

How gravitation effects speed of light and electromagnetic constants

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Abstract

Here is proposed a new dependence between speed of light, vacuum permittivity, vacuum permeability and gravitation.

Proposed dependence well explains all known behavior of quantum in gravitation. Moreover it opens easy enough way to redefine Einstein's theory of gravitation without using paradigm of curved spacetime.

Speed of light depends on gravitation by equation,

$$c_{gr}^4 + v_{esc}^2 * c^2 = c^4 \quad (1)$$

where

c_{gr} - speed of light in gravitation,

v_{esc} - gravitation escape velocity,

c - speed of light far from gravitation.

This equation multiplied by m^2 gives equation for total energy of mass in gravitation

$$m^2 * c_{gr}^4 + (m * v_{esc})^2 * c^2 = m^2 * c^4 \quad (2)$$
$$E_{inner_in_gravitation}^2 + E_{additional_inner_angular_momentum}^2 = E_{total}^2$$

and multiplied by $\frac{h^2 * f^2}{c^4}$ it gives equation for total energy of quantum in gravitation

$$(h * f)^2 * \frac{c_{gr}^4}{c^4} + (h * f)^2 * \frac{v_{esc}^2}{c^2} = (h * f)^2 \quad (3)$$
$$E_{quantum_in_gravitation}^2 + E_{additional_angular_momentum}^2 = E_{quantum_total}^2$$

Now we may find the energy an atom emits

$$E_{atom_emission} = \Delta E_{inner_in_gravitation} = \sqrt{\Delta E_{atom_total}^2 - \Delta E_{additional_inner_angular_momentum}^2} =$$
$$= \sqrt{(h * f)^2 - (h * f)^2 * \frac{v_{esc}^2}{c^2}} = h * f * \sqrt{1 - \frac{v_{esc}^2}{c^2}} = \Delta E_{atom_total} * \sqrt{1 - \frac{v_{esc}^2}{c^2}} \quad (4)$$

And according to it the emission frequency is equal to

$$f = \frac{E_{atom_emission}}{h} = \frac{\Delta E_{atom_total}}{h} * \sqrt{1 - \frac{v_{esc}^2}{c^2}} \quad (5)$$

Like we see the frequency of quantum depends on the gravitation where it was emitted.
 After emission the quantum travels in space with constant frequency.
 But speed of quantum is changing during this travel. It depends on gravitation.

The reason why the speed of light is changing and the reason why an atom emits less energy quantum in gravitation hides in dependence between gravitational potential and electromagnetic constants.
 As we know

$$c = \frac{1}{\sqrt{\epsilon_0 * \mu_0}} \quad (6)$$

Therefore in gravitation we will have

$$\frac{1}{\epsilon_{0_gr}} * \frac{1}{\mu_{0_gr}} = c_{gr}^2 = c^2 * \sqrt{1 - \frac{v_{esc}^2}{c^2}} \quad (7)$$

where ϵ_{0_gr} - vacuum permittivity in gravitation

and μ_{0_gr} - vacuum permeability in gravitation.

Therefore electromagnetic interaction becomes weaker in gravitation
 and therefore some part of inner electromagnetic energy converts to energy of inner angular momentum.

For example, when quick charged particle enters strong gravitation some part of its energy is emitted.
 Here we have some version of Cherenkov radiation.

The reason why electromagnetic constants are changing can be explained by my hypothesis about vacuum structure. We know from quantum mechanic that space is filled with many different types of virtual particles. So we may guess that some type of these virtual particles may be responsible for realize electromagnetic interaction. In gravitation these particles may be separated. Near masses may decrease a number of mentioned virtual particles who response for electromagnetic interaction. Therefore vacuum permittivity and vacuum permeability are changing.

Conclusion

Although here is not used curved spacetime paradigm, proposed view may well explain all known behavior of quantum in gravitation. Therefore it is very likely that all Einstein's general relativity may be redefined according to this point of view. Instead of spacetime interval paradigm we could say material objects moves according to minimal time trajectory. This is more simple paradigm and this paradigm has much more clear physical meaning.

By the way, the hypothesis about the space separation leads to very interesting foresight which may happen in very strong gravitation. Likely exists such matter state when electromagnetic interaction can not spread at all. It would mean that there is no interaction between electrically charged particles. In this way matter can be compressed very much. Here we will have very different and completely unstudied form of matter.

Similar predictions about speed of light was independently done by A. Unzicker [2], H. E. Puthoff [5] and other authors. But here I propose different equation for speed of light in gravitation with different motivation for such phenomenon.

To complete new theory it is necessary to obtain additional experimental data about speed of light in inertial frames. Although special relativity postulated constant speed of light, but until now there is no direct experimental confirmation of this statement. There are at least two alternative possibilities.

The first alternative is that the length of solid matter may contracts absolutely, like Hendrik Lorentz inimically proposed. This may happen because of Doppler effect.

The second alternative is that aether may be dragged proportionally to gravitation influence of big masses.

We need some experiments which could be sensitive enough to find out which view is correct. Experiments like Michelson-Morley are not sensitive to these different possibilities. For example Daniel's Gerazi Lunar laser ranging test or maybe even Stefan's Marinov "coupled shutters" experiment can be useful, especially if the accuracy would be increased.

Confirmation or refusing of these alternatives would be much helpful, because until now the main postulate of relativity is a bit questionable.

References

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