A coherent dual vector field theory for gravitation

Analytical method – Applications on cosmic phenomena

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Abstract

This publication concerns the fundamentals of the dynamics of masses interacting by gravitation.
We start with the Maxwell analogy for gravitation or the Heaviside field, and we develop a model. This model of dynamics, which we know takes in account the retardation of light, allow us to quantify the transfer of angular movement point by point by the means of vectors, and to bring a simple, precise and detailed explanation to a large number of cosmic phenomena. And to all appearances, the theory completes gravitation into a wave theory.

With this model the flatness of our solar system and our Milky way can be explained as being caused by an angular collapse of the orbits, creating so a density increase of the disc. Also the halo is explained. The "missing mass" (dark matter) problem is solved, and without harming the Keplerian motion law.
The theory also explains the deviation of mass like in the *Diabolo* shape of rotary supernova having mass losses, and it defines the angle of mass losses at 0° and at 35°16'.
Some quantitative calculations describe in detail the relativistic attraction forces maintaining entire the fast rotating stars, the tendency of distortion toward a toroid-like shape, and the description of the attraction fields outside of a rotary black hole. Qualitative considerations on the binary pulsars show the process of cannibalization, with the repulsion of the mass at the poles and to the equator, and this could also explain the origin of the *spin-up* and the *spin-down* process. The bursts of collapsing rotary stars are explained as well. The conditions for the repulsion of masses are also explained, caused by important velocity differences between masses. Orbit chaos is better explained as well. Finally, the demonstration is made that gyrotation is related to the Relativity Theory.

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1. Introduction : the Maxwell analogy for gravitation: a short history.

Several studies have been made earlier to find an analogy between the Maxwell formulas and the gravitation theory. Heaviside O., 1893, predicted the field. This implies the existence of a field, as a result of the transversal time delay of gravitation waves. Further development was also made by several authors. L. Nielsen, 1972, deducted it independently using the Lorentz invariance. E. Negut, 1990 extended the Maxwell equations more generally and discovered the consequence of the flatness of the planetary orbits, Jefimenko O., 2000, rediscovered it, deducted the field from the time delay of light, and developed thoughts about it, and M. Tajmar & C.de Matos, 2003, worked on the same subject.

This deduction follows from the gravitation law of Newton, taking into account the time delay caused by the limited speed of gravitation waves and therefore the transversal forces resulting from the relative velocity of masses. The laws can be expressed in the equations (1) to (5) hereunder.

Lecture A : a word on the Maxwell analogy

The formulas (1.1) to (1.5) form a coherent set of equations, similar to the Maxwell equations. Electrical charge is then substituted by mass, magnetic field by gyrotation, and the respective constants as well are substituted (the gravitation acceleration is written as g , the so-called "gyrotation field" as Ω , and the universal gravitation constant as $G^{-1} = 4\pi \zeta$, where G is the "universal" gravitation constant. We use sign $\Leftarrow$ instead of $=$ because the right hand of the equation induces the left hand. This sign $\Leftarrow$ will be used when we want to insist on the induction property in the equation. F is the induced force, v the velocity of mass m with density ρ.

$$F \Leftarrow m\,(g + v \times \Omega) \qquad (1.1)$$

$$\nabla \cdot g \Leftarrow \rho / \zeta \qquad (1.2)$$

$$c^2\,\nabla \times \Omega \Leftarrow j / \zeta + \partial g /\partial t \qquad (1.3)$$

where j is the flow of mass through a surface. The term $\partial g/\partial t$ is added for the same reasons as Maxwell did: the compliance of the formula (1.3) with the equation

$$\operatorname{div} j \Leftarrow - \partial\rho / \partial t$$

It is also expected $\qquad\qquad \operatorname{div} \Omega \equiv \nabla \cdot \Omega = 0 \qquad (1.4)$

and $\qquad\qquad\qquad \nabla \times g \Leftarrow - \partial \Omega / \partial t \qquad (1.5)$

All applications of the electromagnetism can from then on be applied on the *gravitomagnetism* with caution. Also it is possible to speak of gravitomagnetism waves, where

$$c^2 = 1 / (\zeta \tau) \qquad (1.6)$$

where $\tau = 4\pi G/c^2$.

2. Law of gravitational motion transfer.

In this theory the hypothesis is developed that the angular motion is transmitted by gravitation. In fact no object in space moves straight, and each motion can be seen as an angular motion.

Considering a rotary central mass m_1 spinning at a rotation velocity ω and a mass m_2 in orbit, the *rotation transmitted by gravitation* (dimension [rad/s]) is named *gyrotation* Ω.

Equation (1.3) can also be written in the integral form as in (2.1), and interpreted as a flux theory. It expresses that the normal component of the rotation of $\boldsymbol{\Omega}$, integrated on a surface A, is directly proportional with the flow of mass through this surface.

For a spinning sphere, the vector $\boldsymbol{\Omega}$ is solely present in one direction, and $\nabla \times \boldsymbol{\Omega}$ expresses the distribution of $\boldsymbol{\Omega}$ on the surface A. Hence, one can write:

$$\iint_A (\nabla \times \boldsymbol{\Omega})_n \, dA \;\Leftarrow\; 4\pi \, G \, m \, /c^2 \qquad (2.1)$$

Lecture B : a word on the flux theory approach

In order to interpret this equation in a convenient way, the theorem of Stokes is used and applied to the gyrotation $\boldsymbol{\Omega}$. This theorem says that the loop integral of a vector equals the normal component of the differential operator of this vector.

Lecture C : a word on the application of the Stokes theorem and on loop integrals

$$\oint \boldsymbol{\Omega} . \, dl \;=\; \iint_A (\nabla \times \boldsymbol{\Omega})_n \, dA \qquad (2.2)$$

Hence, the transfer law of gravitation rotation (*gyrotation*) results in:

$$\oint \boldsymbol{\Omega} . dl \Leftarrow 4\pi \, G \, \dot{m} \, / \, c^2 \qquad (2.3)$$

This means that the movement of an object through another gravitation field causes a second field, called gyrotation. In other words, the (large) symmetric gravitation field can be disturbed by a (small) moving symmetric gravitation field, resulting in the polarisation of the symmetric transversal gravitation field into an asymmetric field, called gyrotation (analogy to magnetism). The gyrotation works perpendicularly onto other moving masses. By this, the polarised (= gyrotation) field expresses that the gravitation field is partly made of a force field, which is perpendicular to the gravitation force field, but which annihilate itself if no polarisation has been induced.

3. Gyrotation of a moving mass in an external gravitational field.

It is known from the analogy with magnetism that a moving mass in a gravitation reference frame will cause a circular gyrotation field (fig. 3.1). Another mass which moves in this gyrotation field will be deviated by a force, and this force works also the other way around, as shown in fig. 3.2.

The gyrotation field, caused by the motion of m is given by (3.1) using (2.3). The equipotentials are circles:

$$2\pi \, R . \boldsymbol{\Omega}_p \Leftarrow 4\pi \, G \, \dot{m} \, / \, c^2 \qquad (3.1)$$

Perhaps the direction of the gravitation field is important. With electromagnetism in a wire, the direction of the (large) electric field is automatically the drawn one in fig 3.1., perpendicularly to the velocity of the electrons.
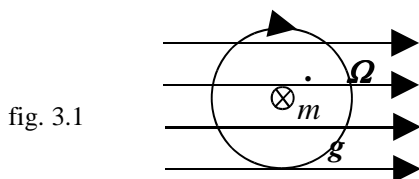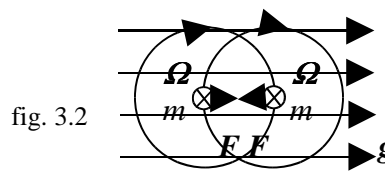

fig. 3.1

fig. 3.2

In this example, it is very clear how (absolute local) velocity has to be defined. It is compared with the steady gravitation field where the mass flow lays in.

This application can also be extrapolated in the example below: the gyrotation of a rotating sphere.

4. Gyrotation of rotating bodies in a gravitational field.

Consider a rotating body like a sphere. We will calculate the gyrotation at a certain distance from it, and inside. We consider the sphere being enveloped by a gravitation field, generated by the sphere itself, and at this condition, we can apply the analogy with the electric current in closed loop.

The approach for this calculation is similar to the one of the magnetic field generated by a magnetic dipole.

Each magnetic dipole, created by a closed loop of an infinitesimal rotating mass flow is integrated to the whole sphere. *(Reference: Richard Feynmann: Lectures on Physics)*

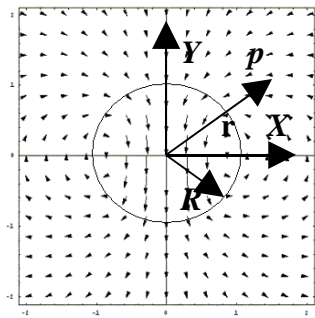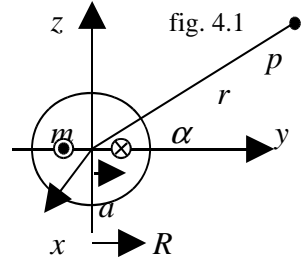The results are given by equations inside the sphere and outside the sphere:

Fig. 4.2

$$\Omega_{int} \Leftarrow \frac{4\pi G \rho}{c^2}\left[\omega\left(\frac{2}{5}r^2 - \frac{1}{3}R^2\right) - \frac{r(r \bullet \omega)}{5}\right] \qquad (4.1)$$

$$\Omega_{ext} \Leftarrow \frac{4\pi G \rho R^5}{5\,r^3 c^2}\left(\frac{\omega}{3} - \frac{r(\omega \bullet r)}{5}\right) \qquad (4.2)$$

(Reference: Eugen Negut, www.freephysics.org) The drawing shows equipotentials of $-\Omega$.

For homogeny rigid masses we can write :

$$\Omega_{ext} \Leftarrow \frac{G\,m\,R^2}{5\,r^3 c^2}\left(\omega - \frac{3r(\omega \bullet r)}{r^2}\right) \qquad (4.3)$$

When we use this way of thinking, we should keep in mind that the sphere is supposed to be immersed in a steady reference gravitation field, namely the gravitation field of the sphere itself .

5. Angular collapse into prograde orbits. Precession of orbital spinning objects.

Concerning the orbits of masses, when the central mass (the sun) rotates, there are found two major effects.

The angular collapse of orbits into prograde equatorial orbits.

In analogy with magnetism, it seems acceptable that the field lines of the gyrotation Ω, for the space outside of the mass itself, have equipotential lines as shown in fig. 5.1. For every point of the space, a local gyrotation can be found.
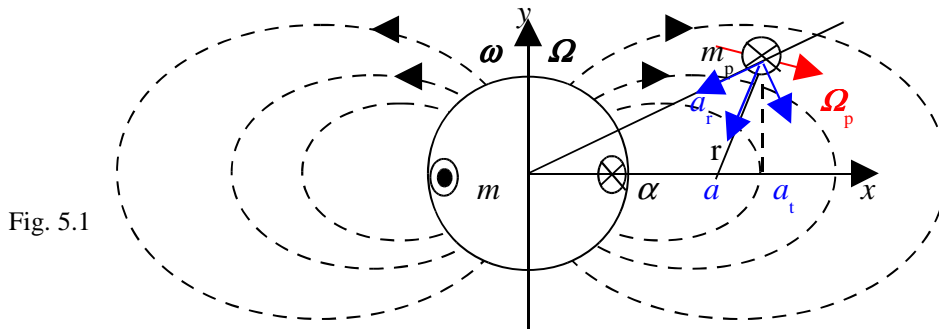
Fig. 5.1

So $v_p = r\,\omega_p$ is the orbit velocity of the mass m_p, it gets an acceleration: $\boldsymbol{a_p} \Leftarrow \boldsymbol{v}_p \times \boldsymbol{\Omega_p}$ -deducted from (1.1)- where a_p is pointed in a direction, perpendicular on the equipotentials line. One finds the tangential component a_{pt} and the radial component a_{pr} out of (4.2).

The acceleration a_{pt} always sends the orbit of m_p toward the equator plane of m. And so m_p has a retrograde orbit (negative ω_p), a_{pt} will change sign in order to make turn the orbit, away from the equator. Finally, this orbit will turn such that the sign of ω_p and therefore a_{pt} becomes again positive ($\alpha > \pi/2$), (prograde orbit), and the orbit will perform a precession with decreased oscillation around the equator.

The component a_{pr} is responsible for a slight orbit diameter decrease or increase, depending on the sign of ω_p.

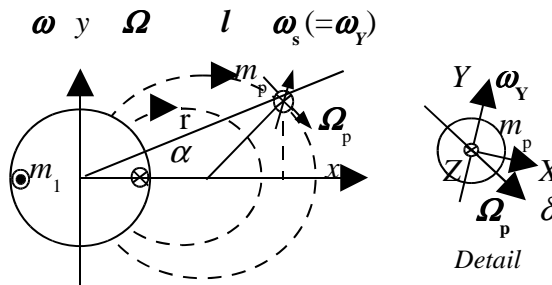### *The precession of orbital spinning objects.*

Fig. 5.2 : *A second effect occur if the small mass is also spinning.*

If the mass m_p is also spinning, with a speed ω_s, one gets: the momentum M_Z of m_p created by $\boldsymbol{\Omega_p}$ results from the forces acting on the rotating particle -from (1.1)-:

$$\boldsymbol{a_\Omega} \Leftarrow \boldsymbol{v_Z} \times \boldsymbol{\Omega_p} \qquad \text{where we write } \boldsymbol{v_Z} \text{ as} \qquad \boldsymbol{v_Z} = \boldsymbol{\omega_Y} \times \boldsymbol{X} \qquad \text{for any particle of } m_p.$$

with X the equivalent momentum radius for the sphere.

Therefore also for any particle of m_p: $\qquad M_Z \Leftarrow 2\,\omega_Y\,X^2\,\Omega_p \cos\delta$.

This means: excepted in the case of an opposite rotation direction of ω_Y and ω, the gyrotation of m_1 will always influence the rotation ω_Y, by generating a precession on m_p.

Lecture D : a word on planetary systems

6. Structure and formation of prograde disc Galaxies.

For contracting spherical galaxies with a spinning centre, two different evolutions can be found. One for objects with an initial tangential velocity (in orbit), and another for objects without orbit (zero initial velocity).

Objects with an orbit

Objects with an orbit will undergo an angular collapse into prograde orbits due to the first effect of section 5.

Ejection out of the galaxy is also possible during this collapse motion for retrograde orbits, because a_{pr} is pointing away from the mass m (opposite forces as in fig.5.1 in that case).

The angular collapse starts from the first spherical zone near the central zone, where the gyrotation is strong and the collapse quick. Every star orbit will undergo an absorbed oscillation around the equator of the mass m , due to the acceleration a_{pt} . This oscillation brings stars closer together. It becomes quickly a group of stars, or even a part of the future disc, and the stars turn out to be more and more in phase. It can become a distorted disc with a sinuous aspect, and finally a disc.

The final tangential velocity $v_{\theta,disc}$ depends from the start position α_o , r_o and the initial tangential velocity $v_{\theta o}$. At the same final radius, several stars with diverse velocities may join.

Distant stars outside the disc will oscillate "indefinitely", or will be partly captured by the disc's gravitation. Remark: perfectly plane retrograde orbits, which existed "since the beginning" at the equator level of the galaxy before the start of the orbit collapse process, can theoretically subsist until a very close encounter or a collision with any prograde object deflects it.

Objects without an orbit

But when a numerical simulation is made of the evolution for objects without an orbital motion, the result is a wide oscillation about the rotation axis of the galaxy's centre, which is perpendicular to the disc.
It is expected that some stars closer to the disc -while oscillating- can be partially captured by its gravitation forces.

In the following few lines, one discovers the complexity of the motion. It appears that the analytical description of the evolution is not successful any more. Only a numerical approach gives clarity.
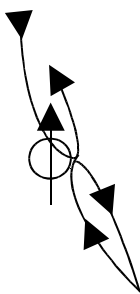
In fig. 5.1 the law for gravitational contraction is $g_r \Leftarrow -G\,m\,/\,r^2$ (6.1)
This radial displacement creates a gyrotation acceleration due to (1.1), deviating the object in a retrograde way

$$a_\theta \Leftarrow v_r \times \boldsymbol{\Omega} \qquad (6.2)$$

in the z-direction, where $\boldsymbol{\Omega}$ is given by (4.2).

When the object does not fall on the rotating centre but misses it, it comes in a region where now a prograde deviation is created. The object will oscillate as follows around the star: when falling towards the star, a retrograde deviation is created, when quitting the star, a prograde deviation is created.

Fig. 6.1

Stellar clusters' trajectories

We could wonder if stellar clusters are obeying this law instead of their presumed converging orbits towards the centre of the galaxy. Since those stars are considered as the oldest ones of the galaxy, it is unlikely that converging would occur. Instead, they will more likely oscillate as objects without an orbit, as explained higher, but, apparently, in such a way that the sum of the forces avoids convergence to the galaxy's centre.

Lecture E : a word on the formation of disc galaxies

Calculation of the constant velocity of the stars around the bulge of plane galaxies

Let's take the spherical galaxy again with a rotary centre (fig. 6.2). The distribution of the mass is such, that a star only feels the gravitation of the centre. We consider equal masses M_o (mass of the centre, named "the bulge") in various concentric hollow spheres according to some function of R (it must not be linear). We take the total bulge as the centre mass because that part does not collapse into a disk, and so, it has to be considered as part of the rotary centre of the galaxy. Possibly, the orbit can be disturbed by the passage of other stars, but in general one can say that only the centre M_o has an influence according to:
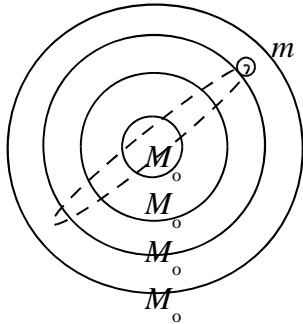
$$F_R = G \frac{M_0 \, m}{R^2} \qquad \text{and} \qquad F_C = \frac{m \, v_R^2}{R} \qquad \text{(6.3) (6.4)}$$

fig. 6.2   So, $F_R = F_C \quad \Rightarrow \quad v_R^2 = \frac{G \, M_0}{R}$ (6.5)

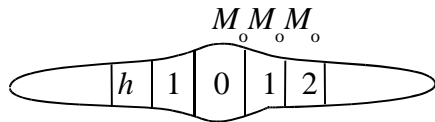When the angular collapse of the stars is done, creating a disc around the bulge, the following effect occurs:

the mass which before took the volume $(4/3) \, \pi \, R^3$, will now be compressed in a volume $\pi \, R^2 \, h$ where h is the height of the disc, that is a fraction of the diameter of the initial sphere (fig. 6.3).

fig. 6.3

And at the distance R, a star feels more gravitation than the one generated by the mass M_o.

To a distance $k.R_o$ the star will be submitted to the influence of about $n.M_o$, where k and n are supposed to be linear functions passing through zero in the centre of the bulge.

Strong simplified, this gives for the total mass according to the distance R:

$$v_{r_2}^2 = \frac{G \, n \, M_0}{k \, R} \qquad \text{(6.6)}$$

Therefore, one can conclude that : $\boxed{v_{r2} = \text{constant}}$

Concerning the centre, zone zero, one cannot say much. Let's not forget that a part of the angular momentum has been transmitted to the disc, and that the centre is not a point but a zone.

For zone one, we can say that the function of the forces of gravitomagnetism must be somewhere between the one of the initial sphere and the zone 2.

Example : calculation of the stars' velocity of the Milky Way

These findings are completely compatible with the measured values.
The diagram shows a typical example, which shows the velocities of stars for our Milky Way.

Using equation (6.6) for our Milky Way, with the reasonable estimate of a bulge diameter of 10000 light years having a mass of 20 billion of solar masses (10% of the total galaxy), and admitting that $k = n$ we get a quite correct orbital velocity of 240 km/s (fig. 6.4).
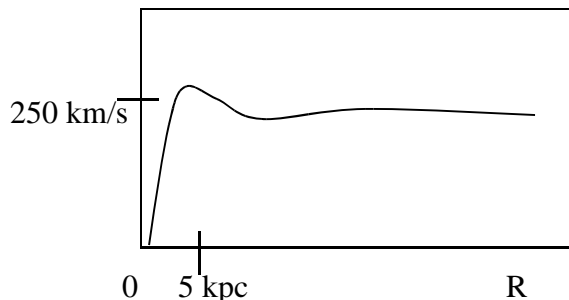
250 km/s

0   5 kpc   R

fig. 6.4

Dark matter and missing mass are not viable

The problem of the 'missing mass' or 'dark matter' that have never been found and that had to bring an explanation for the stars' velocity constancy is better solved with our theory: the velocity constancy is entirely due to the formation of the plane galaxy without a need of invisible masses.
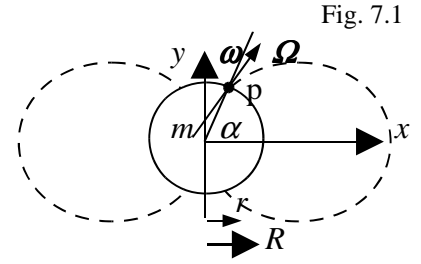
Fig. 7.1

7. Unlimited maximum spin velocity of compact stars.

When a supernova explodes, this happens partially and in specific zones. The purpose here is to find out why this happens so.

Let us consider the fast rotary star, on which the forces on p are calculated (fig. 7.1). We don't want to polemic on the correct shape for the supernova, and suppose that it is still a homogeny sphere. If the mass distribution is different, we will approximate it by a sphere.

For each point p, the gyrotation can be found by putting $r = R$ in (4.2). And taken in account the velocity of p in this field, the point p will undergo a gyrotation force which is pointing towards the centre of the sphere.

Replacing also the mass by $m = \pi R^3 \rho \, 4/3$ we get (4.2) transformed as follows:

$$\Omega_{\mathbf{R}} \Leftarrow \frac{G\,m}{5\,R\,c^2}\left(\omega - \frac{3\,R\,(\omega \bullet R)}{R^2}\right) \tag{7.1}$$

The gyrotation accelerations are given by the following equations:

$$a_x \Leftarrow x\,\omega\,\Omega_y = \omega\,R\cos\alpha\,\Omega_y \quad \text{and} \quad a_y \Leftarrow x\,\omega\,\Omega_x = \omega\,R\cos\alpha\,\Omega_x$$

To calculate the gravitation at point p, the sphere can be seen as a point mass. Taking in account the centrifugal force, the gyrotation and the gravitation, one can find the total acceleration :

$$a_{x\,tot} \Leftarrow R\,\omega^2\cos\alpha\left(1 - \frac{G\,m\,(1 - 3\sin^2\alpha)}{5\,R\,c^2}\right) - \frac{G\,m\cos\alpha}{R^2} \tag{7.2}$$

$$-a_{y\,tot} \Leftarrow 0 + \frac{3\,G\,m\,\omega^2\cos^2\alpha\sin\alpha}{c^2} + \frac{G\,m\sin\alpha}{R^2} \tag{7.3}$$

The gyrotation term is therefore a supplementary compression force that will stop the neutron star from exploding. For elevated values of ω^2, the last term of (7.2) is negligible, and will maintain below a critical value of R a global compression, regardless of ω. This limit is given by the Critical Compression Radius:

$$0 = 1 - \frac{G\,m\,(1 - 3\sin^2\alpha)}{5\,R\,c^2}$$

or $\qquad\boxed{R = R_{C\alpha} < R_C\,(1 - 3\sin^2\alpha)} \tag{7.4}$

where R_C is the Equatorial Critical Compression Radius for Rotary Spheres :

$$\boxed{R_C = G\,m\,/\,5\,c^2} \tag{7.5}$$

R_C is $1/10^{th}$ of the Schwarzschild radius R_S valid for non-rotary black holes ! This means that black holes can explode when they are fast spinning, and that every non-exploding spinning star must be a black hole.

The fig. 7.2 shows the gyrotation and the centrifugal forces at the surface of a spherical star. The same deduction can be made for the lines of gyrotation inside the star. Fig. 7.3 shows the gyrotation lines and forces at the inner side of the star. We see immediately that (7.4) has to be corrected : at the equator, the gyrotation forces of the inner and the outer material are opposite. So, (7.4) is valid for $\alpha \neq 0$.
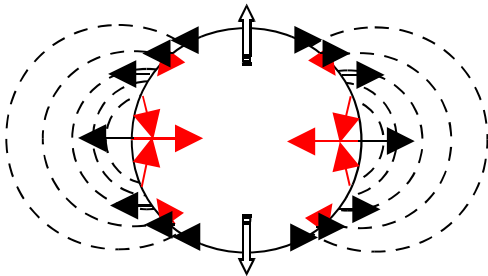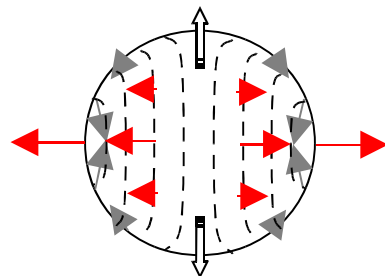

| Fig. 7.2 | Fig. 7.3 |

From (7.4) also results that the shape of fast rotating stars stretches toward an *Dyson* ellipse and even a toroid:

if $\alpha \geq 35°16'$ the Critical Compression Radius becomes indeed zero. Contraction will indeed increase the spin and change the shape to a "tire" or toroid black hole, like some numeric calculations seem to indicate. (Ansorg et al., 2003, A&A, Astro-Ph.).

8. Origin of the shape of mass losses in supernovae.

When a rotary supernova ejects mass, the forces can be described as in section 6 for objects without an orbit, but with an high initial velocity from the surface of the star. Due to (1.1) , at the equator the ejected mass is deviated in a prograde ring, which expansion slows down by gravitation and will in the end collapse when contraction starts again, but by maintaining the prograde rings as orbits.

When the mass leave under angle, a prograde ring is obtained, parallel to the equator, but outside of the equator's plane. This ring expands in a spiral, away from the star, because of its initial velocity. The expansion slows down, and will get an angular collapse by the gyrotation working on the prograde motion.

The probable origin of the angle has been given in section 7: the zones of the sphere near the poles (35°16' to 144°44' and -35°16' to -144°44') are the "weakest". Indeed, these zones have a gyrotation pointing perpendicularly on the surface of the sphere, so that the gyrotation acceleration points tangentially at this surface, so that no compensation with the centripetal force is possible. The zone near the equator (0°) has no gyrotation force which could hold the mass together in compensation of the centripetal force.

Fig. 8.1
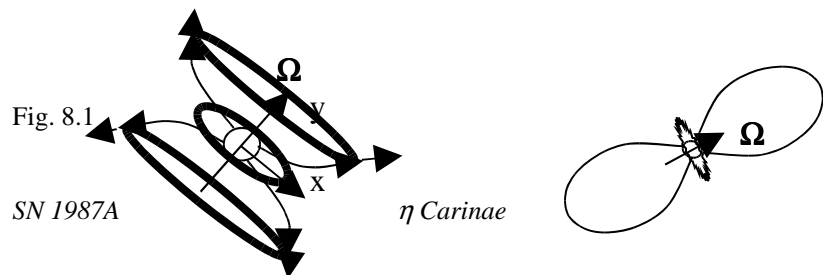
SN 1987A   *η Carinae*

SN 1987A: a local mass loss took place on the equator and probably close to the 35° 16' angle. The zone 35°16' to 144°44' exploded possibly much earlier, and became a toroid-like shaped rotary star.
η Carinae : mass loss by complete shells, probably above the 35° 16' angle, forming two lobes with a central ring.

The observation complies perfectly with this theoretical deduction. The supernovae explode into symmetric lobes, with a central disc. Observation will have to verify that these lobes start nearly at 35°, measured from the equator.

9. Dynamo motion of the sun.

It is observed that the spots on the sun have a displacement from nearby the poles to the equator. This takes about 11 years. This effect can be explained by the gyrotation forces.

Equation (7.1) gives the gyrotation field at the level of the sun. Equations (7.2) and (7.3) can be expressed as a new set of components to the surface of the sun: a tangential component and a radial one.

$$a_{t\,tot} \Leftarrow \omega^2 \sin 2\alpha \left(\frac{R}{2} + \frac{G\,m}{5\,c^2} \right) \qquad (9.1)$$

$$a_{r\,tot} \Leftarrow \omega^2 \cos^2 \alpha \left(R - \frac{G\,m}{5\,c^2} \right) - \frac{G\,m}{R^2} \qquad (9.2)$$

When looking at the tangential component, mainly the centrifugal but also the gyrotation forces push the surface mass to the equator, but considering the radial component, the closer to the equator the more the gyrotation forces push the mass inwards the centre of the sun (excepted at the equator where the forces are zero).

The sun's plasma will begin to rotate internally by creating two toroid-like motions, one in the northern hemisphere, one in the southern.

The differential spin of the sun is not explained by this. For some reason, the spin velocity at the equator is faster than near the poles.
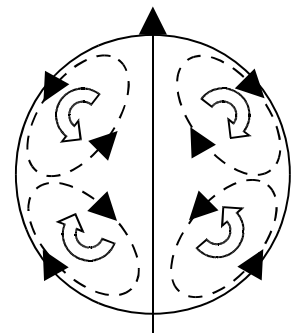
Fig. 9.1.

## 10. Binary stars with accretion disc.

Fast rotating star analysis : creation of bursts, turbulent accretion disks.

In section 7 we have seen that rotary stars have the tendency to evolve towards a toroid-shaped star. Let's take such a star with an accretion disk.

Near the rotary star we have the following. The accretion ring is prograde at the start of its formation. But the prograde motion results into a radial attraction of the ring towards the rotary star following
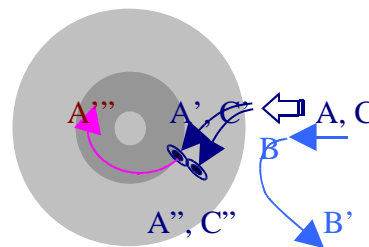
$a_r \Leftarrow v_{pr} \times \Omega$ (fig. 10.4 , particles A, B, C)

When the matter of the accretion ring approaches the radial way, it deviates in
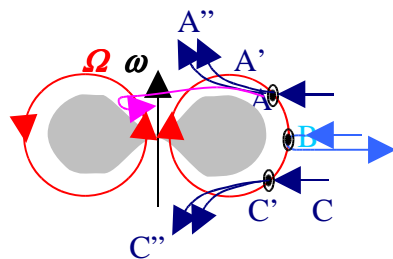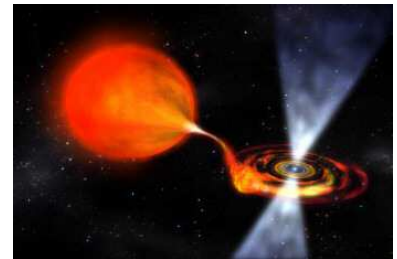
side view   Fig. 10.4   *top view*

retrograde direction, according (for particle A' and C'): $\quad a_R \Leftarrow v_A \times \Omega \quad$ (fig. 10.4 top view).

          update 1/09/2004

With fast rotating heavy masses this acceleration is enormous. Then, when the particles go by retrograde way, again an acceleration is exerted on the particles in another direction $a_P \Leftarrow v_R \times \Omega$ (particles A", C").

As a consequence these particles are projected away from the poles.

At the level of the equator, the mass is sent back towards the accretion disc (particles B, B'). We expect an accretion ring whose closest fraction to the rotary star is almost standing still, with local prograde vortices.

If a particle, due to collisions, gets inside the toroid to the level of the equator, it can be trapped by the gyrotation in a retrograde orbit (particle A"'), or if prograde, absorbed.
This effect can result in a temporary crowding, after which the accumulation should disappear again due to the limited space and because of the local gyrotation forces.
The observed spin-up and spin-down effects are possibly explained by these trapped particles.

When these phenomena are observed, high energy X-rays are related to it. It seems not likely that these X-rays would be gravitational waves. But there is another possible origin for these X-rays. One should not forget that the velocity of the bursts is extremely high, and probably faster than light for some particles. Both the relativity theory and the ether theories would say that high energies are involved. Considering that matter is "trapped light", and for ether theories, that the particles are forced through a slow ether, the stability of these particles could be harmed seriously. If so, the light can escape from the trap, and scatter as X-rays.

Bursts of collapsing stars.

When a rotating star collapses, this happens in a very short time, and it will result in a burst. What is its process ?

The conservation of momentum causes a quick increase of its spin when a collapse occurs. And an increase of spin velocity results in an fast increase of gyrotation forces :

Fig. 10.5

The law (1.5) :
$$\nabla \times g \Leftarrow - \partial \Omega / \partial t$$

is responsible for a huge circular gravitation force in the accretion ring. The attraction occurs in a circular way instead of a radial one.

The consequence is a strong contraction of the accretion ring, resulting in shrinking, and so a sudden repulsion of accretion matter, away from the star at the equator and at the poles, as described in the former section.

A burst occurs both at the poles and at the level of the accretion ring (see fig. 10.4 and fig. 10.5).

Calculation method for the accretion disc of a binary pulsar.

Consider fig. 10.4 in order to analyse the absorption process. Matter is absorbed according to equation (10.1), and will be attracted by gravitation and gyrotation forces near the rotary star. This matter goes prograde, and some of it will flow over the poles, which is then ejected as beams. Some prograde matter at the equator level can be absorbed by the rotary star. But some matter can stay near the rotary star as a cloud, which is subject to the gyrotation pressure forces. A disc around the rotary star is being created according to this gyrotation pressure. The density of the ring will increase, and will approach the rotary star. But because of the limited thickness of the ring and it's increasing pressure, it will also spill toward the outside. The masses that are pulled from the companion will then knock the widened ring (fig. 10.6).
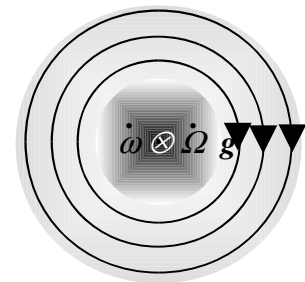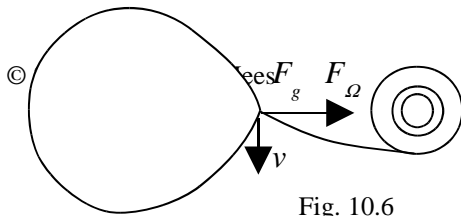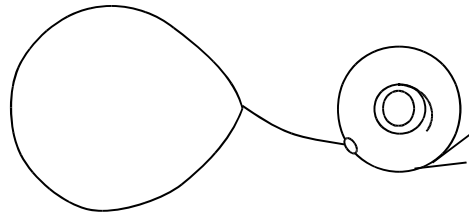
Fig. 10.6   Fig. 10.7

The equilibrium equations can be produced again, this time for a ring of gasses. However, the velocity vector of the inner part of the disc near the rotary star determines whether the disc material will be absorbed or ejected. Prograde matter can be attracted, but retrograde and in-falling matter is repulsed.

11. Repulsion by moving masses.

Repulsion of masses is deducted from drawing 10.4 (particle B), but also directly from the theory: when two flows of masses dm/dt move in the same way in the same direction, the respective fields attract each other.
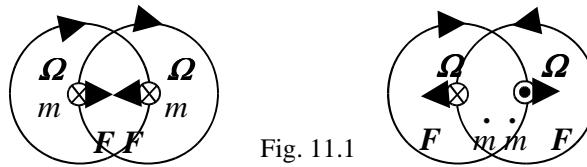

Fig. 11.1

For flows of masses having an opposite velocity, their respective gyrotation fields will be repulsive. It is clear that the velocity of the two mass flows should be seen in relation to another mass, in (local) rest, and large enough to get gyrotation energy created, as explained in section 3.
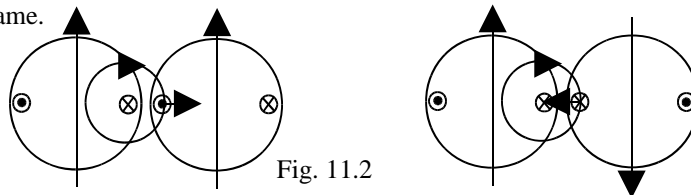
Spinning masses do the same.

Fig. 11.2

Here however, the spinning masses themselves create the reference gravitation field needed to get the gyrotation effects produced.

12. Chaos explained by gyrotation.

The theory can explain what happens when two planets cross each other. Gravitation and gyrotation give an noticeable effect of a chaotic interference. Let's assume that the orbit's radius of the small planet is larger than the one of the large planet. When passing by, a short but considerable attraction moves the small planet into a smaller orbit.

At the same time, gyrotation works via $a_O \Leftarrow v_R \times \Omega$ on the planet in the following way (fig. 12.1): the sun's and the large planet's gyrotation act on this radial velocity of the planet by slowing down it's orbital velocity. The result is a slower orbital velocity in a smaller orbit, which is in disagreement with the natural law of gravitation fashioned orbits :
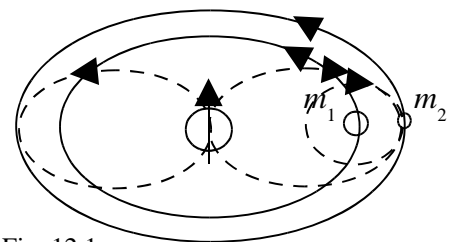
Fig. 12.1
(The orbits are represented as ellipses)

$$v = (GM/r)^{-1/2} \qquad (12.1)$$

Thus, in order to solve the conflict, nature sends the small planet away to a larger orbit. Again, gyrotation works on the radial velocity, this time by increasing the orbital velocity, which contradicts again (12.1). We come so to an oscillation, which can persist if the following passages of the large planet come in phase with the oscillation.

One could say that only gravitation could already explain chaotic orbits too. No, it is not: if no gyrotation would exist, the law (12.1) would send the planet back in it's original orbit with a fast decreasing oscillation. Gyrotation reinforces and maintains the oscillation much more efficiently, and allows even screwing oscillations.

13. The link between Relativity Theory and Gyrotation Theory.

Two flows of masses $\dot{m}$ moving in the same way in the same direction, attract. Whether one observer follows the movement or not, the effect must remain the same when we apply the relativity principle.

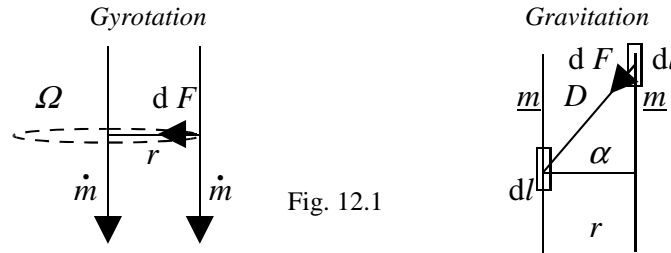The two points of view are compared hereunder.

Gyrotation   *Gravitation*

Fig. 12.1

The following notations are used:

$$\dot{m} = dm/dt \qquad \text{and} \qquad \underline{m} = dm/dl$$

For the *gyrotation* part, the work can be found from the basic formulas in sections 1 until 3 :

$$\underline{F} \Leftarrow \Omega \dot{m} \quad \text{and} \quad 2\pi\, r.\Omega \Leftarrow \tau\, \dot{m}$$

where $\underline{F} = dF/dl$ and $\tau = 4\pi\, G/c^2$.

So, $$\underline{F} = 2\, G\, \dot{m}^2 /(r\, c^2)\,. \qquad \text{Now} \quad \dot{m} = \underline{m}.v$$

Hence, the work is :

$$\underline{F}.dr = 2\, G\, \underline{m}^2\, v^2/(r\, c^2)\, dr \tag{13.1}$$

For the *gravitation* part, the gravitation of $\underline{m}$ acting on dl is integrated, which gives :

$$\underline{F} = 2\, G\, \underline{m}^2 / r$$

The work is : $$\underline{F}.dr = 2\, G\, \underline{m}^2/r\, dr \tag{13.2}$$

Let's assume two observers look at the system in movement: an observer at (local) rest and one in movement with velocity v.

An observer at rest will say: the system in movement will exercise a work equal to the gravitation of the system at rest, increased by the work exerted by the gyrotation of the system in motion.

A moving observer will say: the system will exert a work equal to the gravitation (of the moving system).

Because of the principle of relativity, the two observers are right. One can write therefore:

$$\frac{2\,G\,(\underline{m}_{st})_{st}^2}{r} + \frac{2\,G\,(\underline{m}_v)_{st}^2\,v^2}{r\,c^2} = \frac{2\,G\,(\underline{m}_{st})_v^2}{r} + \mathbf{0} \tag{13.3}$$

where "$(\underline{m}_v)_{st}$" e.g. represents the moving mass, seen by the steady observer.

We can assume (due to the relativity principle) that:

$$(\underline{m}_{st})_v = (\underline{m}_v)_{st}\,. \qquad \text{Hence,} \qquad (\underline{m}_{st})_{st} = (\underline{m}_v)_{st} \sqrt{1 - v^2/c^2}$$

An important consequence of this is: the "relativistic effect" of gravitation, or better, the time delay of light is expressed by gyrotation. This could be expected from the analogy with the electromagnetism.
In other words: when the gravitation and the gyrotation are taken into account, the frame can be chosen freely, while guaranteeing a "relativistic" result.

The fact that the neutron stars don't explode can find its explanation through the forces of gyrotation, but can also be seen as a "mass increase" due to the relativistic effect. The mass increase of the relativity theory is however an *equivalent pseudo mass* due to the gyrotation forces which act locally on every point.

14. Discussion : implications of the relationship between Relativity and Gyrotation.

The discussion about the paragraph 11 relates to the consequences for the relativity theory. This paragraph is treated separately in *"Relativity theory analysed"*, in order to not harm the objective of this paper which is to show how the gyrotation works and what it offers for the study of the dynamics of objects.

Relativity theory analysed

15. Conclusions.

Gyrotation, defined as the transmitted angular movement by gravitation in motion, is a plausible solution for a whole set of unexplained problems of the universe. It forms a whole with gravitation, in the shape of a vector field wave theory, that becomes extremely simple by its close similarity to the electromagnetism. And in this gyrotation, the time retardation of light is locked in.
An advantage of the theory is also that it is Euclidian, and that predictions are deductible of laws analogous to those of Maxwell.

16. References.

Adams, F., Laughlin, F., 1996, Astr-Ph., 9701131v1

Ansorg, M., Kleinwächter, A., Meinel, R., 2003, A&A 405, 711-721

Ansorg, M., Kleinwächter, A., Meinel, R., 2003, Astro-Ph., 482, L87

Alonso, M., Finn, E. J., 1973, Fundamental University Physics.

Caroll B. W., Ostlie, D. A., 1996, An Introduction to Modern Astrophysics.

Einstein, A., 1916, Über die spezielle und die allgemeine Relativitätstheorie.

Feynman, Leighton, Sands, 1963, Feynman Lectures on Physics Vol 2.

Negut, E., 1990, On intrinsic properties of relativistic motions.

Nielsen, L., 1972, Gamma No. 9, Niels Bohr Institute, Copenhagen

Tajmar, M. & de Matos, C.J., arXiv, 2003gr.qc.....4104D

Van Boekel, R., Kervella, P., Schöller, et al., 2003, A&A, 410, L37-L