Gravitational Force, a High Frequency Electromagnetical Oscillation

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Abstract

Photons don't have a mass; this is common knowledge. On the other hand, photons are deviated by gravitational fields, like they occur around every mass. The deviation of photons can be observed at so called gravitational lenses. Therefore there must be some correlation between the electromagnetic photons and the gravitational fields which influence masses.

1 Introduction

The so called gravitational lenses are a macroscopic gravitational effect, which deviate photons from their straight movement when they pass large masses, e.g. a star which is positoned behind the sun can be seen from the earth, because the light beams which are emitted from that star are bent when they pass the sun. That deviation is a very small one.
The most important part of that effect is, that there is a pure electromagnetic system, the photons, influenced by gravitational fields. Hence there must be some correlation between electromagnetism and gravitation.

Assuming that gravitational fields are an electromagnetic effect, how can be explained that the gravitational field always appear to pull two masses to each other when electromagnetic fields have a polarity and can be pulling or pushing, depending on the polarity of the two sources of the electomagnetic fields?

2 Electromagnetic Oscillation

To understand how an electromagnetic oscillation leads to the gravitational effect let's have a closer look at two systems which are surrounded by oscillating electromagnetic fields. What is the resulting effect on both of the systems with regard to the frequency and the phase of both oscillations?

The force between two electrical charged particles can be described with Coulomb's law:

$$F_C = -\frac{q_1 \cdot q_2}{4 \cdot \pi \cdot \varepsilon_0 \cdot r^2}$$

with
F_C = Force of Coulomb in N
q_1 = Charge of first particle in As
q_2 = Charge of second particle in As
ε_0 = Permittivity constant = 8,85 · 10^{-12} $^{As}/_{Vm}$
r = Distance between the particles in m

The force between two gravitational particles (masses) can be described with the Gravitational law:

$$F_G = \frac{g \cdot m_1 \cdot m_2}{r^2}$$

with
F_G = Force of Gravitation in N
g = Gravitational constant = 6,6743 · 10^{-11} m^3/kg s^2
m_1 = Mass of first particle in kg
m_2 = Mass of second particle in kg
r = Distance between the particles in m

As easily can be seen, the calculation of the Coulomb and the Gravitational forces are similar.

Coming back to the beginning of the assumption, the charges of the coulomb force shall be of the oscillating type:

$$q_n = q_{n0} \cdot \sin\left(2 \cdot \pi \cdot f_n + \varphi_n\right)$$

with
q_n = Charge of n^{th} particle in As
n = 1; 2
f_n = frequency of oscillation of n^{th} particle in Hz
φ_n = Phase of n^{th} particle

Setting that expression for the electrical fields of the two particles in Coulomb's law results in

$$F_C = -\frac{q_{10} \cdot \sin\left(2 \cdot \pi \cdot f_1 + \varphi_1\right) \cdot q_{20} \cdot \sin\left(2 \cdot \pi \cdot f_2 + \varphi_2\right)}{4 \cdot \pi \cdot \varepsilon_0 \cdot r^2}$$

It is not necessary that the force F_C has permanently a certain size unequal to zero. It is necessary that the average value of the force F_C is unequal to zero. For that consideration the term in the counter of the fraction is relevant, and in this term it is the multiplication of the sine waves:

$$\sin(2\cdot\pi\cdot f_1)\cdot\sin(2\cdot\pi\cdot f_2)$$

As the phase values only have influence on the polarity of the average value, we can leave them.
To get an information about whether there is a possibility of an average value unequal to zero for the above term, there should be performed a fourier analysis on that term. The parameter a_0 of that analysis is the average fraction of the whole expression.

After some calculation we get

$$a_0 = 1 - \frac{\sin(2\cdot\pi\cdot f)}{2\cdot\pi\cdot f}$$

with
$f = f_1 = f_2$

It is clear that the polarity of the force (pulling or pushing) depends on the resulting phase of the oscillations.

3 Mass of the Photon

Out of that result, that two oscillating electromagnetic fields may behave like respective gravitational fields, i.e. the force is always a pulling one, leads to the question whether there might be some fundamental electromagnetic system which is the base for all the little pieces our universe is made of, the quarks, the electrons, the photons, the gluons, the bosons etc.

Imagine two helixes, wound around one toroidal shape with a phase difference of pi. One of the helixes is an oscillating electrical field, the other one the corresponding magnetic field. The helixes wound around a cylinder would fulfill the Maxwellian Equations on every position of the helixes, but wound around a toroid there are generated potential differences which lead to further oscillations, longitudinal and lateral to the center circle of the toroid. The lateral oscillations lead to pulling forces between two toroidal helixes, the longitudinal oscillations lead to electrical field sources which are electric charges from the macroscopic point of view, either positive or negative.

That electromagnetic helix toroid forms every particle of the standard model, depending on how much helix toroids are put together to one distinctive part.

The photon consists of a minimum of helix toroids, therefore its mass is the minimum possible one with reference to the model and in the range of 10^{-37} to 10^{-38} kg.

Deviated from that result, the radius of the center circle of the helix toroid is 10^{-19} m, the radius of the cross section of the toroid is 10^{-48} m. The frequency of its natural resonance is 10^{40} Hz.

References

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