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Is the Differential Rotation of the Sun Caused by a Coriolis Graviton Engine?

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Abstract

Essential fundamentals of gravitomagnetism are found by applying the process of the reciprocal graviton-losses by particles that are defined here as trapped photons. The gravity field is found to be generated by a Coriolis effect, exerted by gravitons upon particles. Inertial resistance is generated by a Coriolis effect as well. In order to demonstrate the former case, we apply the graviton mechanics to the Sun. The amplitude of this effect is found to match the Sun's rotation frequency.

1. Introduction

Mindful of the previous successes of gravitomagnetism in cosmic phenomena [1], this paper is the subject of a more fundamental research on the mechanism of gravitation.

It is well-known that trapped light is the most convenient solution for the description of matter, even if the great number of very different particles obscure the details of it. The so-called energy-matter exchanges allow for the transition of a large set of particles into others.

From my earlier paper, [1] I found the equations for gyrotation, the 'magnetic'-analogue equivalence in gravitomagnetism. In this paper, I will interpret the gravitation field and inertia as Coriolis effects, applied upon trapped photons.

2. Gravity as a Coriolis effect

Let C_j be an circular orbit of a trapped photon δ_j, within a finite set of orbits of photons $(C_1, C_2, ..., C_n)$ that forms multiple elementary particles. The orbit C_j represents a particle with mass m_j, rotating at an orbit radius R_j with an angular velocity ω_j.

Let L_j be the path of a graviton γ that leaves that circular orbit C_j (I use the word 'graviton' in order to not interfere with the word 'photon', although both might be of the same kind). Let C_i be another photon orbit at a distance R_{ij} from C_j, with an angular velocity ω_i and an orbit radius R_i. Let τ_{ij} be the intersection of L_j with C_i.

The vector expression for the Coriolis acceleration $\vec{a}_{ij}$ at the intersection τ_{ij} is then given by: $$2\vec{\omega}_i \times \vec{c} = -\vec{a}_{ij} \quad (1)$$
wherein $\vec{c}$ is the translation velocity of the graviton.

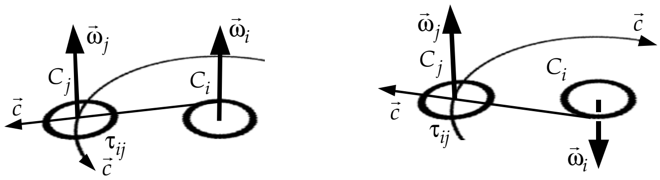

Figure 1.a. and b. Two *cases of trapped light, hit by a graviton, radial or tangential, and undergoing a Coriolis effect.*

<u>Hypothesis</u>: this Coriolis acceleration $\vec{a}_{ij}$ engenders the gravitation acceleration of the particle C_i at a distance R_{ij} from C_j.

The right hand of Eq. (1) is equal to the corresponding gravity acceleration, produced by the diluted fraction $G m_i$ of gravitons that leave the circular photon orbit, in tangential or perpendicular directions. The gravitational acceleration flux in a point τ_{ij} at a distance R_{ij} will be :

$$-G m_i / R_{ij}^2 \tag{2}$$

The total possible number of intersections τ_{ij} is then given by $(2\pi R_i)/R_i$. Hence, from Eq. (1) and (2) follows, in totality :

$$\omega_i = \frac{2\pi G m_i}{2 c R_{ij}^2} \quad \text{or} \quad \upsilon_i = \frac{G m_i}{2 c R_{ij}^2} \tag{3}$$

wherein υ_i is the according rotation frequency.

It was showed [1] that the mutual gyrotation orientations of nested particles in a rotating object, similar as $\vec{\omega}_j$ and $\vec{\omega}_i$ in figure 1.a., have like rotation orientations, due to the like-oriented gyrotation fields. However, particles that are apart from the object always get opposite spin orientations, like $\vec{\omega}_j$ and $\vec{\omega}_i$ in figure 1.b.

3. Inertia as a Coriolis effect

A direct consequence of regarding matter as trapped light is the interpretation of the mechanism of inertia. Also this mechanism is ruled by the Coriolis effect.

Let the trapped photon δ_j be accelerated by a force in a certain direction, as shown in figure 2 and the photon paths will cross in τ_{jj1} and τ_{jj2} .

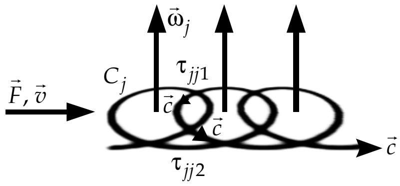

Figure 2. *Trapped light under a force $\vec{F}$ undergoes a Coriolis effect that is oriented in opposite direction.*

There are six possible orientations of $\vec{\omega}_j$ (like the sides of a dice) whereof four result in the same orientation of the Coriolis acceleration $-a_{jj} = 2\omega_j c$, and two of them that have a screwing shape (right of left screwing) don't undergo any Coriolis effect at all.

4. Derivation of the Sun's Rotation Equation

It will be shown below that Eq. (3), when applied to the Sun as a whole, gets a special meaning, due to the like orientation of particles by the Sun's rotation.

Since the gravitons are leaving the Sun in radial or tangential way, or any situation between-in, there is a net gravitational and rotational effect.

Hence, when applying Eq. (3) for gravitons that leave the Sun along the equator, we find:

$$\upsilon_{eq} = \frac{G m_{Sun}}{2 c R_{eq}^2} \tag{4}$$

Herein : G = 6.67x10^{-11} m^3 kg^{-1} s^{-2},
c = *3.00x108* m s^{-1}
and for the Sun, m_{Sun} = 1.98x10^{30} kg
R_{eq} = 6.96x10^8 m.

What I suggest here, is that the Sun's angular velocity might be defined, due to a law of nature, by its gravitational properties. By applying the figures above, this can immediately be checked.

However, when it comes to the entrainment of matter by gravitons, a minimum of viscosity is required. The Dalsgaard model for the solar density [3] shows a hyperbolic-like function, whereof the asymptotes intersect at about 0.98 R_{eq} : at first, there occurs a very quick density increase from 10^{-6} g/cm³ at R_{eq} until 10^{-2} g/cm³ at nearly 0.95 R_{eq} and next a slow, almost linear density increase until $1.5x10^{2}$ g/cm³ at the Sun's center. On the other hand, S. Korzennik et al. [2] found that the highest value of the Sun's rotation is located at about 0.94 R_{eq} , where the corresponding density is 10^{-2} g/cm³.

When applying Eq. (4) by using a corrected radius, somewhere between 0.98 and 0.94 R_{eq} , and when assuming that the total mass may be kept alike, the result for the Sun's rotation frequency υ_{eq} is somewhere between 474 and 515 nHz, or a corresponding sidereal period between 24.44 and 22.49 days, which is very close to the measured Sun's sidereal period of 24.47 days at the equatorial photosphere [2]. This result suggests that the equatorial disc of the Sun maintains and controls the rotation frequency of the Sun ever since the Sun started to rotate in some initial direction.

5. Derivation of the Sun's Differential Rotation Equation

When a graviton quits the Sun at any latitude α , it will cause an acceleration as well, based on Eq. (4) , but whereby the spin ω will be inclined at an angle α (the equator is 0 rad) and whereby the radius R_{eq} remains to same for all latitudes.

In a first approach, I reason as follows. The average direction between the Sun's equatorial, graviton-induced spin, name it ω_{eq} , and the inclined spin, name it ω_{α} , is $\alpha/2$. The value of ω_{α} should, in addition, be reduced by the cosine of $\alpha/2$ towards the rotation axis because we only observe the component at the angle $\pi/2$.

Hence
$$\omega_{\alpha} = \omega_{eq} \cos(\alpha/2) \qquad (5)$$

This result is a raw equation for the differential rotation under the effect of gravitons but it doesn't indeed take into account the centrifugal flow inside the Sun's Convection Zone. This flow engenders a Coriolis effect up to the surface which attenuates the angular velocity, especially in a range around the angle of $\pi/4$. It could be possible to extract a semi-empiric equation from Eq. (5) that takes in account this motion, but this is not the prime purpose of this paper.

6. Discussion

The parity of the Coriolis acceleration with the Sun's gravity acceleration, under the action of escaping gravitons, is remarkable. Gravitons at any latitude produce the same rotation value, which, combined with the global spin of the Sun, result in a differential rotation. The equator is the place where gravitons propel the Sun at the largest resulting velocity.

According to S. Korzennik et al. [2] , the measured differential rotation at the solar surface shows a wide range of rotation frequencies between nearly 337 nHz (rotation period of 34.3 days at the poles) and 473 nHz (rotation period of 24.47 days at the equator). With Eq. (5) we got a raw equation, without solar convection corrections, of the expected differential rotations at places, other than at the equator. For example, the calculated result –by using 0.98 R_{eq} and without further corrections– for the poles is 34.56 days, which comply very well with the measured rotation period of 34.3 days.

The expression "Graviton Engine" follows from the mechanical Coriolis-process that is at the origin of Eq. (4).

7. Conclusion

Our Sun seems to behave like a giant particle whereof any place on the surface is propelled by gravitons that quit the Sun at a speed c . Its motion may confirm our gravitomagnetic interaction-model between particles, shaped as circular trapped light, wherein the Coriolis effect by gravitons generates gravitation. Other latitudes on the Sun's surface, where the same process occur, directly contribute to the measured differential rotation.

8. References

[1] De Mees T., "Analytic Description of Cosmic Phenomena Using the Heaviside Field", Physics Essays, Vol. 18, No. 3 (2005).
[2] Korzennik, S. et al., "Internal rotation and dynamics of the Sun from GONG data", Kluwer, 1997IAUS..181..211K (1997).
[3] NASA/Marshall Solar Physics". Solarscience.msfc.nasa.gov. 2007-01-18. http://solarscience.msfc.nasa.gov/interior.shtml.