matter is close to the speed of light. Consider three directions; V_1, V_2 and V_3. When matter takes direction 3 with an escape velocity of V_3 it cuts the gravitomagnetic field lines, its trajectory is curved by the Lorenz force. Due to the huge gravitational field, it falls back to the black hole by making loops. When matter takes direction 2 with an escape velocity of V_2, its trajectory is curve by the radial huge gravitational field, it starts cutting the gravitomagnetic field lines; its trajectory is curved by the Lorenz force. Due to the huge gravitational field, it falls back to the black hole by making loops. When matter takes direction 1 with an escape velocity of V_1, $\alpha = 0$, the gravitational field is almost diluted to zero, very low potential energy change occurs and therefore very low lost of kinetic energy, it does not cut the gravitomagnetic field lines, it does not experience the Lorenz force, ***it spends less time near***

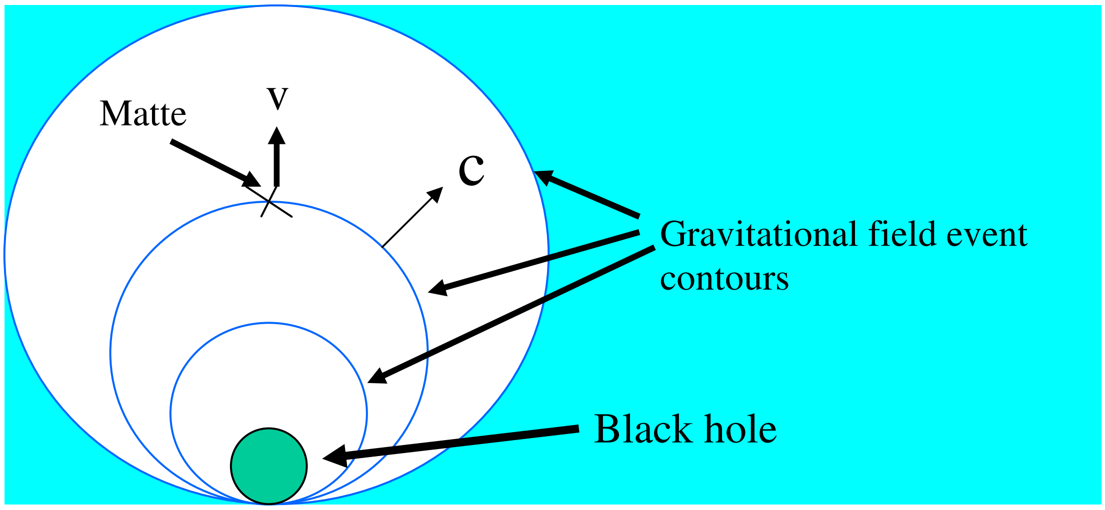
the black hole, and it escapes straight away in space as a North Pole polar jet, a South Pole polar jet is produced in the same way. In that
case, the only way that matter can escape from a rotating black hole is only through the ***bipolar jets tunnels***. They are the only ***escape tunnels to space***; all the other ***tunnels are prohibited*** by the gravitomagnetic field.



Due to the Doppler effect the observed gravitational field at the poles of a black hole is given by;

$$g_4 = -\frac{Gm\,(1 - v/c)^{1/4}}{r^2\,(1 + v/c)^{1/4}}$$

Doppler Effect on the intensity of the gravitational field at the North Pole of a black hole. g_4 denotes the observed intensity of gravitational field if the matter and the black hole were in relative motion with a velocity of v. As matter approaches the speed of light, the gravitational field is stretched or diluted, in this way matter can escape from the black hole at speeds less than the speed of light.



Light dynamics

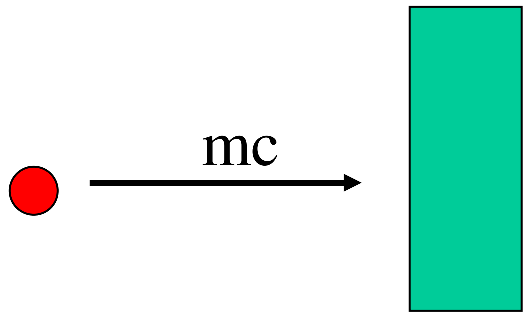
In physics, **wave-particle duality** holds that light and matter exhibit properties of both waves and of particles. A central concept of quantum mechanics, duality represents a way to address the inadequacy of conventional concepts like "particle" and "wave" to meaningfully describe the behaviour of quantum objects.

<u>Light momentum</u>

Radiation pressure is the pressure exerted upon any surface exposed to electromagnetic radiation. If absorbed, the pressure is the energy flux density divided by the speed of light. If the radiation is totally reflected, the radiation pressure is doubled. For example, the radiation of the Sun at the Earth has an energy flux density of 1370 W/m^2, so the radiation pressure is 4.6 µPa (absorbed) .

By analogy to the kinetic theory or collision theory of gases formulated by the Scottish physicist James Clerk Maxwell, we will determine the radiation pressure by assuming that light is composed of particles of energy mc^2 where m denotes the equivalent masse of a given particle that collides on a reflective surface having a reflective coefficient of ψ ($1 \geq \psi \geq 0$).. The masse energy equivalence principle ($E = mc^2$) can be easily be derived from the Lorentz transformation.

$$E = h\nu = mc^2$$



- Ep = energy of the photon
- n = the number of the photon per unit time and per unit area
- E = n.Ep total energy per unit time and per unit area = energy flux density
- h = planks constant

- ν = the frequency of the radiation
- mp = the equivalent "masse" of a photon
- m = n.mp total masse per unit time and per unit area
- ψ = the reflective coefficient $1 \geq \psi \geq 0$
- c = speed of light

Lets us determine the momentum of light before and after reflection of ray of light that is perpendicular to a reflective surface.

Momentum before reflection (Mb);
Mb = mc = E/c

Momentum after reflection (Ma)

Ma = -ψmc = -ψE/c

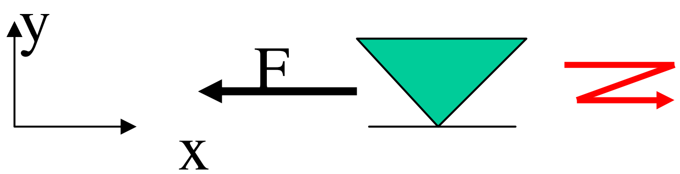
Radiation pressure = force per unit area = (momentum before – momentum after)

Radiation pressure = (Mb – Ma) = (1 + ψ)E/c.

If the light is totally reflected then ψ = 1 => **Radiation pressure = 2E/c**

If the light is totally absorbed then ψ = 0 => **Radiation pressure = E/c.**

Let us consider a light emitting diode LED as shown in the diagram below;



If all the emitted light is in the x axis direction, then the reaction force Fr is given by;

$$Fr = \frac{P}{c} = \frac{cdm}{dt}$$

Where P is the light power and if the emitted light was due to masse/energy conversion, then dm/dt is the converted masse per unit time.

If 1kg was converted every second, then the thrust = 3.10^8 N. By converting masse to energy we can devised more efficient rocket engines.

The light rocket engine thrust equation, by ignoring the lost masse, is given by

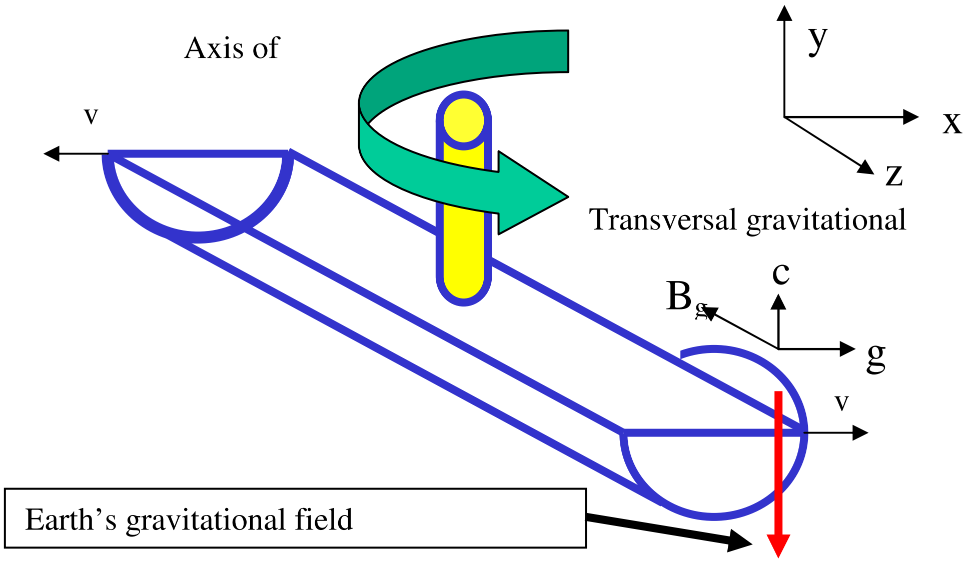
$$\mathbf{Fr = \frac{cdm}{dt}}$$

This could be the only engine that could enable spacecrafts to approach the speed of light in order to go to the stars.

Joseph NDURIRI, Toulouse, **FRANCE**, 29 September 2007, ++33(0)6-31-13-61-55, nduriri@voilà.fr , www.gravitomagnetism.com

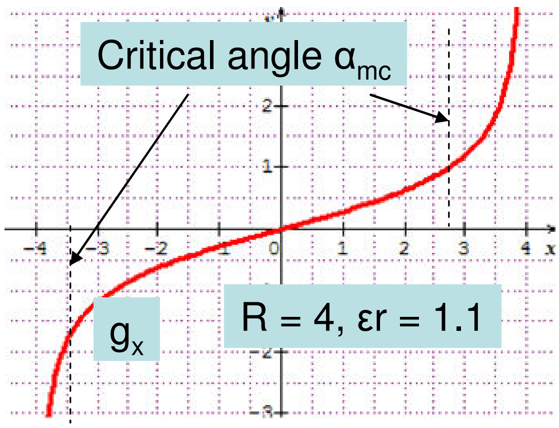
Gravitational wave generator

Stretch C



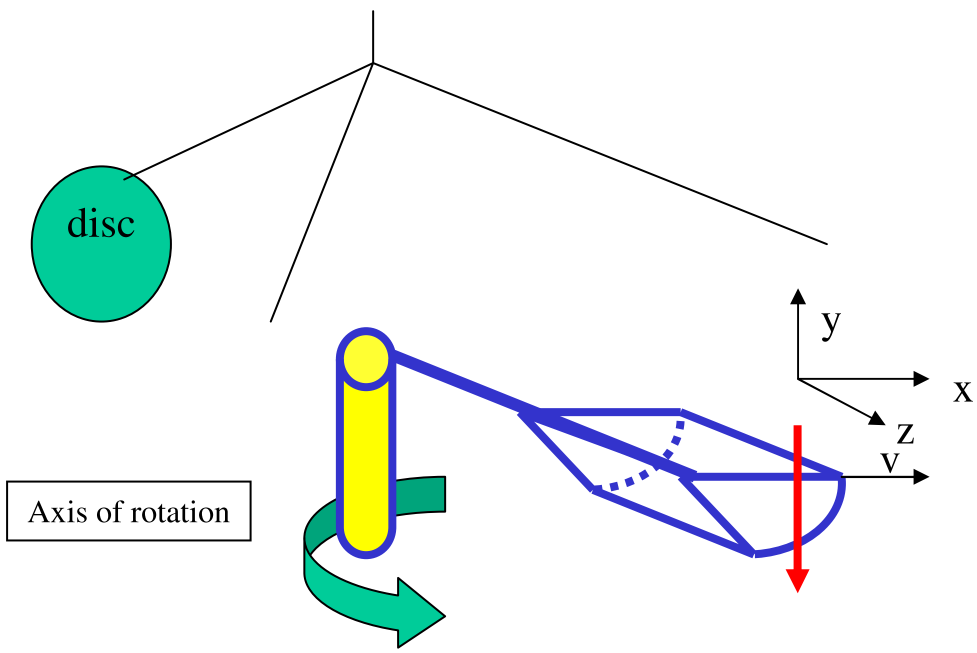
Hypothesis: we assume that the speed V_m of the gravitational interaction in matter is less than its speed in vacuum c.

The generator is composed of bar of a non-conductive material having a semi-circle cross section as shown in the diagram above. This bar is put in rotation at a very high speed in a horizontal plane (preferably super sonic speed) thereby having a vertical rotation axis. As it cuts the Earth's gravitational field is acts as an accelerated variable delay line in the vertical direction due to semi-circle cross section curvature. A horizontal gravitational gradient between adjacent gravitational field lines is there by created. This gravitational field gradient propagates as a gravitational transversal wave in the vertical direction (y axis positive direction). It is composed of two components; Bg gravitomagnetic field in the z-axis and g gravitational field in the x-axis. To avoid sound interference the gravity wave generator is enclosed in a vacuum space. The diagram below shows the gravitational wave intensity as a function in the x direction (**Allais Effect**).



For more details see Allais Effect in the Treatise on Gravity and Gravitomagnetism www.gravitomagnetism.com

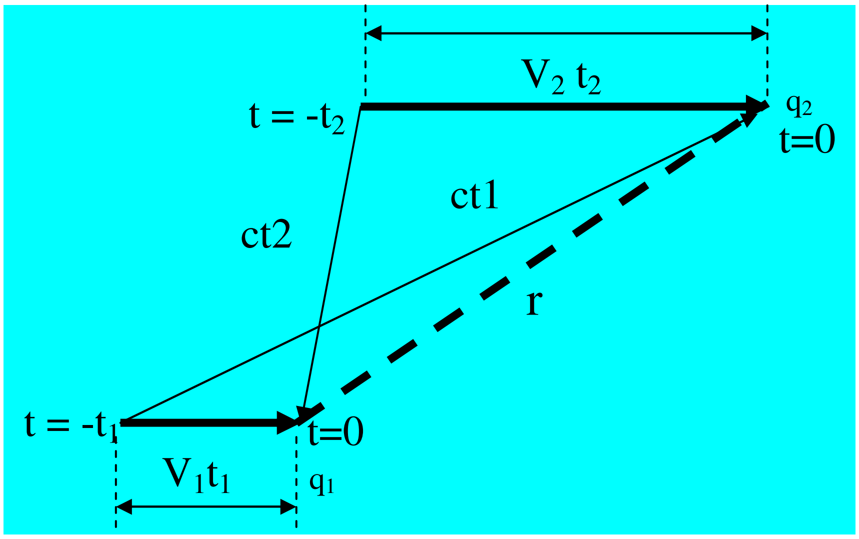
Gravity wave detector



The gravity wave detector is composed of thin disk of a non-conductive material. It is suspended by 3 strings; the 3 strings are joined to the 4th string that is in the vertical direction at the centre of the disc as shown in the diagram above, the less the torque of the string the more sensitive the detector is. As seen in the diagram above as prism having a quarter circle leading edge and a triangular lagging edge is put in rotation along the vertical axis at a very high speed (preferably super sonic speed). The prism's leading edge is a quarter circle that acts as an accelerated delay thereby creating a gravitational gradient between adjacent Earth's gravitational field along the x axis, this gravitational gradient propagates as a transversal gravitational perturbation at the speed of c in the y axis positive direction. The lagging triangular edge acts as a linear delay, thereby creating zero gravitational gradient between Earth's adjacent field lines. The disk and the prism should be as close as possible (2 mm). To avoid sound interference the gravity wave detector and generator are enclosed in a vacuum space. With time the detector (suspended disc) should rotate in the clockwise direction. If the prism's leading edge was a triangular edge and if the lagging edge was a quarter circle still rotating the prism in the same angular direction as before, then with time the detector (suspended disc) would rotate in the anticlockwise direction.

For more details see **Allais Effect** in the Treatise on Gravity and Gravitomagnetism www.gravitomagnetism.com

Time and space delay



Consider two particles q_1 and q_2 at time t= 0 moving in two parallel lines respectively with a velocity of v_1 and v_2, separated by a distance r. Due to time and space delay, the force exerted on q_1 by q_2 is the force that was build by q_2 at time $t = - t_2$ when this particle occupied its ancient position and the force exerted on q_2 by q_1 is the force that was build by q_1 at time $t = - t_1$ when this particle occupied its ancient position. In the classical mathematical model, we consider r, at time t = 0, as the distance that separates the two particles but this does not correspond to a physical reality. The Lorenz transformation corrects the time and space delay by introducing the magnetic and gravitomagnetic field.

We never watch the TV in live since the present time has not yet arrived.